CHAPTER - II

GROWTH OF OUTPUT

An attempt is made in this chapter to measure output of the Indian Railways which consists of passenger and goods services. Since the output is not homogeneous, problems of aggregation have necessarily to be solved. Our objective is to measure growths of output and inputs to analyse productivity and technical change overtime. Instead of calculating capacity output, we have adopted the technique of evaluating technologically necessary capital which involves an adjustment of capital series -- see Chapter IV. We shall now briefly present some theoretical considerations regarding output. Later under Section B, we take up the empirical aspects.

SECTION 'A'

THEORETICAL CONSIDERATIONS:

Sales Value and Value Added Concepts:

2.2 There are two concepts of output -- sales value and value added, either as gross or net of depreciation. The value added concept has its genesis in national income measurement. In micro-studies both the concepts are relevant. But in such studies involving either time or spatial series where comparisons of output with different vertical structures are involved, the value added concept is more meaningful.[1]

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1. Prof. Harold Barger of Columbia University in a communication to the author in September 1973 expressed his preference for the sales value concept due to statistical difficulties with

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Since value added is synonymous with incomes generated, it should be equal to wages and surplus. Thus : Total Revenue - Interindustry Purchases = Gross Value added (GVA).

$\therefore$ GVA = Wages + Surplus (including capital consumption)

Thus where wages and surplus can be directly evaluated, the measurement of inter-industry purchases is cumbrous and redundant. The value added can be directly evaluated and can be expressed as a proportion of sales value. However, there are practical difficulties in constructing a deflator for purposes of evaluating value added output at constant prices. (These difficulties are discussed below in paras 2.25 to 2.27). We shall now consider aggregation of output.

Aggregation:

2.3 Aggregation comes up at different levels. Suppose, there are two kinds of output produced by an enterprise and

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respect to valuation of interindustry purchases at constant prices. However, Prof. D.Philip Locklin of University of Illinois in a personal communication in Oct. 1973 observed: 'I have never seen attempts to determine value added by railway system, but it may be useful, or even necessary to your study, depending on your objectives'. We consider that since we are taking capital and labour as the two factor inputs, it is essential to take into account value added concept as it denotes the two rewards for the factors we have analysed. Fortunately for us, since the proportion of value added in the sales value is stable, the results are not going to be very much different even when sales value concept is used. There is one difficulty regarding the sales value concept. A discussion of sales value with reference to capital and labour alone is unscientific. We have to necessarily take into account inter-industry purchases as an input since the sales value includes interindustry purchases. Thus when sales value concept is treated as the dependent variable, we cannot avoid measurement of inter-industry purchases at constant prices. We, therefore, feel that Prof. Barger's suggestion does not insulate the analysis from the difficulty of measuring interindustry purchases at constant prices. In a recent communication in June, 1974 Prof. Barger indicated his approval for the use of value added concept.

/para 2.2

these two may not be homogeneous in themselves. To cite an example, railway transport produces passenger and freight services. But the passenger service itself has various gradations and similarly the freight services. The level to which aggregation is carried implies a certain amount of arbitrariness and individual discretion.

2.4 However, heterogeneous commodities and services can be aggregated in money terms. But these aggregated quantities have to be adjusted for prices.

2.5 Aggregation of output in money terms at constant prices is generally deemed as physical output in empirical studies. But at best, it is only a relative output which we are measuring in terms of a base year. Sometimes, it is possible to measure output in physical terms by converting the components of the product-mix with the aid of some conversion ratios.[2] Resource utilisation can be used to arrive at conversion ratios. Theoretically, this methodology of taking costs for weighting the components of physical output is more sound, though for micro-studies such a procedure cannot be carried too far, since costs to one productive unit are the sale prices to another productive unit which again are composed of costs.

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2. We understand that in some airlines cost studies in United States, passenger KMs are converted into tonne KMs by using an estimated average weight of a passenger and his baggage. This information is given by D. Philip Locklin, Emeritus Professor of Economics, University of Illinois in a recent personal communication to the author.

Double Deflation:

2.6 Generally value added is calculated in current prices and adjusted with output price index which is not scientific. Such a procedure assumes that prices of inter-industry purchases and output have identical variations which is not reasonable to expect. Hence both sales value and inter-industry purchases have to be adjusted with different appropriate price indexes in constant prices of a base period. This method is called double deflation.[3]

Value Added Output:

2.7 Value added output refers to the true production assignable to the industry. 'Thus it is not the gross value of product; but it is the sum of returns to several factors of production viz., labour, capital and enterprise. This sum can also be obtained by subtracting from gross value of product of each industry, the value of materials, semi-fabricants, durable capital and services of other industries consumed during the process of production.[4] Net Value Added (NVA) refers to that part of output which remains after deducting not merely the inter-industry purchases but other appropriate deductions including depreciation charges representing the allowance for capital consumption.

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3. For detailed discussion see John W.Kendrick (Ed.,) Output-Input and Productivity Measurement, Studies in Income and Wealth, Vol.25, NBER, New York, 1961, pp.203-331; Simon Kuznets, Long-term Changes in the National Income of the USA since 1970, Kuznets (Ed), Income and Wealth Series II, 1952, p.93; R.C.Geary, 'The Concept of Net Volume of Output with special reference to Irish Data', Journal of Statistical Research Society (JSRS), New Series, 1944 and W.B.Reddaway 'Movements in the Real Product of the UK, JRSS, Series A, 1950.
4. Simon Kuznets, National Income: A Summary of Findings, New York, 1946, p.1.

The Census of Indian Manufactures (since 1959 called Annual Survey of Industries - ASI) also define value added in almost similar way.[5] GVA adjusted for prices of output is the usual evaluation at constant prices. However, net value added requires a measure of capital consumption i.e. depreciation.

Depreciation:

2.8 It is generally accepted that the true output should be net of depreciation. Both conceptually and in practice, depreciation is not amenable for correct measurement. Let us consider first the theoretical part. Depreciation depends on the value of capital which is composed of wages of dated labour and interest. A change in wage or interest rate i.e. a change in distribution of income affects the valuation of capital and therefore depreciation. The relationship between income distribution and the value of capital is one of the important strands of post-Keynesian economics.[6] The recent discussion on switching, for instance, Samuelson's Surrogate production function[7] is nothing but a problem connected with valuation of capital. Thus theoretically, the value of capital and therefore depreciation and income distribution are connected with each other.

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5. Tenth Census of Indian Manufactures, Government of India, Delhi, 1955, p. xiv and also other Annual Reports.
6. P. Sraffa, Production of Commodities by Means of Commodities, Cambridge University Press, Cambridge, 1963, Ch.XII; Joan Robinson, The Accumulation of Capital, Macmillan, London, 1958, p.417 and G. Mathur, Planning for Steady Growth, Basil Blackwell, Oxford, 1965, Ch.10.
7. J.E.Stiglitz (Ed), The Collected Scientific Papers of Samuelson, Oxford & IBH, Bombay, 1970, Vol.1, p.325 and P.Sraffa, op.cit., Ch. XII.

Joan Robinson in her theoretical works measures capital in terms of a composite index where capital in dated-labour time is divided by current wage bill -- Real Capital Ratio. But the concept of labour-time is itself influenced by notional interest rate. It is only under conditions of a steady growth with a given technology that there is any hope of measuring capital -- let alone the best method of measuring depreciation. Thus even conceptually measurement of capital is a problem that has not been solved adequately even in the latest post-Keynesian theoretical discussions.

2.9 Regarding empirical difficulties, there are no settled and generally accepted methods to compute either capital or depreciation. Dr. Barna discussed four methods to measure capital, two of which refer to micro-studies.[8] One of the later two methods refers to the estimation of capital as written down book value of assets. These values are reported at historic cost minus the accumulated depreciation at rates fixed by considering the estimated life of the assets. This method is of doubtful validity since under this method, unrealistic depreciation policies are not corrected. Further, the historic cost basis assumes stability in price level of equipment which is not true. However, the difficulty of prices can be solved to some extent. The other methods are the methods of replacement value of the entire capital assets and the cost of replacing the actual retirements of assets. However, unless

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8. T. Barna, 'On Measuring Capital', in the Theory of Capital, F.A.Lutz and D.C.Hague (Eds), Macmillan, London, 1961, pp.76-88.

there is a second-hand market and substitutes for the retiring assets are available, these methods may not be of much use. In a dynamic economy, technological changes constantly occur and hence it is difficult to get substitutes for the retiring assets.

