8.1. INTRODUCTION

The aim of the present study is to review, analyse and present a comparative study of the trends and determinants of productivity of the selected State Road Passenger Transport Undertakings operating city services in India during the period from 1981/82 to 2000/01. Having identified the factors which are likely to influence the productivity, they were statistically tested. The study is mainly based on secondary data. Besides, more information was gathered through personal discussions with executives of the Central Institute of Road Transport, Pune. The data thus collected were subdivided into suitable tabular forms for the purpose of analysis and drawing inferences. Statistical techniques like mean, coefficient of variation, growth rate, index number and regression were applied appropriately wherever found necessary. This concluding chapter is an attempt to recapitulate the main findings and conclusion emerging from the entire study. In addition, suitable suggestions have been made for the improvement in the performance of the selected SRPTUs, viz. Bombay Electric Supply and Transport (BEST), Metro Transport Corporation (MTC), Ahmedabad Municipal Transport Service (AMTS), Pune Motor Transport (PMT), Kolhapur Motor Transport Undertaking (KMTU) and Pumpri - Chinchwad Municipal Transport (PCMT). In order to maintain sequence and continuity, chapter-wise conclusion is presented. As the first chapter is introductory in nature, conclusion is drawn from the second chapter onwards.
8.2. REVIEW OF LITERATURE

The studies made in India and abroad on various modes of transportation productivity have been discussed briefly in the second chapter. Most of the studies concentrated on labour productivity, capital productivity and total factor productivity. Only a limited number of studies analysed material productivity. For measurement of various productivities, the output either in physical term or in financial term was used in most cases. In physical term in most of the studies, they used seat-kilometre or vehicle-kilometre as output. Only in a limited study, passenger-kilometre was applied as output. Similarly, inputs were also used in physical term or in financial term. To measure labour productivity the number of employees was considered as physical input. On the contrary, wages and salaries in gross or real term were used as labour input. In some studies, labour productivity was calculated by applying seat-kilometre per employee or seat-kilometre per unit of labour cost to calculate labour productivity. Fleet size was considered as capital input in physical term and gross fixed assets or fixed assets in real term as financial input to measure capital productivity. Similarly, for material productivity, diesel was considered as material input.

8.3. MEASUREMENT ISSUES IN PRODUCTIVITY

In Chapter-3 entitled “Measurement of Variables” the various concepts and measurement of output inputs, and productivity as well as the measurement of determinant variables have been dealt with.

• CONCEPT OF OUTPUT

In this study, gross as well as net concept of output in real term has been used. The gross output has been applied to measure material productivity and net concept of output has been used to calculate labour productivity, capital productivity and total factor productivity. The gross output has been measured by considering both operating and non operating revenue. The net concept of
output has been obtained by deducting the total value of intermediate input from the value of total revenue. The output has been deflated by product price index to get output in real term.

• **CONCEPT OF INPUTS**

  **Labour input** can be measured either in physical units of labour such as employment, man hours, man days and man years or in financial terms as personnel cost in gross value or in real term. In the present study, the estimated personnel cost in real term has been taken as labour input.

  **Capital input** can either be measured in financial term or in physical term. In this study, the gross value of fixed capital in real term has been used as capital input. The gross fixed capital includes fixed assets and capital work-in-progress and does not include working capital and investment in outside the firm.

  **Material input** has been measured either in physical term such as tons, litres and units or in financial term such as material cost or fuel cost. In this study, the value of material in real term has been considered as material input.

  **Fuel cost** may be used either in litres of fuel (physical term) consumed or value of fuel consumed (financial term). In this study, the value of fuel consumed in real term has been considered. Similarly, the tyre input may be used either in physical term or in financial term. In this study, the value of tyre consumed in real term has been used.

• **MEASUREMENT OF PRODUCTIVITY**

  Theoretically, there are as many indices of productivity as there are inputs. Mainly partial productivity, total productivity and total factor productivity can be used to measure productivity. In this study, the partial factor productivity of labour and capital, the total factor productivity and the material
productivity have been considered. Further, the gross output in real term has been used to measure material productivity, whereas the net output in real term has been used to measure labour productivity, capital productivity and total factor productivity.

