

FINANCIAL ANALYSIS OF URBAN PUBLIC PASSENGER TRANSPORTATION SYSTEM :
A CASE STUDY OF DTC

M. S. SAHOO

DEPUTY DIRECTOR, MINISTRY OF SURFACE TRANSPORT

ABSTRACT

The State Road Transport Undertakings on their own are not able to generate enough resources to support their existing level of activity and finance further growth. The support in the form of capital contribution is not forthcoming from the Government because of overall resource crunch. The consequence is inadequacy of public transport and unprecedented growth of personalised vehicles which enhances the cost of life. This paper uses standard techniques of financial management to present a realistic picture of the working of urban public transportation system on the basis of a case study.

INTRODUCTION

Urban transportation is assuming alarming proportion because of phenomenal growth of personalised vehicles. The personalised vehicles in Delhi, for example, have been growing at an annual compound growth rate of 13.2 percent during the decade 1981-91. Two wheelers only constituted 67 percent of the total registered motor vehicles in 1991. The two wheelers alongwith other personalised modes of conveyance like cars, though constitute a very large proportion of vehicle population, carry a relatively small proportion of passengers. The cost of transportation per unit of transport by personalised modes is significantly higher. Further many of the economic costs like degradation of environment, depletion of non renewable natural resources, congestion, accident etc. are borne by non users of transport. This enhances the cost of life.

Such phenomenal growth of personalised vehicles is caused by exponential increase in population, rapidly accelerating pace of economic activities and gross inadequacy of public transportation system. The Delhi Transport Corporation (DTC) on its own, for example, is not in a position to generate surplus to finance its growth and meet increasing demand for transport.

The State Transport Undertakings (STUs) including DTC are making concerted efforts to provide cost effective and efficient transportation services under financial, technical, infrastructural, manpower and political constraints without having autonomy in real sense of the term. Financial constraints are costs and revenue. Cost, that is, wages, prices of tyre, oil, chassis, spare parts and land for depots / workshops are exogenously determined. Revenue comes mainly from fares which are decided by the Government. Technological constraints include overaged buses, poor maintenance facilities. Regarding infrastructural constraints, depot capacity is limited. These STUs are under obligation to operate on uneconomic routes and provide concessional travel facility to various segments of society. Under these constraints, the STUs and DTC in particular are facing serious problem of resource crunch which is causing decay in their growth and deregulation of transport system and increase in the number of personalised vehicles. And because of overall resource crunch, the usual support from Governments are not forthcoming. As a result the growth of STUs are being restricted and increasing demand for transport is sought to be catered by privately operated buses.

What ails the public transportation transport system ? Is it their real inherent inefficiency or the conventional accounting which paints such a gloomy picture ? This paper attempts to present a realistic financial analysis of public transportation system on the basis of a case study of DTC.

OBJECTIVES

The objectives of this paper are to (a) analyse cost and revenue, (b) ascertain impact of factor prices on cost, (c) study comparative performance of metropolitan STUs, (d) work out break even levels of fare, vehicle utilisation and load factor, (e) analyse capital structure, profitability and asset

management and (f) estimate loss to DTC on account of concessional travel facility to students.

METHODOLOGY

The methodology adopted for analysis of the aforementioned parameters is specified as under :

i. Cost and revenue have been analysed with the help of the following parameters :

a. Operating Profit = Total revenue net of passenger tax minus operating cost, where operating cost is the sum of all expenses except interest.

b. Net profit = Total revenue net of passenger tax minus total cost.

c. Cost / Revenue / Profits per bus km is obtained by

$$\frac{\text{Total Cost} / \text{Total Revenue} / \text{Total Profit}}{\text{Total revenue kms during a year}}$$

d. Cost / Revenue / Profit per bus per day is obtained by

$$\frac{\text{Total Cost} / \text{Total Revenue} / \text{Total Profit}}{\text{Average Number of buses held} * 365}$$

e. Cost / Revenue / Profit per passenger km is obtained by

$$\frac{\text{Total Cost} / \text{Total Revenue} / \text{Total Profit}}{\text{Total passenger kms performed during a year}}$$

f. Share of each component of cost has been found by

$$\frac{\text{Expenses on particular component}}{\text{Total Expenses}} * 100$$

ii. Impact of factor prices on cost per km has been ascertained with the help of Cost per Km (CPK) and price index. The CPK has been found by dividing total cost on a particular head by total bus km. CPK and price per unit of factor have been indexed by assigning a weight of 100 to the base year. For the subsequent years, the indices have been obtained from

CPK or Price per unit in the current year

$$\frac{\text{CPK or Price per unit in the base year}}{\text{CPK or Price per unit in the current year}} * 100$$

iii. A comparative study of the performance of all the metropolitan STUs

have been made to assess operating efficiency in terms of per km cost operation for the year 92-93.

iv. Fifteen financial ratios have been calculated for last five years on the basis of financial statements to study the capital structure, profitability and asset management.

v. Break even level of fare vehicle utilisation and load factor given the fare level and load factor break even level of load factor given the fare level and vehicle utilisation have been calculated for DTC with existing cost data.

vi. An attempt has been made to assess the cost borne by DTC on account of concessional travel facility to students on the basis of cross section feedback. Six scenarios of costs have been worked out.

FINANCIAL ANALYSIS

This paper is divided into six parts as follows :

- I. Analysis of Revenue and Cost
- II. Ratio Analysis and Break Even Analysis
- III. Concessional travel facility to students and
- IV. Conclusion and Policy recommendations.