2.10 The Census of Indian Manufactures calculates depreciation at rates allowed by the Income-Tax authorities which vary according to the type of industries and assets. The rates allowed by the Income-tax department are the maximum permissible but the depreciation actually provided in the balance sheets generally is higher in the boom and lower in the slack. Hence, the rate of depreciation allowed by the Income-tax department cannot be seriously considered for a rigorous analysis. Further, in underdeveloped economies, an asset is often used at approximately constant levels of output far beyond the technical life of the asset until it is discarded or sold for scrap.[9] Probably due to paucity of finances or equipment, an asset is used beyond its technical life. Consequently, the maintenance charges, consumption of fuel, etc. go up. Thus changes in inter-industry purchases (especially fuel and maintenance spares), partly at least, reflect depreciation charges. Therefore, the so-called GVA in developing countries is not so far removed from the NVA as it is commonly believed.[10]

2.11 The above discussion leads to the conclusion that even conceptually the problem of valuation of capital and therefore, depreciation has not been solved adequately even in theoretical

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9. George Rosen, Industrial Change in India, Asia Publishing House, Bombay, 1959, p.42.
10. A.Nagaraj, Nationalised Road Transport in Hyderabad State, unpublished Ph.D. thesis, Osmania University, 1967.

discussions not to speak of practical difficulties involved in its computation. Depreciation methods are mere conventions used to adjust balance sheets and do not have any foundation in the economic calculus.[11] In theoretical works, the problem of depreciation is usually solved through the concept of 'balanced age composition of capital'.[12] However, this balanced age composition does not have much relevance for empirical studies. In view of the theoretical and statistical difficulties involved in the computation of depreciation and also the last point -- 'the so called GVA in developing countries is not so far removed from NVA as it is commonly believed' -- (mentioned in para 2.10 above), we have preferred GVA to NVA.[13] Let us now present the methods adopted to measure the output of the Railways.

SECTION 'B'

EMPIRICAL ADJUSTMENTS.

2.12 Having decided to prefer GVA to NVA, we now discuss the problem of adjusting data to the theoretical variables discussed above. For calculating GVA, the traditional method is to calculate sales value (total revenue) and deduct inter-industry purchases out of the former. The Railways sales output consists mainly of services to carry persons and goods and also material goods like locomotives, carriages, wagons and other miscellaneous services such as catering, advertisement, communication, luggage

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11. F.A.Lutz, 'The Essentials of Capital Theory', in the Theory of Capital, op.cit., p.5.
12. G.Mathur, op. cit., Chapter IV, p.50.
13. Deakin and Seward prefer GVA to NVA in their Productivity Measurement of Transport Industry. See B.M.Deakin and T.Seward, Productivity in Transport, Cambridge University Press, London, 1969, pp. 19-20.

Table 2.1

GROSS EARNINGS OF PASSENGER AND FREIGHT SERVICES

(Rs.Crores)

	Passenger Service				Freight Service									
	Passenger		Other Coaching		Revenue Freight		Imputed Non-Revenue Freight	Other Goods		Total Passenger and Goods (6 =1+2+3+4+5)		Miscellaneous		Total Passenger and Goods including Miscellaneous (8 = 6+7)
	1		2		3		4	5		6		7		8	
1951-52	109.9	(37.7)	19.9	(6.8)	143.3	(52.5)	10.0	3.7	(1.3)	286.8	(98.3)	5.1	(1.7)	292	(100)
-53	100.4		18.2		143.2		12.7	3.2		277.7		5.1		282	
-54	100.0		18.0		144.8		14.2	2.8		279.8		5.2		285	
-55	102.6		19.2		156.0		15.1	3.1		296.0		6.0		302	
-56	107.7		20.9		177.4		15.5	3.1		324.6		6.3		332	
-57	116.3	(31.6)	21.1	(5.7)	200.6	(59.7)	19.1	3.4	(0.9)	360.5	(98.0)	7.5	(2.0)	368	(100)
-58	119.1		24.2		225.2		21.3	4.5		394.8		8.4		803	
-59	116.7		23.6		236.4		23.7	4.4		404.8		9.6		414	
-60	125.6		25.4		255.4		25.9	5.1		437.4		10.8		448	
-61	131.8		27.2		280.5		32.4	5.7		477.4		12.6		490	
-62	150.9	(28.0)	29.1	(5.4)	300.1	(62.8)	38.6	6.8	(1.3)	525.5	(97.5)	13.6	(2.5)	539	(100)
-63	169.2		32.5		342.7		45.3	6.9		596.6		16.7		613	
-64	185.2		34.1		386.4		51.0	8.9		665.6		17.5		683	
-65	199.3		34.7		398.4		52.2	11.5		696.1		20.4		716	
-66	219.2		39.4		452.4		53.3	13.1		777.4		22.8		800	
-67	229.3	(27.7)	39.0	(4.7)	467.9	(63.0)	54.0	13.8	(1.7)	804.0	(97.0)	24.8	(3.0)	829	(100)
-68	252.6		39.5		489.0		56.6	13.8		851.5		26.4		878	
-69	265.1		45.1		549.0		60.2	13.8		933.2		28.0		961	
-70	278.9		48.1		578.1		60.9	16.2		982.2		34.2		1016	
-71	295.5		62.1		600.7		63.1	17.6		1039.0		33.4		1072	
-72	320.1	(27.4)	69.4	(6.0)	655.7	(61.8)	65.2	19.6	(1.7)	1130.0	(96.8)	36.8	(3.2)	1167	(100)

Source: Supplements.

Notes : (1) Col.2 includes parcels, mail, luggage, etc. and Col.5 includes demurrage, wharfage,etc.

(2) Col.4 is computed by multiplying the Non-Revenue Tonne KMs (about 89 per cent of which is Coal - vide Appendix Table-2-A-1) with the average price charged to carry Coal to public.

(3) Figs. in Col.8 do not tally with the sum of Figs. in Cols.6 and 7 due to rounding off.

(4) Figs. in parentheses are percentages.

(5) Figs. in Col.3 in parentheses are the combined percentage share of Col.3 and Col.4.

and mail. Thus the output of the Railways is a product-mix consisting of both commodities and services of varied nature.

2.13 The Railways have been producing essentially capital commodities in their three productive units - vide para 1.15. In the present study, since these units produce capital items we have omitted them and restricted the study to passenger and freight services only. see para 3.2. On the same token, part of the output of some of the workshops, which is in the nature of material goods should have been excluded. However, maintenance repair (not capital-building) is their main job and hence they have been included.

2.14 Output can be measured either in money terms at constant prices or in physical magnitudes where the problem of prices do not arise. We shall presently discuss estimation of sales value in money terms. The Railways broadly classify their revenues under five heads viz. passenger services, other coaching, goods, other goods and miscellaneous. In computing output, we took into consideration the first four services only which account for about 97% of gross output vide table 2.1. The miscellaneous services like communications, catering, advertisement, are not easily amenable for appropriation into passenger and goods services. Besides their break-down data are not available. In view of this we omitted these services and hence the output computed by us has a slightly downward bias to the extent of about 3%. Since the same omission has been carried for every year, it is hoped that relative positions of magnitudes are not seriously affected.