The labour productivity has been measured by dividing the net output in real term by the personnel cost in real term. Similarly, the capital productivity has been estimated by dividing the net output in real term by the gross fixed capital in real term. On the other hand, the total factor productivity has been estimated by using Kendrick and Solow measure. The numerator is the net output in real term and the denominator is the sum of the labour and capital inputs in real term under these measures. Further, the material productivity has been estimated by using the gross output in real term as numerator and the material cost in real term as denominator. The fuel productivity has been measured by considering the gross output in real term as numerator and the fuel cost in real term as denominator. The tyre productivity has been measured by dividing the gross output in real term by the tyre cost in real term.

- **MEASUREMENT OF DETERMINANT VARIABLES**

The variables that are used to determine the productivity here are denoted as determinant variables. In this study, the following have been considered as the most important variables that influence the productivity. – size of firm measured in terms of output, capital intensity measured in terms of capital – labour ratio, load factor as proxy for capacity utilisation measured in terms of passenger – kilometres sold to passenger kilometre offered, quality of service in terms of breakdown and accident and labour-management relations measured in terms of time in years.
8.4. PROFILE OF SELECTED STATE ROAD PASSENGER TRANSPORT UNDERTAKINGS

The profiles of SRPTUs under study have been presented in chapter-4. In addition, this chapter also deals with the emergence of state transport undertakings in India. Further, it also discusses the origin, growth and performance of selected SRPTUs operating in India. In this regard, the physical and financial performances of selected SRPTUs during the period 1981/82–2000/01 have been analysed. In physical performance, the fleet strength, fleet in operations, passenger-kilometres and employment have been analysed, whereas in financial performance, the net fixed assets, total revenue, personnel cost, material cost, other costs, total cost, net profit and value added have been analysed.

The important findings are:

❖ The growth rate of total cost was comparatively more than that of the total revenue in all the sample undertakings. As a result, the losses had increased from year to year invariably among all the undertakings. It is disheartening to note that almost the entire sample undertakings had incurred net losses during the period of study. It implies that higher growth rate of cost and lower growth rate of revenue has ultimately resulted in net loss. The growth rate percentage of loss was more in PMT (15.68 per cent) and less in AMTS (11.93 per cent).

❖ The rate of growth of total revenue had lagged behind the rate of growth of value added in BEST, MTC, AMTS and PCMT.

❖ A higher growth rate had been found in respect of fixed assets in MTC (10.42 per cent), KMTU (10.27 per cent), and PMT (8.82 per cent) than in the remaining three corporations, viz. BEST (7.35 per cent), AMTS (7.11 per cent) and PCMT (8.11 per cent). The rate of growth of
Passenger-Kilometre in PMT (4.66 per cent), PCMT (3.59 per cent) and MTC (3.54 per cent), as well as the growth of the personnel cost in PCMT (13.70 per cent), BEST (13.24 per cent), and PMT (12.30 per cent) were high when compared to the other units under study. Besides, the material cost in PMT (12.21 per cent), BEST (11.42 per cent) and PCMT (10.93 per cent) were more when compared to other selected undertakings.

❖ An impressive and significant positive growth rate of fleet strength and fleet in operation had been observed in all the sample undertakings. More increase in fleet strength and fleet in operation have been noticed in PMT (5.08 per cent) and PCMT (5.78 per cent).

❖ Significant growth of employment had been observed in all the study units. The rate of growth of employment had been found less in AMTS and PCMT. The number of employees per bus of all the sample undertakings has been found more when compared to the average number of employees per bus in all undertakings reported to CIRT during 2000/01. As a result, this might have affected labour productivity.

❖ Passenger-kilometre had also increased in most of the undertakings under study. The increase of PKM had been more in PMT (4.66 per cent) followed by PCMT (3.59 per cent), MTC (3.54 per cent) and AMTS (3.23 per cent). The least growth of PKM in KMTU had been due to the decrease in the strength of fleet from 1997/98 till the end of the study period.

In the light of these evidences, a detailed analysis of productivity of the selected six SRPTUs is called for.
8.5. TRENDS IN PRODUCTIVITY VARIABLES

The productivity variables, analysed in chapter-5 have been classified into productivity measurement variables and productivity determinant variables. The trend of those variables in six selected SRPTUs for the period 1981/82 – 2000/01 have been summarised in a logical manner.

8.5.1. TRENDS IN MEASUREMENT VARIABLES

The trends in variables used to measure productivity, viz. gross output, net output, labour input, capital input, material input, fuel input and tyre input are summarised as under:

• GROSS OUTPUT

The gross output had characterised by an increasing trend in almost all the selected undertakings, since the growth rate had been positive and statistically significant. On an average, the rate of growth of output had been comparatively high in PMT (6 per cent) and MTC (4.3 per cent), whereas it had been moderate in PCMT (3.2 per cent) and AMTS (2.96 per cent). However, a low growth rate of output has been observed in BEST (1.17 per cent) and KMTU (0.49 per cent).