PART - I

REVENUE AND COST

Most of the STUs reported loss for the year 1992-93. This means that total revenue (traffic and non traffic) was less than total costs which comprised direct costs like costs on personnel, fuel and lubricants, tyres and tube spares and materials, taxes, depreciation, interest and others. The extent and the reasons for loss differ from undertaking to undertaking. To a large extent, the loss is attributed to the burden and interest payments which are not economic costs. These costs have nullified the profitability of investments and affected public image of STUs very badly.

REVENUE

The total revenue of DTC increased by 67 percent during last five years (1989-93). It increased from Rs. 115 crores in 88-89 to Rs. 190 crores in 92-93. This is despite the fact that ordinary fares were doubled in December, 1992.

This means that with the level of operations remaining unchanged, the revenue should have nearly doubled. This did not happen because the output i.e. passenger kms performed which really fetches revenue decreased from 1797 crore kms in 88-89 to 1571 crore kms in 92-93. This is due to decline in fleet strength, fleet utilisation, vehicle utilisation and load factor. The decline in load factor has been very perceptible. Its implication is that DTC has been increasingly unable to market the services that it provides. For the month of July, 93, it could sell only 70 percent of its output. It is very difficult for an organisation to break even when 30 percent of its output is just waste in the sense that it does not earn any revenue. This calls for serious efforts on marketing front.

The share of traffic revenue in total revenue is about 94 percent. However the contribution of non-traffic revenue is increasing over the years. The share of inter-state services is about 18 percent and its share is also increasing.

COSTS

The costs have been rising continuously despite decrease in volume of output. During 1988-89 and 1992-93, the total costs increased by 89 percent whereas output decreased by 13 percent. The diagram No. 1 depicts the growth of each element of cost during 1989-93.

The rise in interest cost has been very sharp followed by cost on personnel. Unfortunately these two elements constituted nearly three fourth of total costs. The composition of costs for the years 1988-89 and 1992-93 is shown in the diagram No. 2(a) & (b).

The two components of cost, viz. personnel and interest are more or less fixed in nature and do not vary with the level of output. When the fixed costs are so high, the business can not break even, unless the output sold is also very high. The volume of output depends, as mentioned earlier, on the size of the fleet, fleet utilisation, vehicle utilisation and load factor. Different levels of these factors can be combined to achieve the break even output. However, these two elements need to be controlled. For example, the personnel cost for the year 92-93 amounted Rs. 153 crores when the staff ratio was 9.55. If staff is reduced (which can be done without impairing the output) to 8.5 (in fact it was 8.48 in 87-88), the person-

nel cost would reduce to Rs. 136 crores. There has been some effort in this direction and DTC has been able to bring down staff ratio to 9.56 by the end of July, 93 from 10.11 as on 31st March, 93. Similarly, if the net capital base of Rs. 115 crores (Government contribution minus accumulated loss) is financed by debt and equity in the ratio of 50:50 and debt carries 15 percent interest obligation, the interest liability would reduce from Rs. 143.49 crores to Rs. 8.63 crores only.

In the year 1988-89, the personnel cost constituted 46 percent followed by interest (15.53 percent) and fuel and lubricants (15.23 percent). But due to fast increase in interest cost, the share of interest has gone up to 36 percent in 92-93.

IMPACT OF FACTOR PRICES ON COST

The cost per km of operation is affected by the prices of inputs and factor productivities. The extent of impact of factor prices on four major elements of cost which constitute about 90% of total costs has been worked out for last ten years and are placed at Annexure - 1. This is analysed as under.

FUEL PRICES & FUEL COST PER KM

The price of diesel per litre increased from Rs. 3.14 to Rs. 4.98. In terms of index, it increased by 58.45 percent. The cost on fuel and lubricants per bus km increased from 99 paise to 173 paise. The rate of increase is 74.75 percent. The rise in price as well as cost per km during first 9 years was about 58 percent. Only during the year 92-93, the cost per km has been higher. This indicates that the entire increase in cost per km is due to increase in prices of fuel.

TYRE PRICES AND TYRE COST PER KM

Similarly the price of tyres increased from Rs. 2656 per tyre to Rs. 6332 in 1991-92 registering an increase of 138.4 percent. But the cost on tyres, tubes and retreaded material per km increased by only 50 percent from 30 paise to 45 paise. This means that there has been substantial improvement in tyre productivity which diluted the impact of price rise.

LABOUR PRICES AND LABOUR COST PER KM

The consumer price index (CPI) increased from 111 in 83-84 to 240 in 92-93. The increase is by 116.22 per-

cent. Had the employees been paid just to compensate them for rise in CPI and there were no improvement in productivity of labour, the labour cost per km would have increased by 116.22 percent and not by 178.72 percent. This means that the labour prices do not bear any relation with labour productivity and CPI. The cost per km has increased because of the fact that the increase in wage rate has been higher than the rise in CPI and changes in productivity.

INTEREST COST AND COST PER KM

The interest cost per km increased from Rs. 1.10 in 88-89 to Rs. 5.06 in 92-93. This has happened precisely because of interest on accumulated interest which could not be paid from revenue account. As on 31st march, 1993, the balance sheet has an accumulated loss of Rs. 1095 crores. This means that the so called government contribution of Rs. 1210 crores is represented by an asset base of only Rs. 183 crores. The DTC is under obligation to pay interest on Rs. 1210 crores which includes an accumulated loss of Rs. 1095 crores. As a result the effective interest liability works out 137 percent for the year 92-93 while the apparent average rate of interest is only 13.33 percent. This has been worked out in Annexure - 3. No business, particularly in service sector, can be sustained if it is required to pay interest at the rate of 137 percent, that too when it does not have any equity base.