Table. 2.2

IMPUTED PHYSICAL OUTPUT

Years	Passenger KMs (Billion)	% of other coaching in passenger Earnings	Imputed Passenger KMs (Billion)	Freight Tonne KMs (Billion)	% of 'Other goods' in Freight Earnings	Imputed Freight Tonne KMs (Billion)
	1	2	3	4	5	6
1951-52	62.8	18.1	74.2	47.4	2.4	48.5
-53	59.4	18.1	70.2	47.3	2.1	48.3
-54	59.7	18.0	70.5	48.1	1.7	49.0
-55	61.7	18.7	73.2	52.5	1.8	53.4
-56	62.4	19.4	74.5	59.6	1.6	60.5
-57	67.4	18.1	79.6	65.7	1.5	66.7
-58	69.2	20.3	83.3	74.6	1.8	75.9
-59	68.0	20.2	81.8	76.5	1.7	77.8
-60	73.8	20.2	88.7	82.0	1.8	83.5
-61	77.3	20.7	93.3	87.8	1.8	89.3
-62	81.9	19.3	97.7	91.2	2.0	93.0
-63	84.0	19.2	100.1	100.7	1.8	102.5
-64	88.6	18.4	104.9	106.8	2.0	109.0
-65	93.5	17.4	109.8	106.6	3.5	109.2
-66	96.3	18.0	113.6	116.9	2.3	120.0
-67	102.2	17.0	119.6	116.6	2.6	119.6
-68	107.2	15.6	123.9	118.9	2.5	121.8
-69	106.9	17.0	125.1	125.1	2.3	128.0
-70	113.4	17.2	132.9	128.3	2.5	131.6
-71	118.1	21.0	142.9	127.4	2.7	130.8
-72	125.3	21.7	152.5	133.3	2.7	136.9

Source: Supplements.

2.15 Apart from measuring sales value in terms of money, we can also measure in physical terms viz. passenger KMs, and freight tonne KMs.[14] In order to include 'other coaching services', which is composed of luggage, parcels, mail, etc., we adjusted the passenger KMs by the percentage share of 'other coaching services' in the 'passengers carried earnings'.[15] Similarly, the freight tonne KMs are adjusted by the percentage share of 'other goods services' (like demurrage, wharfage) in the freight earnings. Thus, the passenger KMs and the freight tonne KMs computed by us represent imputed passenger and freight output. The output computed also includes Non-Revenue Traffic, which arises on account of railways consumption of its own output.

2.16 Table 2.2 presents the imputed passenger and freight output. It is evident from the table that roughly the 'other coaching services' amount to a fifth while that of 'other goods services' account for about 2% in the passenger and goods earnings respectively. However, the basic problem of aggregation of physical output still remains.

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14. However, passenger and goods originating/ carried may be considered as units of measurement in the absence of sufficient data. Harold Barger used 'number of passengers carried'/ Passenger KMs as a measure of output along with freight tonne KMs due to scanty data. See Harold Barger, the Transportation Industries 1889-1946, NBER, New York, 1951, p.25. However, unless we know the lead i.e. the average distance a passenger/ a tonne of good is carried, such measures are near approximations, warranted by paucity of data.

15. Parcel services are identical with goods movement except that they are moved at fast speeds. Luggage and mail services are like quasi-goods services. There seems to be some logic to include them with the goods services. There is equally a strong case to convert them to passenger services, because they refer to passenger trains and the resource utilisation and rates are different from that of goods trains.

2.17 Apart from the revenue method - vide para 2.14, the following three other methods are used to calculate the output in terms of a single magnitude.

1. Conversion of passenger KMs and freight tonne KMs as so much of tonnes moved over space taking into account the weight of wagons, coaches and locomotives also, (see below para 2.31).

2. Conversionof freight tonne KMs. into passenger KMs using the resource utilisation (costs) as weights. Thus excluding the tare weight of rolling stock (see below 2.33).

3. A Composite unit based on the first and second methods i.e. taking the two types of outputs as per the first method and adding them giving weights based upon resource utilisation (see below 2.36).

2.18 Sometimes a composite index of output is constructed by a mere summation of passenger KMs and freight KMs. Such an aggregation is only a rough tool of analysis and not a very precise one.[16] However, if the ratios of the product-mix are

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16. (a) The Indian Railways use this method to construct an index of traffic units to express growth rates, capital output, output-labour ratios, in their annual review. See Review of the Performance of Indian Government Railways, Government of India, Ministry of Railways, New Delhi.

(b) Holland Hunter, Soviet Transportation Policy, Harvard University Press, Cambridge, 1957, p.362.

(c) S.J.Patel, 'Investment and Efficiency in Indian Railways', Indian Economic Review, Vol.4, No.1, Feb.1958.

(d) R.K.Saggar, 'Investment, Productivity and Deficits', Round Table, Vol. 2, No.10, April 8, 1973.

(e) C.D.Jones, 'The Performance of British Railways 1962-68', Journal of Transport Economics and Policy, Vol.4, No.2, May, 1970, pp. 163-164. Though he used such a method of aggregation, he observes that it is an unsatisfactory measure, since there is substantial difference between the revenues earned by the two services.

(f) D.L.Mumby, 'The Productivity of British Railways', Bulletin of the Oxford University Institute of Economics and Statistics, Vol. 24, No.1, Feb. 1962. He computed traffic units both

(foot note contd.)

stable overtime, the above method could be deemed as a rough and ready indicator. During the two decades under the present analysis, we find that the ratios of passenger KMs to freight tonne KMs are not stable - vide Appendix Table 2-A-2.

All the above four methods i.e. the three methods immediately mentioned above inpara 2.17 and the Revenue Method give us sales value but not GVA. We now discuss the method adopted to determine GVA.

Estimation of GVA:

2.19 The physical output as measured by the last three methods is not easily amenable to deductions of inter-industry purchases which consist of various heterogeneous goods and services. Consequently, they (inter-industry purchases) have to be measured in money terms only. Thus we made use of two units of measurement -- the output ir physical terms and the inter-industry purchases in money terms.

Since GVA = Sales output - Inter-industry purchases, and since GVA = Wages + Surplus,[17]

Inter-industry purchases = Gross output - (Wages + Surplus)

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weighted and unweighted to measure productivity. He observes that the 'unweighted traffic units' has great convenience but has little logic and economic meaning. However, in his analysis for the time period chosen, the simple traffic units do not grossly misrepresent the position but they gave biased position in the later years.

17. In a similar way, Barna derived value added to calculate Capital-Output Ratios in Manufacturing Industries in the U.K. See T.Barna, op. cit. p.82-83 and B.M.Deakin and T.Seward, op.cit.

2.20 We derived the value of inter-industry purchases by subtracting the wages and surplus from the gross earnings, for each year. The physical sales value output is then adjusted by an index denoting the share of inter-industry purchases in sales value. The details of computation of wages and surplus are discussed below:

Computation of wages and Profits:

2.21 The computation of the two broad components of the GVA viz., wages and profits, needs further discussion. These two terms are used to represent the respective shares of labour and capital employed in the enterprise. Wages include all monetary and non-monetary benefits accrued or deemed to have been accrued to the employees. They include salary, dearness allowance, other special allowances, overtime payments, passages, subsidised food, medical and welfare benefits, contributions to provident fund and accruable pensionary and gratuity benefits.

2.22 Profits are the residue which remain after meeting the working expenditure. They include dividend paid to the Government of India, depreciation allocated and amounts ploughed back to various reserve funds.

2.23 Passenger fares were taxed during 1961-62 to 1963-64 which was later abolished. However, since 1964-65 the Railways have been making payments to the Government, approximately at the then existing rates, in lieu of passenger fares tax. We have not treated this amount as transfer payments on the

assumption that essentially it represents dividend. In the absence of such payment, probably Government would have raised dividend payments.

2.24 The Railway statistics include pension and gratuity payments actually paid to the retiring employees under wage bill. Strictly such payments do not represent income attributable to the employees in the respective years. The pension and gratuity accruable in each year to the working employees should be treated as part of the wage bill. Hence the credits made to the pension and gratuity fund, where available, are added to the wage bill given in the Supplements and tha actually paid pension is subtracted. For the years 1951-52 to 1963-64 there was no pension fund. Hence the actual payments towards pension and gratuity paid to the retiring employees are assumed to represent the accruable pension and gratuity. The best way is to estimate the true liability of pension and gratuity payments for each year by working out a ratio on the basis of age composition of different categories of staff. But, for such an estimation, detailed data are needed which are not available. Hence, we have not attempted to estimate the true pension liability of the Railways. Regarding special contribution to gratuity, no corresponding reserve is created. These payments are made from Miscellaneous Expenses Account, the breakdown of which is not available. Hence, the actual payments made during each year are added to the wage bill. We have not included the Pension Fund pertaining to the Railway Board due

to unavailability of detailed data. Since it is a negligible item (amounting to less than 1% of general pension fund) and since the omission is carried in all the years, it is hoped the relative trends will not be vitiated.