• NET OUTPUT

The net output had characterised by an increasing trend in most of the sample units during the study period. The mean value is more in PMT (199) and less in PCMT (118). The growth rate of net output had been more in the case of MTC (4.85 per cent) followed by PMT (3.38 per cent) and AMTS (2.81 per cent), whereas the growth rate was very less in KMTC (0.24 per cent). On the contrary, the rate of decline in net output had been more in PCMT (13.81 per cent) followed by BEST (9.67 per cent). It implies that the net revenue had failed even to absorb the intermediate output like material cost.
• LABOUR INPUT

The labour input had been characterised by an increasing trend in most of the selected SRPTUs. The mean value of labour input was more in PCMT (460) and less in AMTS (148). The growth rate was comparatively higher in PCMT (8.64 per cent) followed by BEST (7.01 per cent), PMT (6.01 per cent), MTC (4.81 per cent), AMTS (4.41 per cent) and KMTU (3.73 per cent). The increase in labour input was more than the increase in net output in all the SRPTUs. This will result in decrease in labour productivity.

• CAPITAL INPUT

The capital input had shown an increasing trend in all the selected units. The mean value of capital input was more in KMTU (484) and less in BEST (139). The growth rate of KMTU showed a higher growth (8.81 per cent) followed by MTC (7.74 per cent), AMTS (6.23 per cent), BEST (5.14 per cent) and PCMT (5.11 per cent). The increase in capital input had been more in all the SRPTUs than the increase in gross output and as a result of this, the capital productivity of all the SRPTUs may decrease.

• MATERIAL INPUT

The material input had also registered an increasing trend in all the sample units. Its mean value had been more in PCMT (253) and less in AMTS (119) Considering its growth, a higher growth rate has been noticed in PMT (6.80 per cent) followed by PCMT (5.86 per cent), BEST (4.72 per cent), KMTU (4.47 per cent), AMTS (3.59 per cent) and MTC (3.08 per cent). The increase in material input had been more than the gross output in most of the study units; as a result the material productivity may decrease.
• **FUEL INPUT**

The fuel input had shown a fluctuating upward trend in all the SRPTUs. The growth rate of fuel input had been more in PCMT (281) and less in AMTS (110). It has been observed that, the increase in growth rate of fuel input had been higher in PCMT (6.54 per cent), PMT (6.09 per cent), KMTU (4.35 per cent) and BEST (4.11 per cent). On the other hand, it is less in MTC (2.79 per cent) and AMTS (2.75 per cent). The increase in growth rate of fuel input is less than the real total revenue of MTC (4.85 per cent) and AMTS (2.81 per cent) (vide Table 5.1) may result in increasing the fuel productivity in MTC and AMTS, while in the remaining four units where their inputs was more than their output, the results showed a decreasing growth rate in fuel productivity.

• **TYRE INPUT**

The tyre input had shown a fluctuating upward trend in most of the SRPTUs. The mean value had been more in PMT (195) and less in AMTS (112). The growth rate had been more in PMT (7.3 per cent) and less in PCMT (0.7 per cent). The increase of tyre input had been more than the gross output in most of the units, which result a decrease in tyre productivity in most of the units.

The growth rate of output had lagged behind the growth rate of labour input, capital input and material input to a significant level in all the selected SRPTUs. That is, the growth in labour productivity, capital productivity, material productivity and total productivity depends on growth in output.

**8.5.2. TRENDS IN DETERMINANT VARIABLES**

The trends in variables used as determinants of productivity, viz. size of firm, capital intensity, load factor, quality of service and labour management relations are summarised as under:
• SIZE

The size has been measured in terms of both gross as well as net concept of output. The gross output had been characterised by an increasing trend in almost all the selected SRPTUs. On an average, the growth of output had been higher in PMT (199) and lower in PCMT (118). Similarly, the growth rate had been more in PMT (6 per cent), followed by MTC (4.3 per cent), PCMT (3.2 per cent) and AMTS (2.96 per cent) but less in BEST (1.2 per cent) and KMTU (0.5 per cent). The net output had shown an increasing trend in most of the sample units. Its mean value had been high in PMT (173) and low in PCMT (-544). The growth rate of net output had increased in MTC (4.9 per cent), PMT (3.4 percent), AMTS (2.8 per cent) and KMTU (0.2 per cent), whereas in BEST and PCMT it had shown a decline of 9.7 per cent and 13.8 per cent respectively.