COST AND REVENUE PER BUS

The cost of operating a bus for a year works out Rs. 9.64 lakhs against a traffic revenue of Rs. 4.26 lakhs. This means that every bus contributes Rs. 5.38 lakhs to the loss per year. This frightens the idea of addition of bus. The cost of operating a bus on city route per year is Rs. 9.67 lakhs whereas for inter-state route, it is Rs. 9.35 lakhs. This is despite the fact that the vehicle utilisation on inter-state route is 354 kms as against 195 kms on city route. This distortion is because of anomalies in determination and allocation of costs between two services. For example, the interest cost on city route is Rs. 3.59 lakhs while on inter-state route, it is Rs. 2.04 lakhs. This disparity is, it is understood, due to the fact that different tranche of government contribution carry different rates of interest and interest is charged to a service on the basis of the tranche from which the vehicles were acquired. A brief summary of the costs and revenues

per bus is presented in table No. 1. It is observed from the table that the revenue per bus from inter-state services in 92-93 (in Rs. Lakhs)

Particulars	City services	Inter-state services	DTC
Cost	9.67	9.35	9.64
Revenue	4.13	8.09	4.54
Profit	-5.54	-1.26	-5.10
Operating Profit	-1.95	0.79	-1.67

ice is Rs. 8.09 lakhs as against Rs. 4.13 in city services. This is because of higher vehicle utilisation and load factor on inter-state route. The inter-state route earned an operating profit of Rs. 0.79 lakh per bus.

COST AND REVENUE PER BUS KM

Table No. 2 indicates the costs and revenue per bus km for the year 92-93.

Table No. 2: Costs and Revenues per bus Km in 92-93 (in Rs.)

Particulars	City	Inter state	DTC
Cost	15.54	8.04	14.23
Revenue	6.64	6.96	6.70
Profit	-8.90	-1.08	-7.53
Operating profit	-3.14	0.68	-2.47

The cost of operation per bus km works out Rs. 14.23 while revenue is Rs. 6.70. The net loss per bus km is higher on city route because of low vehicle utilisation and the revenue per km is lower because of lower load factor.

COST AND REVENUE PER PASSENGER KM PERFORMED

The cost and revenue per passenger km performed has been presented in table No. 3. It is evident from the table

Table No. 3: Costs and Revenues per Passenger Km performed (in paisa)

Particulars	City services	Inter-state services	DTC
Cost	27.82	13.58	25.67
Revenue	11.89	11.75	12.08
Profit	-15.93	-1.83	-13.89
Operating profit	-5.62	-1.15	-4.46

that the cost of operation per bus km is 25.67 paisa while revenue is 12.08 paisa. The net loss per km is 13.59 paisa. The cost per passenger km on city

route is higher because of lower load factor. The revenue per passenger km is almost same on both the routes, traffic revenue per passenger km being slightly higher on city routes and non traffic revenue slightly higher on inter-state route.

COMPARATIVE PERFORMANCE OF URBAN STUS

For the purpose of comparison, four STUs, viz. Delhi Transport Corporation (DTC), Calcutta State Transport Corporation (CSTC), Bombay Electricity Supply and Transport Undertaking (BEST), Pallavan Transport Corporation (PTC) have been taken into consideration. The details of their physical and financial performance and each element of cost per bus km for the year 92-93 have been worked out and are at Annexure - 2. It is observed from the annexure that DTC is the biggest undertaking with 4184 buses with highest percentage of overaged buses. The physical performance parameters are relatively good.

The cost as well as revenue per bus km are highest in the case of BEST. The cost is higher probably because of high percentage of double decker buses. Revenue is highest despite a load factor of 60 percent. This indicates that the average fare rates are very high as can be seen from table No. 4. The PTC has the lowest cost because of higher vehicle utilisation and low staff cost and interest cost. Revenue is high because of high load factor and a relatively high fare level. CSTC has a very low vehicle utilisation but very high load factor and highest staff cost. In case of DTC, interest cost is highest and fare level is lowest. As a result, DTC has highest loss per km despite relatively good physical performance.

The high interest cost and low fare level are beyond the control of DTC. A meaningful comparison can be made on the basis of economic costs, i.e. costs on personnel, tyres and tubes, fuel and lubricants and other material. This has been presented in table No. 4.

Table No. 4: Economic Costs and Average Fare Level of Urban STUs for 92-93

Undertaking	Economic cost per bus km (in paise)	Average fare per passenger Km. (in paise)
DTC	816	11.19
BEST	916	28.42
CSTC	1126	12.55
PTC	795	12.53

It is observed from the above table that the economic costs of DTC per bus km is one of the lowest, 816 paise next only to 795 paise of PTC. With the decline in staff ratio in DTC, the economic costs of operation for 93-94 will be lowest. But DTC would continue to incur loss as long as its fare does not cover the economic costs at least. With the existing fare level of 11.19 paise and assuming a load factor of 100 percent, the revenue per km works out 738 paise which is still short of economic costs. There is no undertaking where the revenue per km worked out on the basis of existing fare rate and 100 percent load factor is less than the economic cost of operation. If fare does not cover economic costs, it means that DTC is subsidising the commuters at its own cost and as a result it borrows to finance revenue expenses with heavy penal interest. The efficiency as reflected in terms of lowest cost of operation is converted to inefficiency by lowest fare level.

It, therefore, follows that no doubt operational efficiency is necessary, but it is not sufficient for viability unless fare level is adequate. If we assume a load factor of 83.97 percent, as occurred in 92-93, the fare per passenger km should be 14.72 paise which is equal to economic cost. Then only traffic revenue would cover the cost of operation and non traffic revenue would cover depreciation, taxes and interest.

PART -II

RATIO ANALYSIS

Three sets of ratios, viz. financial structure ratios, profitability ratios and asset management ratios have been computed for DTC for 1989-93 and are at Annexure - 3.