Having discussed the details of computation of wages and profits, we now present the relevant data to compute GVA.

2.25 To determine the proportionof GVA in gross product (sales value output), either of the following two methods can be followed. First, deflating the gross product by output prices, and wages and surplus by wage rate and rate of return on capital. Second deflating gross product by output prices and inter-industry purchases by appropriate input prices. We have chosen the latter method since there is difficulty in determining rate of return on capital. Besides, the problem of valuation of capital also arises.

2.26 From the Railway statistics, it is not easily possible to compute inter-industry purchases. Hence, we determined the volume of inter-industry purchases by indirect method. By subtracting wages and surplus (GVA) from total revenue we computed the value of inter-industry purchases. The railway budget give an idea of the compositionof inter-industry purchases. We are able to classify about 80% of the total inputs vide Appendix Table 2-A-3. Fuel and Repairs and maintenance inputs account for the bulk of the inputs. The composite index has been computed by using shares of inputs as weights. Generally, many researchers use base year weights, but we have deviated

Table 2.3

GROSS VALUE ADDED - CONSTANT PRICES

(as per cent of output)

(Rs.Crores)

Years	Gross Earnings	Inter-Industry Purchases	G.V.A. (3 = 1-2)	Proportion of G.V.A. in Gross Earnings (%) (4 = 3 as % to 1
	(C O N S T A N T P R I C E S)			
	1	2	3	4
1951-52	292.0	80.0	212.0	72.6
-53	270.8	74.2	196.6	72.6
-54	272.9	76.9	196.0	71.8
-55	292.6	82.0	210.6	72.0
-56	317.7	83.2	234.5	73.8
-57	345.9	92.8	253.1	73.2
-58	377.0	102.1	274.9	72.9
-59	385.8	97.4	288.4	74.8
-60	408.8	107.7	301.1	73.7
-61	435.9	112.0	323.9	74.3
-62	459.1	116.9	342.2	74.5
-63	496.4	132.3	364.1	73.4
-64	525.0	135.0	390.0	74.3
-65	537.9	142.3	395.6	73.6
-66	579.3	156.7	422.6	73.0
-67	590.0	151.1	438.9	74.4
-68	604.3	156.3	448.0	74.1
-69	631.0	159.4	471.6	74.7
-70	660.6	171.8	488.8	74.0
-71	670.4	170.3	500.1	74.6
-72	709.4	178.3	531.1	74.9

Source: Supplements.

Notes: (1) Col.1 is calculated by deflating passenger revenue, freight revenue and imputed non-revenue traffic revenue by passenger fare, freight rate and coal prices indices respectively. The price indices are given in Appendix - Table 2-A-5.

(2) Col.2 is computed by deflating the inter-industry purchases by appropriate price indices vide Appendix - Table 2-A-4.

from this procedure, since base year weights do not allow GVA to reflect properly technical change.[18] Therefore, instead of using the base-year weights, every fifth year we calculated the shares and used them as weights. The whole sale price indices of inputs and output prices are given in Appendix Tables 2-A-4 and 2-A-5.

2.27 Since the total revenue includes imputed value of non-revenue traffic, when wages and surplus are deducted from the revenue, what we get is not interindustry purchases alone. In fact, they include imputed value of non-revenue traffic. Thus it has become necessary to treat the non-revenue traffic as if, it is some kind of inter-industry purchases. Superficially it might appear that it should have been better if non-revenue traffic is not included in the total revenue, but this would certainly lead to difficulties since input-output relations get vitiated. To avoid this greater difficulty, we have chosen the somewhat unusual procedure of treating non-revenue traffic as an inter-industry purchase. If we omit it, in inter-industry purchases, surplus would be artificially boosted up.

2.28 Table 2.3 presents gross revenue, inter-industry purchases and GVA at constant prices. The proportionof GVA has varied between 72% and 75%, 74% being a modal value. The proportion is lowest, in 1953-54 (71.8%) and highest in 1971-72 (74.9%). Thus roughly three-fourths of the gross product

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18. For details see, E.Denison, The Sources of Economic Growth in the United States and the Alternatives Before us, Committee for Economic Development, New York, 1962, p.140.

Table 2.4
G.V.A. AT 1951-52 PRICES (REVENUE METHOD)

Years	Passenger KMs (Billions)	Freight Tonne KMs (Billions)	Passenger Output (At constant prices, Rs. Crores)	Freight Output	Total Output	G.V.A. %	G.V.A. at constant Prices (Rs. Crores)	Index of Col.7
	1	2	3	4	5	6	7	8
1951-52	74.18	48.51	130	156	286	72.6	208	100.0
-53	70.19	48.26	123	155	278	72.6	202	97.2
-54	70.45	48.95	123	158	281	71.8	202	97.2
-55	73.19	53.42	128	172	300	72.0	216	104.0
-56	74.51	65.53	130	195	325	73.8	240	115.6
-57	79.60	66.70	139	215	354	73.2	259	124.8
-58	83.33	75.92	146	245	391	72.9	285	137.3
-59	81.75	77.77	143	250	393	74.8	294	141.6
-60	88.72	83.49	155	269	424	73.7	313	150.5
-61	93.89	89.33	164	288	452	74.3	336	161.8
-62	97.70	93.04	171	300	471	74.5	351	169.0
-63	100.1	102.5	175	330	505	73.4	371	178.6
-64	104.9	109.0	184	351	535	74.3	398	191.5
-65	109.8	109.2	192	352	544	73.6	400	192.9
-66	113.6	120.0	199	386	585	73.0	427	205.7
-67	119.5	119.6	209	385	594	74.4	442	212.9
-68	123.9	121.8	217	392	609	74.1	451	217.4
-69	125.1	128.0	219	412	631	74.7	471	227.1
-70	132.9	131.5	233	423	656	74.0	485	233.8
-71	142.9	130.8	250	421	671	74.6	501	241.1
-72	152.6	136.9	267	441	708	74.9	530	255.4

Source: Supplements.

Notes : 1. Cols.3 and 4 are computed by multiplying Cols.1 and 2 with their respective average fare and freight charges in 1951-52.

2. For details of computation of Cols.1 and 2 see Table 2.2

represents GVA or income generated within the enterprise.

GVA Revenue Method:

2.29 In the transport enterprises, passenger and freight revenue is deflated by the respective fare and freight indexes with reference to a base period to insulate from price changes. Harold Barger[19] R.K.Saggar[20] D.L.Munby[21] and Roy Choudhary[22] used such methods of aggregation to compute a composite index of output. The revenue method of calculating output with necessary adjustments to a certain degree, overcomes the problem of aggregation.

2.30 Table 2.4 presents GVA at constant prices of 1951-52. The passenger output has doubled while that of freight output increased by a little less than two times. On the whole the increase in GVA is about 155% or the growth is at an annual compounded rate of 5.3%.[23]

GVA - Physical Weights Method:

2.31 In this method we treated the entire moving train as the output. We aggregated the passenger and freight services in terms of physical weights viz., gross tonne KMs which include the weight of passenger, luggage carried, parcels, weight of

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19. Harold Barger, op.cit. p.25.
20. R.K.Saggar, 'Efficiency of Indian Railways', 1960-61 to 1969-70, Economic and Political Weekly, Vol.7, No.41, Oct.7, 1972.
21. D.L.Munby, op.cit.
22. Uma Datta Roy Choudhary, 'Production Function for Indian Railway System', Indian Economic Review, Vol.4 (New Series),No.2, October, 1971. She has aggregated the passenger and freight output by assigning weights to the two services on the basis of proportion of revenues in the base year.
23. Growth rates are computed by Least Squares Method, using exponential function, $Y = ab^x$

Table 2.5

G.V.A. In physical Weight

Years	Passenger Output (B I L L I O N Tonne	Freight Output KMS)	Total Output	G.V.A. $	G.V.A. (Billion Tonne KMs)	Index of Col.5
	1	2	3	4	5	6
1951-52	65.93	105.5	171.4	72.6	124.4	100.0
-53	66.61	107.0	173.6	72.6	126.0	101.3
-54	69.57	108.3	177.9	71.8	127.7	102.7
-55	72.36	116.6	189.0	72.0	136.1	109.4
-56	74.45	130.1	204.6	73.0	151.0	121.4
-57	77.71	142.4	220.1	73.2	161.1	129.5
-58	82.90	157.7	240.6	72.9	175.4	141.0
-59	85.29	162.6	247.9	74.8	185.4	149.0
-60	89.21	175.1	264.3	73.7	194.8	156.6
-61	92.55	186.4	279.0	74.3	207.3	166.6
-62	96.12	193.3	289.4	74.6	215.6	173.2
-63	99.37	210.1	309.5	73.4	227.2	182.5
-64	102.1	222.6	324.6	74.3	241.2	193.9
-65	107.2	223.1	331.0	73.6	243.6	195.8
-66	113.1	242.3	356.4	73.0	259.4	208.5
-67	116.5	240.6	357.1	74.4	265.7	213.6
-68	118.2	247.4	365.6	74.1	270.9	217.8
-69	120.1	260.2	380.3	74.7	284.1	228.4
-70	122.6	268.8	391.4	74.0	289.6	232.8
-71	127.1	263.2	390.3	74.6	291.2	234.1
-72	131.7	272.1	403.8	74.9	302.5	243.2

Source: Supplements.

Note:- Physical weight includes net weight of passengers, goods, tareweight of wagons, vehicles and locomotives.

freight, tare weights of rolling stock. R.K.Koshal[24] used this method to compute output. To calculate tonne KMs of passengers carried, the Railway authorities assign 0.091, 0.081 and 0.071 tonne to First (including Air-conditioned class), Second and Third Class Passengers respectively.[25] These assigned weights include free luggage allowed to passengers. Thus approximately 12 passengers are treated as equivalent to a tonne of freight excluding the tare weights of trains. However, treating 12 passengers as equivalent to a tonne of freight, has little economic significance since the passenger services need provision of more space and other amenities whereas the freight service does not require such extra facilities relatively. Further, for hauling same tonnage of different goods like steel, timber and petroleum products, the resources used are different. Hence, apart from physical weights of passengers and freight, we took into account the tare weights of wagons, carriages and locomotives.

2.32 Table 2.5 gives the gross tonne KMs of passenger and freight services and the GVA. The GVA has increased from 124 to 303 billion tonne KMs or an increase of about 145% during the two decades. This means, the GVA has registered an annual compounded growth rate of 4.9%.

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24. R.K.Koshal, 'Statistical Cost Analysis', Ph.D. Dissertation (Unpublished), University of Rochester, 1967.

25. Government of India, Ministry of Railways, 'Manuel of Statistical Instructions' Vol.I, 1959, p.61.

GVA - Cost Method:

2.33 We can also aggregate the output using costs as weights.[26] We have used this method to calculate ratios of passenger KMs to freight tonne KMs per unit of expenditure. These ratios are used to convert the freight tonne KMs into passenger KMs.

2.34 The Railways apportion the total working expenditure, including and excluding notional interest on capital invested, between passenger and freight services on reasonable scientific criteria. Where the costs are in the nature of joint expenditure on the two services appropriate criteria are followed. For instance, to apportion the expenses incurred on track and its maintenance, not only the respective gross tonne KMs of passengers and freight services are considered but also the speeds of trains are given due weightage. We have taken apportioned total expenses, excluding interest, gauge-wise. Railway authorities calculate interest rate on capital equal to the dividend rate which is not uniform since the dividend rate is subject to policy matter. Further, to determine reasonable rate of interest, the usual problems of capital valuation arise as referred to above (paras 2.9 and 2.10). Since the dividend rate is uniform on all types of capital employed in passenger and freight services, the ratio of cost is not affected, even if we exclude the interest charges. Hence, we

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26. Kaplan aggregated the passenger KMs and freight tonne KMs with the weights of rouble operating costs of a base year per passenger KM and tonne KM respectively. N.P. Kaplan, 'The Growth of output and Inputs in Soviet Transport and Communications, American Economic Review: Vol. 57, No.5, December 1967.

Table 2.6

G.V.A. - COST METHOD

Years	Passenger and Freight Output (Billion Passenger KMs)				G.V.A. %	G.V.A. (Billion Passenger KMs)	Index of Col.6
	B.G.	M.G.	N.G.	Total			
	1	2	3	4	5	6	7
1951-52	121.3	47.0	1.9	170.2	72.6	123.5	100.0
-53	118.6	47.6	1.7	166.9	72.6	121.2	98.1
-54	119.0	47.9	1.9	168.8	71.8	121.1	98.1
-55	127.2	50.4	2.3	180.1	72.0	129.6	104.9
-56	139.4	56.2	2.4	197.0	73.8	145.4	117.7
-57	150.5	61.0	2.3	213.8	73.2	156.4	126.6
-58	167.2	66.7	2.4	236.3	72.9	172.3	139.4
-59	168.4	67.5	2.4	238.3	74.6	178.2	144.2
-60	182.2	72.3	2.4	256.9	73.7	189.3	153.2
-61	194.5	77.2	2.6	274.3	74.3	203.8	165.0
-62	201.9	82.4	2.6	286.9	74.5	213.7	173.0
-63	218.1	87.1	2.5	307.7	73.4	225.9	182.8
-64	220.2	93.4	2.6	326.2	74.3	242.4	196.2
-65	233.4	96.2	2.7	332.3	73.6	244.6	198.0
-66	261.8	103.4	2.7	367.9	73.0	261.3	211.5
-67	255.9	10.3	2.6	361.9	74.4	269.3	218.0
-68	264.3	102.7	2.7	369.7	74.1	274.0	221.8
-69	274.2	107.2	2.8	384.2	74.7	287.0	232.3
-70	284.1	112.4	2.8	399.3	74.0	295.5	239.2
-71	290.3	115.0	2.7	408.4	74.6	304.7	246.6
-72	307.5	119.5	2.8	429.8	74.9	321.9	260.6

Source: Supplements.

Note : Freight tonne KMs are converted into passenger KMs with the ratio of unit cost of passenger KMs to freight tonne KMs, gauge-wise, in 1951-52.

preferred the concept of total expenditure excluding interest. The cost ratio in 1951-52 between passenger KMs and freight tonne KMs is about 1.7, 3.6 and 3.4 in Broad Gauge (BG), Metre Gauge (MG) and Narrow Gauge(NG) respectively. The following example illustrates the point. Suppose 80 passenger KMs and 180 freight tonne KMs are produced at a cost of Rs. 40 and Rs.60 respectively.

	Passenger 80 Passenger KMs.	Freight 180 Tonne KMs.
Total cost	Rs. 40/-	Rs. 60/-
Production per unit of expenditure.	80/40 = 2	180/60 = 3

∴ Passenger KM : Tonne KM As 2:3

or Passenger KM : Tonne KM As 2/3:1

Aggregate output = 180 x 2/3 + 80 = 200 passenger KMs.

Thus we have converted freight tonne KMs into passenger KMs on the basis of the aforesaid cost ratios for each type of gauge. The combined output (GVA) of passenger and freight services in terms of passenger KMs is given in Table 2.6.

2.35 It is evident from the table 2.6 that the GVA has grown from 124 to 322 billion passenger KMs or an increase of 161% during the two decades. This means that the GVA has increased at an annual compound rate of 5.3%.