A. FINANCIAL STRUCTURE RATIOS

i. Debt - Equity Ratio : Financial prudence suggests that there should be a reasonable balance between the portion of assets being provided by creditors and the portion of assets being provided by stock holders. This balance is measured by debt equity (D/E) ratio which has been computed by dividing government contribution by reserve and surplus. And if the business earns a higher return than the interest rate prevailing in the market, a relatively higher proportion is financed from borrowed funds and vice versa. In the case of DTC, when the rate

of return is negative, D/E ratio is 48. This implies that for each rupee of assets provided by stock holders, assets worth Rs. 48 have been provided by creditors. This ratio is not only high, it is also increasing over the years because of accumulated interest which get converted to debt and DTC is, under RTC Act, not allowed to raise equity capital. Such high share of debt in the capital, that too not represented by assets, have reflections on other ratios.

ii. Interest charge coverage ratio : The most common measure of the ability of an organisation to provide protection to long term creditors is the times interest earned ratio. This has been computed by dividing the earnings before interest by yearly interest charges that must be met. Generally earnings are viewed adequate to protect long term creditors if this ratio is 2 or more. In the case of DTC, it is negative.

iii. Debt service coverage ratio : It indicates the ability to service debt burden. This has been calculated by Earnings before depreciation & interest

Interest liability + 1/8 of outstanding debt

The ratio has been negative. Negative interest charge coverage ratio and debt service coverage ratio indicate that DTC would never be in a position to pay interest and debt. The capital base, therefore, needs to be restructured.

iv. Asset coverage ratio : Long term creditors look for asset backing for their credit. They compare the long term assets at the disposal of the company with long term loans extended by them. This comparison is made through asset coverage ratio. This has been calculated by dividing the net non current assets by government contribution. This ratio declined from 0.23 in 88-89 to 0.09 in 92-93. The protection to creditors is abysmally low.

B. PROFITABILITY RATIOS

i. Profit Margin : Current operational efficiency which indicates organisation's ability to produce and sell at the most competitive cost is measured by profit margin. This has been computed by dividing earning before interest by traffic revenue net of passenger tax. This also turns out to be negative. This indicates that with the existing fare structure, DTC can not have profitable existence. The operational ratio is 146. This means that the

operating costs are more than operating revenue by 46 percent.

ii. Return on assets : This indicates the ability to service investment. This has been computed by

Earnings before interest

$$\frac{\text{Total assets} - \text{Current liabilities}}{\text{Total assets}} * 100$$

This is a summary measure of overall financial health. This is negative and as low as - 50. This means that 50 percent of assets is eaten up by revenue loss every year.

C. ASSET MANAGEMENT RATIOS

i. Asset turnover ratio : It indicates efficiency in resource use. This has been computed by dividing total revenue by total assets. This has improved over the years to 1.04. This means that Rs. 100 worth of assets are required for every Rs. 104 of turnover.

ii. Inventory turnover ratio : It indicates how quickly the inventory is realised to cash. This has been computed by dividing cost of materials (fuel & lubricants, tyres & tubes, spares and materials) used during a year by the inventory on hand at the end of the year. For 92-93, it works out 6.7. This indicates that DTC's inventory has been turned over 6.7 times during the year. The number of days it takes to use the entire inventory one time is determined by dividing 365 by the number of times the inventory turns over during a year. It works out 54 days. For a business enterprise located in Delhi and when the entire inventory are bought locally, holding up inventory for 54 days is unreasonable.

DTC is over capitalised as its earning capacity does not justify the amount of capitalisation. The earnings are not enough to yield a fair return on investments and the real worth of the assets is less than its liabilities. The real value of DTC is less than its book value. To bring the book value in conformity with real value, fictitious assets of Rs. 1095 crore (loss) has to be written off immediately. The creditor (Central Government) has to sacrifice this as part of capital restructure programme. This step would help in reducing cost of operation and improve the balance sheet. With the balance sheet looking up and with the huge immovable properties at the disposal of DTC, DTC can go to market to raise funds. Since Government is not in a

position to provide funds to DTC, DTC should be allowed to raise debt to the extent of Rs. 115 crore, the same as the net contribution of Central Government which may be converted to equity. The control remains with the Government and D/E ratio becomes 1:1. And on line with Railways, DTC should be under obligation to pay 6.25 percent dividend on equity. No further assistance is to be given by Government. DTC has to depend on financial institutions for working capital requirement.

BREAK EVEN ANALYSIS FOR CITY SERVICES

There are formidable problems in the computation of break even level of output in transport sector. Firstly, it is difficult to identify the unit of output. It can be vehicle km, passenger km offered and passenger km performed. Cost is related to vehicle km and passenger km offered while revenue is related to passenger km performed. Secondly, it is related to identifying and segregating various elements of cost into fixed and variable categories. Over the years the labour cost which should ideally be variable cost has become fixed cost in road transport undertakings. Third problem arises because of the fact that the same level of output can be obtained by various combination of vehicle utilisation and load factor. This means that there can be a break even level of vehicle utilisation for a given level of load factor and revenue per passenger km, a break even level of load factor for a given level of vehicle utilisation and revenue per passenger km, and a breakeven level of revenue per passenger km for a given level of vehicle utilisation and load factor. Two additional problems arise in connection with DTC. Because of faulty capital structure, interest cost, a fixed element, is unduly high. This makes break even level unrealisable. Further there is difficulty in getting reliable data.

However, an attempt has been made to calculate break even level of vehicle utilisation, revenue per passenger km performed and load factor on the basis of the following assumptions:

a. Costs on fuel and lubricants, tyres and tubes, spares and others constitute variable cost. The costs on personnel, tax, depreciation and interest constitute fixed cost.

b. On the basis of trends of expenditure and revenue observed from the data for last 12 months (July, 92 to June,

93), it is presumed that the fixed costs per bus per day is Rs. 2500 and variable costs per bus km is Rs. 2.80.