GVA - Composite Unit Method:

2.36 An alternative method of calculation of composite

Table. 2.7

G.V.A. — COMPOSITE UNIT METHOD

Years	Passenger and Freight Output (Billion Tonne KMs)				G.V.A. %	G.V.A. (Billion Tonne KMs)	Index of Col.6
	B.G.	M.G.	N.G	Total			
	1	2	3	4	5	6	7
1951-52	122.8	30.0	1.2	154.0	72.6	111.8	100.0
-53	123.5	31.3	1.3	156.1	72.6	113.3	101.4
-54	126.4	32.3	1.4	160.1	71.8	115.0	102.8
-55	134.4	33.7	1.7	169.8	72.0	122.3	109.4
-56	144.4	37.2	1.7	183.3	73.8	135.3	121.0
-57	154.9	40.3	1.7	196.9	73.2	144.1	128.9
-58	167.7	45.6	1.7	215.0	72.9	156.7	140.2
-59	172.4	47.4	1.8	221.6	74.8	165.7	148.2
-60	183.4	50.7	1.8	235.9	73.7	173.8	155.5
-61	192.6	54.3	1.8	248.7	74.3	184.8	165.3
-62	199.9	56.6	1.8	258.3	74.5	192.4	172.4
-63	214.5	59.2	1.8	275.5	73.4	202.3	180.9
-64	224.4	62.6	1.9	288.8	74.3	214.5	191.9
-65	228.9	64.4	1.9	295.2	73.6	217.3	194.3
-66	246.1	68.2	2.0	316.3	73.0	230.9	206.5
-67	248.2	67.8	2.0	318.0	74.4	236.6	211.6
-68	255.3	68.0	2.0	325.3	74.1	240.8	215.5
-69	265.4	70.5	2.0	337.9	74.7	252.4	225.8
-70	272.8	72.7	2.0	347.5	74.0	257.2	230.0
-71	272.2	73.3	1.9	347.4	74.6	259.2	231.8
-72	282.8	74.6	1.9	359.3	74.9	269.1	240.7

Source: Supplements

Note : Cols. 1, 2 and 3 are calculated by applying the ratio of unit cost of passenger tonne KMs to freight tonne KMs, gauge-wise, in 1951-52.

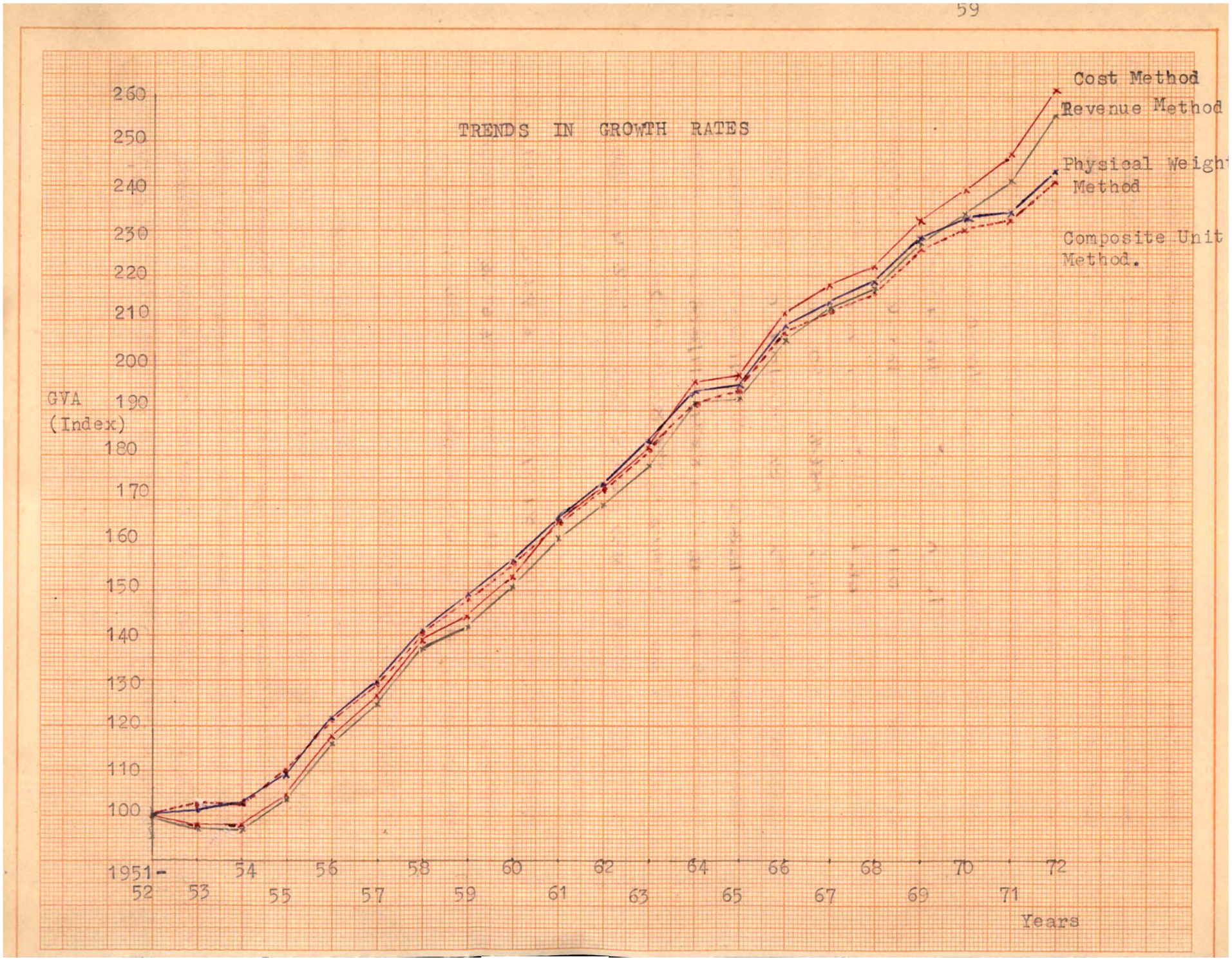
Table .2.8

G.V.A. - COMPOSITE UNIT METHOD -
INDICES OF PASSENGER, FREIGHT AND
TOTAL SERVICES

Years	Passenger	Freight	Total
	1	2	3
1951-52	100.0	100.0	100.0
-53	101.1	101.6	101.4
-54	104.4	101.6	102.8
-55	108.9	109.7	109.4
-56	114.8	125.6	121.0
-57	118.9	136.4	128.9
-58	126.3	150.6	140.2
-59	133.3	159.3	148.2
-60	137.4	169.0	155.5
-61	143.8	181.5	165.3
-62	149.7	188.9	172.4
-63	152.5	202.3	180.9
-64	158.6	216.8	191.9
-65	166.0	215.6	194.3
-66	172.5	231.9	206.5
-67	181.1	234.5	211.6
-68	183.0	239.9	215.5
-69	187.5	254.4	225.8
-70	194.7	260.3	230.0
-71	198.2	257.0	231.8
-72	206.1	266.6	240.7

Sources: (1) Col.3 is as per Col.7 of Table 2.7

(2) Cols.1 and 2 are based on G.V.A. of Passenger and Freight services measured in terms of composite unit method.


TRENDS IN GROWTH RATES
Cost Method
Revenue Method
Physical Weight Method
Composite Unit Method.
GVA (Index)
260
250
240
230
220
210
200
190
180
170
160
150
140
130
120
110
100
1951-52
53
54
55
56
57
58
59
60
61
62
63
64
65
66
67
68
69
70
71
72
Years

output is a combination of the aforesaid second and third methods. The gross tonne KMs of the passenger and freight services (GVA in physical weight) are weighted by the ratio of passenger tonne KMs to freight tonne KMs per unit of expenditure. Tables 2.7 and 2.8 present GVA in tonne KMs and their indices computed by using costs as weights. We find that in 1951-52, the cost of producing approximately 0.81, 0.98 and 0.83 passenger tonne KM is equal to 1 freight tonne KM. in BG, MG and NG respectively. By using these ratios, we have weighted the output of the two services and computed the output. The GVA has increased from 112 to 269 billion tonne KMs or increased by 141% in the two decades. This means, it has grown at an annual compound rate of 4.6%. However, the two components of the output -- freight and passenger services -- have grown at 5.5% and 3.9% per annum respectively.

2.37 Having discussed the measurement of GVA by various methods, we now discuss the relative merits of these methods to find out the most appropriate and meaningful measure.