The following formulae have been developed to work out various break even levels :

i) Break even level of revenue per passenger km

$$= \frac{FC + (VU * VC)}{VU * CC * LF}$$

ii) Break even level of load factor

$$= \frac{FC + (VU * VC)}{VU * CC * RP}$$

iii) Break even level of vehicle utilisation

$$= \frac{FC}{(CC * LF * RP) - VC}$$

Where FC stands for fixed cost

VU stands for vehicle utilisation

VC stands for variable cost

CC stands for carrying capacity of bus

LF stands for load factor

RP stands for revenue per passenger km performed

The calculations indicate that with the existing level of fixed cost of Rs. 2500 per day and average fare of 11-12 paise per passenger km and vehicle utilisation of about 200 kms per day for city services, break even requires a load factor of 200 percent. But as the average fare level rises to 23 paise, break even level of load factor comes down drastically to 101 percent which is realisable. The break even level would otherwise be realisable if fixed cost is made realistic.

With the existing levels of vehicle utilisation of 200 kms a day and load factor of 84 percent, the break even level of fare works out 28 paise per passenger km. But as load factor rises to 110 percent, the break even fare reduces to 21 paise. And with the existing level of load factor and fare structure, the break even level of vehicle utilisation works out 700 Kms. However as the average fare per km rises to 27 paise, the break even level of vehicle utilisation reduces to 205 kms.

It is also observed from the calculations that the break even level of load factor is more sensitive to revenue per passenger km, the break even level of revenue per passenger km is more sensitive to load factor and break even level of vehicle utilisation is very sensitive to both load factor and revenue per passenger km.

CONCESSIONAL TRAVEL FACILITY TO STUDENTS

The major social cost borne by DTC is the provision of concessional travel facility to students. Students are issued monthly / quarterly passes for Rs. 12.50 per month. It is claimed by DTC that it bears an annual burden of about Rs. 25 crores because of this facility.

There has not been any scientific study to estimate the loss of revenue due to this facility. It is understood from DTC that a student pass holder is entitled to the service as any ordinary pass holder who pays Rs. 150 for an all route pass per month. A rational person would not pay Rs. 150 for an all route pass unless he anticipates that he would use transport services worth at least or about Rs. 150. As a student pass holder is entitled to same amount of service as any ordinary pass holder, it is presumed that he also uses services worth Rs. 150 while he pays Rs. 12.50 only. So the concession granted to a student per month is Rs. 137.50. This amount multiplied by the number of monthly passes issued during a year is the net loss to DTC.

The above approach to estimation of loss of revenue to DTC is rudimentary. This ignores the basic economic concepts like elasticity of demand and cross elasticity of demand. As the price of a commodity or service rises, the demand for the same decreases. The common belief is that the demand for transport service by students is highly elastic (of course this needs to be verified). If students are denied pass facility or if the passes are priced at Rs. 150, quite a large proportion of students would shift to other modes of travel as it has happened with other people. Because DTC provides concessional service, students are preferring to use it and not others. DTC has got a ready made captive market. If DTC could sell the same amount of service to students at Rs. 150 and thereby maintain the load factor, Rs. 137.50 would be the real loss of revenue. Even without revision in pass prices, but with the introduction of red lines, the number of passes sold to students has reduced.

Given the above complications, it is not easy to estimate the loss of revenue to DTC on account of this facility. A detailed scientific study is required before venturing such an esti-

mation. However, a rough estimate has been attempted for the year 92-93 on the basis of cross section feed back from students and DTC staff. During 1992-93, 1,614,181 student passes (monthly equivalent as quarterly passes are also issued) were issued. The number of passes issued varied drastically from month to month. Only 16,156 passes were issued in the month of June as against 2,19,355 in the month of October. This is so because of nature of activities in academic institutions.

The number of working days in an academic institution varies from month to month. In the month of June there may not be any working day and in the month of November, there may not be any holiday except Sundays. More passes are sold in the months having more working days. This does not mean that passes issued in lean months (e.g. June) are used very little. The students of those institutions which work during June and those research scholars, who need to consult libraries, take passes in the month of June. Therefore the passes issued in the month of June are used as intensively as in any other month. Further it is not necessary that a student uses pass on every working day. For various reasons, classes may not be held every day and even if classes are held, he may not attend. Student passes are used not only for trips to academic institutions but also for many non-academic purposes. It may be assumed that the travel for non-academic purpose may be more or less equivalent to travels not undertaken for academic purpose.

On the basis of cross section feed back from the students, it is felt that a pass is used on 24 days a month. The computation of revenue loss to DTC has, however, been made for 5 alternative scenarios assuming passes are used 22, 23, 24, 25 and 26 days in a month. In the absence of any data relating to distance travelled by student pass holders, it was felt again from cross section feed back of the students that the proportion of students travelling various distances is as given in scenario - III of the Annexure - 4. Scenario - I represents the views of the students. The estimation of loss has also been made for two additional scenarios II and IV. The scenario - V presumes that a student travels average trip length on one side.

The distances travelled have been classified into 3 slabs on the basis of existing fare structure of DTC and travel behaviour of students. The ordina

Percentage of student pass holders
travelling different distances

Distance (Km)	SCENARIOS				
	I	II	III	IV	V
00 - 12	50	40	30	20	Two trips
13 - 32	30	35	30	40	of average
32 & above	20	25	40	50	trip length

ary fare structure is composed of Re. 1 for distances travelled up to 6 kms, Rs. 2 for distances between 6 and 16 kms and Rs. 3 for distances above 16 kms. Therefore a student would have to pay Rs. 2 if he travels up to a total of 12 kms both ways (inward and outward) if he does not use the facility of pass, Rs. 4 if the distance covered is between 13 and 32 kms and Rs. 6 if the distance exceeds 32 kms.

The computation of loss of revenue to DTC is shown in Annexure - 4. As can be seen, the most likely loss due to student concession is in the range of Rs. 12 - 14 crores which is about half the amount claimed by DTC. This is subject to further adjustment for economic reasoning given on pre pages and one of the purpose of concessional facility to students being minimisation of ticket less travel. Since DTC is expected to be run on commercial lines, it need to be compensated for this loss of revenue. Till further scientific assessment of the loss is made, DTC may be reimbursed Rs. 14 crores every year.

PART - IV

CONCLUSION AND POLICY RECOMMENDATION

CONCLUSION

With the introduction of privately operated buses, the load factor of DTC buses has gone down drastically to about 70 percent. Coupled with deterioration in other physical performance parameters like fleet strength, fleet utilisation and vehicle utilisation, the output, i.e. passenger kms performed decreased by 13 percent from 1797 crore kms in 88-89 to 1571 crore kms in 92-93. This is why the revenue increased by 67 percent only during the same period despite doubling of ordinary fare structure in December, 1991. But the cost increased by 89 percent because of increase in prices of inputs, high staff ratio and interest on accumulated loss. The staff ratio increased to 10.11 by the end of March, 93 as the staff could not be reduced in proportion to reduc

tion in fleet strength. Wage rate has been rising at a rate higher than what is warranted by the rise in consumer price index and productivity. DTC had to pay interest on fictitious assets worth Rs. 1095 crores. Although the apparent average rate of interest was only 13.33 percent, the effective rate of interest was 137 percent during 92-93. The interest cost is exorbitant because of over capitalisation. The return on assets being minus 50 percent, D/E ratio of 48 is against any financial prudence. Negative interest charge coverage ratio and debt service coverage ratio indicate that DTC can not service the debt.

The economic costs of operation (all costs except tax, depreciation and interest) per bus km was one of the lowest among urban STUs. The apparent financial loss is because of a low fare structure. In fact it is the lowest among the urban STUs. It does not cover even the economic cost of operation with 100 percent load factor. Assuming a load factor of 84 percent, as it occurred in 92-93, the economic fare should be 14.72 paise.

Break even level of fares per passenger km, load factor and vehicle utilisation turn out to be unrealisable because of huge fixed costs which include interest and wage. However, the load factor is more sensitive to fare structure, fare structure is more sensitive to load factor and vehicle utilisation is very sensitive to both load factor and fare structure.

DTC is under obligation to provide concessional / free travel facility to different sections of people like freedom fighters, handicapped persons, residents of resettlement colonies, students etc. A rough estimate indicates that the loss of revenue on account of concessional travel facility to students for the year 92-93 was about Rs. 14 crores.

The process of cost determination and its allocation among cost heads is faulty. It is not possible to know the cost incurred on city services, the cost of resources at the disposal of Depot Manager, the cost and revenue of a Depot, a route and also a schedule / trip.

POLICY RECOMMENDATIONS

The DTC may be converted into a limited company registered under the Companies Act, 1956. On registration as a company, the capital base may be

restructured. Of the central government contribution of Rs. 1210 crores, Rs. 1093 crores representing fictitious assets may be written off immediately and for the balance Rs. 115 crores, equity shares may be issued at par to Government of India. In addition, assets of DTC may be revalued and any increase in the value of asset because of revaluation may be credited to central government by way of bonus shares or credited to 'Reserve & Surplus' account. Thereafter DTC may be permitted to raise funds from capital market by way of debentures not exceeding Rs. 115 crores depending on transport requirements for Delhi so that the D/R ratio does not exceed 1:1 and government retains control. DTC should be under obligation to pay 6.25 percent dividend on the equity contribution of Government on line with Railways.

The average revenue per passenger km should be revised immediately to 14.72 paise from 11.19 paise at present. This would mean revision in fare level by 30 - 40 percent. Thereafter the revision in fares should be linked to changes in input prices. Alternatively, fares may be revised upwards by some percentage. However this percentage should meet about 40-50 percent of increase in input prices and the remaining part may be met by mobilising financial resources from other sources like advertisement, property development etc. Till any scientific assessment of the loss to DTC on account of concessional / free travel facility is made, Rs. 14 crore may be reimbursed by government to DTC every year.

The revision in wages should be linked to changes in productivity and CPI. For example, if CPI rises by 10 percent and productivity by 10 percent, the wage should rise by 21 percent (1.10 * 1.10).

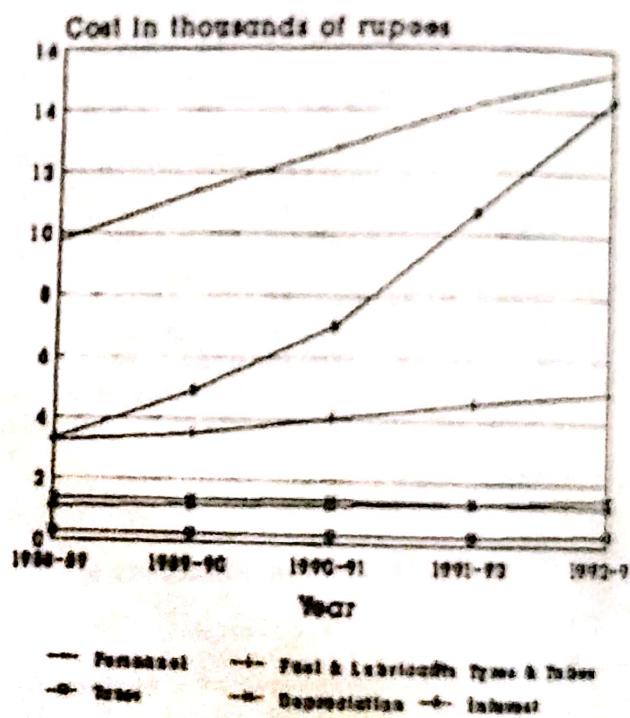
DTC has to improve load factor by adopting a vigorous marketing strategy to attract passengers from privately operated buses. The private operators being very small would not be in a position to have a counter marketing strategy. In addition DTC has to improve fleet utilisation and vehicle utilisation.