A. Comparison of the Methods:

2.38 The graph on the overleaf gives in the growth of GVA. The annual growth rates of GVA, measured with the aid of the 4 methods discussed above, are almost similar. Lowest growth rate is witnessed in the fourth method (Composite-Unit 4.6%) while it is highest in the first and third method (Revenue and Cost Method 5.3%). At best the revenue method of aggregation

at constant prices of a base year, gives only relative outputs. Besides, the relative prices charged for goods and passenger traffic need not reflect the true costs since the fares and freights are subject to policy matter. The physical output measured in terms of gross tonne KMs seems to be appropriate. However, a substantial proportion of the gross tonne KMs (about 90% and 50% of passenger and freight output respectively vide Appendix Table 2-A-6) is accounted for by the tare weight of carriages, wagons and locomotives. Thus it conceals the true output sold in the market. Further, it merely considers the physical weights as output and does not consider the relative costs involved in the production of the two services. Passenger service needs extra costs in the nature of providing more space, catering, waiting halls, accommodation etc. These are taken into consideration in the third and fourth methods. However, the third method (Cost Method) partially takes into account the resource utilisation and the physical output. Hence an appropriate method of aggregation of output should invariably give due weightage to the physical output in terms of gross tonne KMs and the relative costs involved. This was attempted in the fourth method (Composite Unit). We have a preference for the fourth method, which we deem as more scientific. In any case, whatever method we adopt the results are not going to be very much different.

2.39 Having measured the output and its growth over years, it is interesting to make a very brief comparative study with the growth of Indian economy as a whole.

2.40 A comparison of the growth rates of the Railways output with the growth rates of the Indian economy is useful to find in a broad sense whether the Railways are keeping pace with the march of the nation. Table 2.9 presents these comparisons.

Table 2.9

GROWTH OF THE RAILWAYS VIS-A-VIS INDIAN ECONOMY

(1950-51 to 1971-72)

Annual rate of growth (%) of						
Passenger Service.	Population.	Freight Service	Agricultural production.	Industrial production.	Passenger and freight services.	Real National Income.
3.9	2.1	5.5	3.1	6.6	4.6	3.6

SOURCES: 1. Growth Rates of the Railways are computed from Table 2.8.

2. Growth Rates of population, agricultural, industrial production and Real National Income are taken from 'Bank of India Bulletin', Vol.IV, No.6, June,1972, Bombay, page 89.

It is evident from the table that the passenger service has grown at a faster rate (3.9%) than the population growth (2.1%). The growth rate of freight service 5.5% is in tune with the growth of agricultural and industrial production (3.1% and 6.6%). Thus on the whole, the overall growth rate of the Railways (4.6%) is slightly greater than the rate growth of Real National Income (3.6%).

A P P E N D I X

(Chapter-II)

Appendix Table.2-A-1

NON-REVENUE AND REVENUE GOODS TRAFFIC

(Tonne M.s - Crores)

Y.E. MS	NON-REVENUE GOODS TRAFFIC						Total Revenue Traffic		Total Revenue and Non-revenue Traffic (5 = 3 + 4)	
	Coal		Other stores		Total (3 = 1 + 2)					
	1		2		3		4		5	
1951-52	N.A.		N.A.		N.A.		N.A.		4737	
-53	618	(87.6)	87	(12.4)	705	(100) (14.9)	4034	(85.1)	4787	(100)
-54	682		96		778		4036		4813	
-55	749		108		857		4411		5247	
-56	813		101		914		5049		5963	
-57	893	(88.4)	106	(10.6)	1006	(100) (15.3)	5566	(84.7)	6571	(100)
-58	999		149		1148		6310		7458	
-59	1019		164		1183		6464		7647	
-60	1108		187		1296		6905		8201	
-61	1382		160		1542		7234		8775	
-62	1429	(90.1)	157	(9.9)	1587	(100) (17.4)	7535	(82.6)	9122	(100)
-63	1564		191		1755		8314		10069	
-64	1696		226		1922		8862		10824	
-65	1548		234		1782		8875		10657	
-66	1558		240		1798		9598		11694	
-67	1604	(88.6)	148	(11.4)	1732	(100) (14.9)	9928	(85.1)	11661	(100)
-68	1591		183		1774		10112		11886	
-69	1529		172		1701		10813		12514	
-70	1470		172		1642		11182		12825	
-71	1433		131		1564		11072		12736	
-72	1501	(91.7)	136	(8.3)	1637	(100) (12.2)	11690	(87.7)	13327	(100)

Source: Supplements.

Notes: (1) Figures in parentheses represent percentages.

(2) N.A. = Not Available.

Appendix Table.2-A-2

COMPOSITE TRAFFIC UNITS

(Crores)

Years	Passenger KMs		Freight Tonne KMs		Traffic Units (3 = 1+2)	
	1		2		3	
1951-52	6281	(57)	4737	(43)	11018	(100)
-53	5943		4727		10170	
-54	5970		4813		10783	
-55	6166		5247		11413	
-56	6240		5958		12198	
-57	6740	(51)	6571	(49)	13313	(100)
-58	6927		7548		14475	
-59	6801		7647		14448	
-60	7381		8201		15582	
-61	7779		8775		16554	
-62	8189	(47.3)	9122	(52.7)	17311	(100)
-63	8399		10069		18468	
-64	8859		10684		19543	
-65	9349		10657		20006	
-66	9629		11694		21323	
-67	10215	(46.7)	11661	(53.3)	21876	(100)
-68	10716		11886		22602	
-69	10694		12514		23208	
-70	11338		12825		24163	
-71	11812		12736		24548	
-72	12533	(48.5)	13327	(51.5)	25860	(100)

Source: Supplements.

Note : Figures in parentheses represent percentages.

Appendix Table.2-A-3

COMPOSITION OF INTER-INDUSTRY PURCHASES

(Rs.Crores)

Years	Repairs and Maintenance	Coal	Mineral Oils	Electricity	Stores and Clothing	Printing and Stationery	Food, Beverages etc.	Total Cols. 1 to 7	Non-Revenue Traffic Imputed Expenses	Total Classified inputs (10=8+9)	Total Inter-Industry Purchases(including Col.9.	% of classified inputs (Col.10 as % to Col. 11).
	1	2	3	4	5	6	7	8	9	10	11	12
1951-52	23.3	29.0	0.78	1.95	3.35	0.70	-	59.03	10.0	69.0	80.0	86.3
-53	23.9	20.8	0.73	1.74	3.31	0.71	-	51.27	12.7	64.0	80.9	79.1
-54	25.4	22.4	0.74	2.00	3.59	0.85	-	54.98	14.2	69.0	83.1	83.0
-55	27.0	21.5	0.67	1.07	1.59	0.47	-	52.28	15.1	67.4	88.3	76.3
-56	29.3	22.0	0.47	1.26	2.03	0.53	0.23	55.80	15.5	71.3	89.1	80.0
-57	32.1	25.6	0.40	1.27	1.91	0.55	1.78	63.61	19.1	82.7	110.3	75.0
-58	24.8	45.6	0.56	3.35	3.89	0.92	1.27	80.36	21.8	102.2	129.4	78.9
-59	20.6	45.7	2.15	3.48	4.72	0.88	1.41	80.76	23.7	104.5	128.2	81.5
-60	18.5	51.0	4.36	4.27	4.44	1.02	1.64	85.18	25.9	111.1	143.4	77.5
-61	20.0	54.8	5.29	4.73	4.02	1.04	2.04	91.96	32.4	124.4	156.1	79.7
-62	15.2	60.2	4.66	5.59	3.81	0.90	2.33	92.71	38.6	131.3	164.8	79.7
-63	22.0	62.6	7.56	7.03	4.14	0.95	2.49	106.8	45.3	152.1	194.6	78.2
-64	23.8	65.1	16.32	8.28	5.83	1.17	2.74	123.2	51.0	174.2	215.4	80.9
-65	23.6	68.2	22.1	10.4	5.14	1.34	3.27	138.0	52.2	190.0	235.4	80.3
-66	33.5	64.5	28.3	12.6	6.05	1.53	3.65	155.1	53.3	208.4	267.8	77.8
-67	39.2	65.7	35.3	14.0	6.16	1.35	4.17	165.9	54.0	219.9	274.0	80.3
-68	44.4	74.6	42.0	16.7	6.73	1.27	4.35	190.1	56.6	246.7	306.6	80.5
-69	51.6	77.8	48.1	19.0	7.15	1.30	4.61	209.5	60.2	269.7	332.6	81.1
-70	52.9	81.6	55.3	20.6	7.38	1.46	4.84	224.6	60.9	285.5	358.8	79.6
-71	60.2	74.4	57.6	21.6	8.00	1.62	5.27	228.7	63.1	291.8	370.2	79.0
-72	63.0	74.7	64.7	24.2	8.98	1.75	5.79	248.1	65.2	313.3	406.4	77.1

Sources: (1) Cols. 1 to 7 are computed from Railways Budgets - Demands for Grants, Ministry of Railways.

(2) Col. 9 is computed from Supplements.

Appendix Table.2-A-4

WHOLESALE PRICE INDICES OF INPUTS

Years	WHOLESALE PRICES OF							Composite Index of Inputs	Combined Index with base 1951-52=100
	Machinery Transport Equipment	Coal	Mineral Oils	Textiles	Electricity	Stationery and Paper Products	Food Articles		
	(1952 - 1953 = 100)								
	1	2	3	4	5	6	7	8	9
1951-52	86.8	100.0	96.0	82.0	100.0	100.0	83.8	93.5	100.0
-53	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	107.2
-54	98.0	100.0	99.3	99.7	99.9	81.9	106.7	98.8	105.9
-55	96.8	100.0	99.2	104.2	99.3	84.3	94.6	98.3	105.4
-56	97.4	100.7	94.8	101.6	98.3	98.2	86.6	98.2	103.9
-57	98.9	115.9	97.3	107.5	102.8	97.8	102.3	109.5	117.4
-58	101.7	127.6	106.8	107.3	108.9	109.0	106.5	118.3	126.9
-59	103.9	133.3	107.8	103.3	111.4	115.7	115.2	122.5	131.3
-60	106.5	134.6	108.4	107.8	114.0	113.8	119.0	124.2	133.1
-61	111.9	140.5	109.2	125.8	119.3	108.1	120.0	129.9	139.2
-62	114.5	141.6	111.3	125.5	123.0	108.1	120.1	126.5	135.6
-63	117.9	151.4	112.7	126.1	118.0	110.6	126.1	131.5	140.9
-64	124.2	161.7	134.2	127.7	128.9	112.6	136.8	142.5	152.7
-65	128.0	168.7	134.3	132.4	140.4	110.8	159.9	147.9	158.5
-66	135.9	176.0	139.0	143.9	137.9	106.8	168.8	154.2	165.3
-67	149.8	186.1	146.4	153.1	137.9	106.8	199.9	164.0	175.8
-68	155.0	220.1	155.3	151.6	194.2	106.8	242.2	179.8	192.7
-69	157.6	243.6	159.7	159.9	208.7	120.5	231.5	189.2	203.4
-70	168.7	235.1	167.1	173.1	177.0	129.9	236.4	188.8	202.4
-71	177.6	237.8	175.1	128.8	184.7	132.1	244.9	197.1	211.3
-72	190.8	242.0	190.9	202.3	189.4	140.3	252.6	207.1	222.0

Source: Cols.1 to 7 are supplied on request by the Economic Adviser, Ministry of Industrial Production, Government of India.

Notes : (1) Col.8 refers to composite index of inter-industry purchases excluding Non-Revenue Traffic.
(2) Machinery Transport Equipment price indices are used to deflate Repairs and Maintenance costs, on the assumption that the prices of inputs of Repairs and Maintenance cost move in close relation with the prices of Machinery Transport Equipment.
(3) Stores and clothing inputs are deflated by Textile prices.
(4) Printing and Stationery charges are deflated by stationery and paper products prices.
(5) Food, Beverages, etc. are deflated by Food articles prices.

Appendix Table 2-A-5

INDICES OF PRICES OF OUTPUT AND INPUTS (1951-52=100)

Years	Passenger Fares Index	Goods Freight Index	Non-Revenue Traffi Freight Index	Composite Index of Inter-Industry Purchases	Compe-site Index of output prices
	1	2	3	4	5
1951-52	100.0	100.0	100.0	100.0	100.0
-53	96.6	110.9	120.0	107.2	104.9
-54	95.4	111.8	120.0	105.9	104.4
-55	94.9	109.3	120.0	105.4	103.2
-56	98.3	108.6	113.3	105.9	104.5
-57	98.3	111.8	126.7	117.4	105.4
-58	98.3	112.7	126.7	126.8	106.9
-59	97.7	113.7	133.3	131.3	107.0
-60	97.7	115.2	133.3	133.1	109.6
-61	97.7	120.2	140.0	139.2	112.4
-62	105.7	123.6	162.0	135.6	117.4
-63	114.9	128.0	172.0	140.9	123.5
-64	119.4	135.4	186.7	152.7	130.1
-65	120.0	139.5	196.3	153.5	133.1
-66	130.3	141.9	198.0	165.3	136.1
-67	128.8	146.3	208.0	175.8	140.5
-68	134.9	150.6	218.7	192.7	145.2
-69	141.7	157.8	236.0	203.4	152.3
-70	140.6	160.6	247.3	202.4	155.8
-71	142.9	168.6	252.7	211.3	159.9
-72	145.7	174.2	263.3	222.0	164.5

Source: (1) Cols.1 to 3 and 5 from Supplements.
(2) Col.4 from Appendix Table 2-A-4, Col.9.

Notes: (1) Passenger and Goods price indices are based on average rate charged per passenger KM and tonne KM respectively.

(2) The index in Col.3 is based on the price charged to carry coal - vide Table 2.1, Col.4. Relatively, freight rates of coal increased steeply. Hence, Col.3 trend is not in tune with Col.2.

(3) Col.5 is the weighted average of fares and freights —the weights being proportion of passenger and goods earnings.

Appendix Table.2-A- 6

AVERAGE LOAD OF A TRAIN

(Tonnes)

Years	Goods Train			Passenger Train			
	Net Weight	Gross Weight	Col.3 as % to Col.2	Adjusted Average number of Passengers carried per Train	Weight of Passengers carried per Train	Gross Weight of Train	Col.5 as % to Col.6
	1	2	3	4	5	6	7
1951-52	247	559	44.2	371	29.7	376	7.9
-53	244	560	43.5	371	29.7	376	7.9
-54	256	578	44.4	371	29.7	376	7.9
-55	264	595	44.4	372	29.8	376	7.9
-56	281	621	45.2	362	29.0	383	7.6
-57	295	644	45.8	377	30.2	390	7.7
-58	317	675	47.0	379	30.3	409	7.4
-59	319	689	46.3	366	29.3	417	7.0
-60	320	706	46.3	388	31.0	432	7.2
-61	340	729	46.6	401	32.1	444	7.2
-62	346	736	46.9	409	32.7	454	7.3
-63	363	759	47.8	409	32.7	459	7.1
-64	362	772	47.7	422	33.8	465	7.3
-65	367	773	47.5	430	34.4	476	7.2
-66	385	797	48.1	424	33.9	477	7.1
-67	387	804	48.1	440	35.2	480	7.3
-68	382	803	47.6	463	37.0	482	7.7
-69	393	829	47.4	448	35.8	489	7.1
-70	389	817	47.6	461	36.9	494	7.6
-71	400	827	48.4	482	38.6	507	7.6
-72	409	839	48.7	503	40.2	515	7.8

Source: Supplements

Notes: (1) Data for the years 1951-65 relate to steam Traction and for later years the average of All Traction.

(2) In the case of goods train, figures represent average of B.G, M.G., and N.G., while for passenger train average of B.G. and M.G. only.

(3) The actual average number of passengers carried per train are adjusted to include other coaching like parcels, mail, etc.

(4) The Weight of a passenger is treated as equivalent to 0.08 tonne including free luggage allowed to a passenger - vide para 3.31.