The head office and the depots may be converted to responsibility centres, preferably profit centres. A system for determining costs and making proper allocation to responsibility centres need to be established.

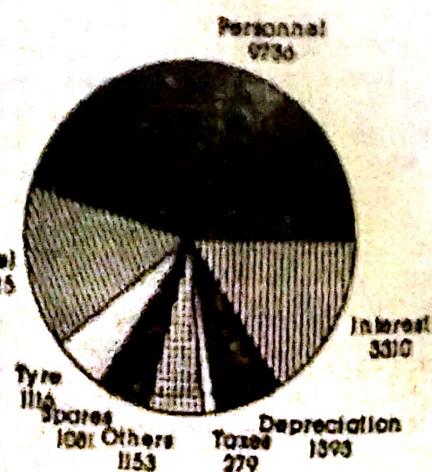
FURTHER AREAS OF RESEARCH

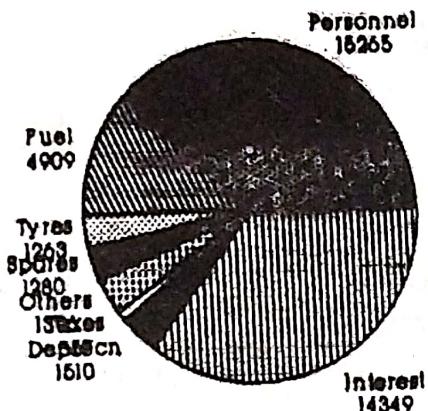
- i. Estimation of cost function
- ii. Assessment of loss to DTC on account of concessional services.
- iii. Evolving a system for determination of costs and its allocation and Management Control System for DTC.
- iv. Revising the policy of privatisation of road transport.
- v. Estimation of land use transport models.
- vi. Development of rational pricing policy for urban public passenger transportation.
- vii. Development of organisational MTS for DTC. Estimation of demand and revenue function for DTC.

Graph No. 1 : COST TREND OF DTC FOR 1988-93



COST COMPOSITION OF DTC FOR Graph No. 2 (a) 1988-89 (in Rs. Lakhs)



**COST COMPOSITION OF DTC FOR
1992-93 (in Rs. Lakhs)**


Sl. No.	Particulars	Unit	Name of the undertaking*			
			DTC	CSTC	BEST	PTC
1	2	3	4	5	6	7
PHYSICAL PERFORMANCE						
1.	Average Fleet held	Number	4184	1246	3026	2355
2.	Av. age of the fleet	Years	5.70	4.08	7.84	5.60
3.	% age of overaged	% age	37.86	N.A.	8.49	18.60
4.	Fleet utilisation	% age	87.00	74.40	92.10	89.10
5.	Vehicle utilisation Km/ Bus/	Day	185.60	133.90	195.80	198.90
6.	Load Factor	% age	84.00	89.80	80.00	89.80
7.	Staff per bus	Number	9.50	9.80	11.90	7.40
8.	Diesel Consumption	KMPL	3.79	3.41	3.14	3.58
FINANCIAL PERFORMANCE						
1.	Revenue per km.	Paise	588	857	1374	905
2.	cost per km.	Paise	1441	1316	1492	948
3.	Net loss per km.	Paise	755	659	118	42
COST STRUCTURE						
1.	Staff cost	Paise / km	546	741	617	512
2.	Fuel & Lubricants	"	172	200	201	198
3.	Tyres & Tubes	"	48	71	46	36
4.	Spares & Material	"	50	114	52	51
5.	Interest	"	489	32	92	45
6.	Depreciation	"	52	99	128	39
7.	Taxes	"	41	07	74	20
8.	Others	"	43	52	282	49

* DTC : Delhi Transport Corporation
CSTC : Calcutta State Transport Corporation
BEST : Bombay Electricity & State Transport Undertaking
PTC : Pallavan Transport Corporation

ANNEXURE 1

FACTOR PRICES AND COST PER BUS KILOMETRE

Year	Price per ltr.(Rs.)	Indices	CPI Indices	
			(Paise)	(Paise)
1983-84	3.14	100.00	99	100.00
1984-85	3.23	102.64	100	101.01
1985-86	3.40	108.02	110	111.11
1986-87	3.58	114.00	112	113.13
1987-88	3.58	114.00	110	111.11
1988-89	3.62	121.54	108	109.09
1989-90	3.68	123.45	107	108.08
1990-91	4.01	127.52	136	137.37
1991-92	4.98	158.45	156	157.58
1992-93	4.98	158.45	173	174.75

Tyres, Tubes and Retreaded Material

Year	Price per Tyre (Rs.)	Indices	CPI Indices	
			(Paise)	(Paise)
1983-84	2656	100.00	30	100.00
1984-85	3107	116.98	25	83.33
1985-86	3457	130.16	37	123.33
1986-87	3482	131.10	38	130.00
1987-88	4168	156.93	43	143.33
1988-89	4537	170.82	37	133.33
1989-90	4627	174.21	37	123.33
1990-91	5007	188.52	42	140.66
1991-92	6332	238.40	45	150.00
1992-93	5547	208.85	45	150.00

Labour

Year	CPI	Indices	CPI Indices	
			(Paise)	(Paise)
1983-84	111	100.00	183.02	100.00
1984-85	118	106.31	271.91	140.67
1985-86	136	113.51	292.87	151.73
1986-87	137	122.42	282.75	146.48
1987-88	149	134.23	335.45	197.79
1988-89	166	149.55	325.00	167.34
1989-90	173	153.06	346.00	178.25
1990-91	193	173.07	428.00	221.73
1991-92	219	197.20	466.00	251.76
1992-93	240	216.22	538.00	278.72

ANNEXURE 4

COMPUTATION OF LOSS OF REVENUE FOR 1992-93
(Total Number of Passes : 1634181 equivalent) (Rs. Lakhs)

Distance (km)	Rate of passes	Proportion	Days in a month
100 - 17	22	22	34
17 - 32	20	20	33
32 - 60	20	20	33
60 - 112	20	20	33
112 - 177	20	20	33
177 - 242	20	20	33
242 - 307	20	20	33
307 - 372	20	20	33
372 - 437	20	20	33
437 - 502	20	20	33
502 - 567	20	20	33
567 - 632	20	20	33
632 - 697	20	20	33
697 - 762	20	20	33
762 - 827	20	20	33
827 - 892	20	20	33
892 - 957	20	20	33
957 - 1022	20	20	33
1022 - 1087	20	20	33
1087 - 1152	20	20	33
1152 - 1217	20	20	33
1217 - 1282	20	20	33
1282 - 1347	20	20	33
1347 - 1412	20	20	33
1412 - 1477	20	20	33
1477 - 1542	20	20	33
1542 - 1607	20	20	33
1607 - 1672	20	20	33
1672 - 1737	20	20	33
1737 - 1802	20	20	33
1802 - 1867	20	20	33
1867 - 1932	20	20	33
1932 - 1997	20	20	33
1997 - 2062	20	20	33
2062 - 2127	20	20	33
2127 - 2192	20	20	33
2192 - 2257	20	20	33
2257 - 2322	20	20	33
2322 - 2387	20	20	33
2387 - 2452	20	20	33
2452 - 2517	20	20	33
2517 - 2582	20	20	33
2582 - 2647	20	20	33
2647 - 2712	20	20	33
2712 - 2777	20	20	33
2777 - 2842	20	20	33
2842 - 2907	20	20	33
2907 - 2972	20	20	33
2972 - 3037	20	20	33
3037 - 3102	20	20	33
3102 - 3167	20	20	33
3167 - 3232	20	20	33
3232 - 3297	20	20	33
3297 - 3362	20	20	33
3362 - 3427	20	20	33
3427 - 3492	20	20	33
3492 - 3557	20	20	33
3557 - 3622	20	20	33
3622 - 3687	20	20	33
3687 - 3752	20	20	33
3752 - 3817	20	20	33
3817 - 3882	20	20	33
3882 - 3947	20	20	33
3947 - 4012	20	20	33
4012 - 4077	20	20	33
4077 - 4142	20	20	33
4142 - 4207	20	20	33
4207 - 4272	20	20	33
4272 - 4337	20	20	33
4337 - 4392	20	20	33
4392 - 4457	20	20	33
4457 - 4522	20	20	33
4522 - 4587	20	20	33
4587 - 4652	20	20	33
4652 - 4717	20	20	33
4717 - 4782	20	20	33
4782 - 4847	20	20	33
4847 - 4912	20	20	33
4912 - 4977	20	20	33
4977 - 5042	20	20	33
5042 - 5107	20	20	33
5107 - 5172	20	20	33
5172 - 5237	20	20	33
5237 - 5292	20	20	33
5292 - 5357	20	20	33
5357 - 5422	20	20	33
5422 - 5487	20	20	33
5487 - 5552	20	20	33
5552 - 5617	20	20	33
5617 - 5682	20	20	33
5682 - 5747	20	20	33
5747 - 5812	20	20	33
5812 - 5877	20	20	33
5877 - 5942	20	20	33
5942 - 5977	20	20	33
5977 - 6042	20	20	33
6042 - 6107	20	20	33
6107 - 6172	20	20	33
6172 - 6237	20	20	33
6237 - 6292	20	20	33
6292 - 6357	20	20	33
6357 - 6422	20	20	33
6422 - 6487	20	20	33
6487 - 6552	20	20	33
6552 - 6617	20	20	33
6617 - 6682	20	20	33
6682 - 6747	20	20	33
6747 - 6812	20	20	33
6812 - 6877	20	20	33
6877 - 6942	20	20	33
6942 - 6977	20	20	33
6977 - 7042	20	20	33
7042 - 7107	20	20	33
7107 - 7172	20	20	33
7172 - 7237	20	20	33
7237 - 7292	20	20	33
7292 - 7357	20	20	33
7357 - 7422	20	20	33
7422 - 7487	20	20	33
7487 - 7552	20	20	33
7552 - 7617	20	20	33
7617 - 7682	20	20	33
7682 - 7747	20	20	33
7747 - 7812	20	20	33
7812 - 7877	20	20	33
7877 - 7942	20	20	33
7942 - 7977	20	20	33
7977 - 8042	20	20	33
8042 - 8107	20	20	33
8107 - 8172	20	20	33
8172 - 8237	20	20	33
8237 - 8292	20	20	33
8292 - 8357	20	20	33
8357 - 8422	20	20	33
8422 - 8487	20	20	33