• CAPITAL INTENSITY

It has been observed that the capital intensity had shown an increasing trend in most of the selected SRPTUs. The mean value also had been noticed to be above the base year level in most of the units. The mean value is more in KMTU (188) and less in BEST (71). The growth rate of capital intensity had been 6.23 per cent in PCMT 3.10 per cent in MTC, 2.87 per cent in AMTS and 2.86 per cent in PMT. BEST and KMTU show declining growth rate of 1.92 per cent and 5.77 per cent respectively. The increase in K/L to a large extent could be attributed to the expansion of service areas, replacement and augmentation of buses on existing routes as well as on new routes. The decrease in K/L in BEST is due to more increase in labour cost than the increase in capital investment.

• LOAD FACTOR

The load factor had shown a decreasing trend in almost all the selected SRPTUs. On an average, the LF had been more in AMTS (104) and less in PCMT (63). The annual growth rate of load factor had been positive only in
AMTS with 0.81 per cent and in MTC it shows a nil growth rate. In other four undertakings, it shows a negative growth rate (3.24 per cent in KMTU, 3.08 per cent in PCMT, 2.03 per cent in BEST and 0.92 per cent in PMT). It may be pointed out that the causes of under utilisation of the load factor are exogenous in nature and thus outside the decision range of the undertaking.

• BREAKDOWN AND ACCIDENT

The breakdown and accident had shown a decreasing trend in most of the selected units. Its mean value had been more in KMTU (145) and less in PCMT (42). The growth rate of breakdown and accident had been positive in MTC (5.35 per cent), KMTU (0.51 per cent) and BEST (0.15 per cent). On the other hand, in other three undertakings it showed a negative growth rate (2.60 per cent in AMTS, 1.13 per cent in PCMT and 0.63 per cent in PMT).

8.6. TRENDS IN PRODUCTIVITY

In chapter- 6, the trends in partial productivity of labour, capital and material as well as the total factor productivity in Kendrick and Solow measures, during the period 1981 / 82–2000/ 01 have been analysed. The trends in productivity of selected SRPTUs are below:

8.6.1. TRENDS IN LABOUR PRODUCTIVITY

The labour productivity of all the SRPTUs had shown a declining trend during the study period. The average of LP had declined in most of the undertakings except PMT, where as its growth rate was meagre. A decline in growth rate of LP had been found in all the study units. The decline in LP was more in BEST (17.77 per cent) followed by PCMT (10.72 per cent), KMTU (6.84 per cent) and less than 3 per cent each in MTC, AMTS and PMT. The main reason for decline was over employment per bus when compared to the all India average of other SRPTUs. Further, it has been noted that the personnel cost
had increased year by year, but revenue had not increased proportionately due to socio-economic and political reasons.

8.6.2. TRENDS IN CAPITAL PRODUCTIVITY

The growth rate of capital productivity had shown a downward trend in all the selected SRPTUs. The decline had been more in PCMT, BEST, KMTU and AMTS, but less in MTC. The mean value of CP in all the units were less than that of the base year and the decline was more in PCMT (-81) and less in MTC (97). The negative trend in CP was comparatively higher in PCMT (19.48 per cent) and lower in MTC (2.90 per cent). This could be attributed to the existence of the comparatively lower growth rate of output than capital input in almost all the selected SRPTUs. The reason for this could be either the high capital investment in vehicles or the competition existing in the market or overage of vehicles. The average age of the buses was the highest in AMTS (11.82 yrs) followed by BEST (9.94 yrs), when compared to the average age of vehicle in other SRPTUs. Further, the adverse effect on the CP could be attributed to the increase in capital intensity.

8.6.3. TRENDS IN TOTAL FACTOR PRODUCTIVITY

The total factor productivity measured under Kendrick measure had declined in all the sample undertakings during the study period. On the other hand, in Solow measure TFP had declined only in BEST, AMTS and MTC, but in other three units it showed an increasing trend. The mean of TFPK had been comparatively more in PMT (105) and less in PCMT (-73). On the contrary, in TFPS the mean value had comparatively high in KMTU (164) and less in BEST (-202). The negative growth rate of TFPK was comparatively high in BEST (17.81 per cent) and low in PMT (0.06 per cent). On the other hand, the growth rate of TFPS was high in KMTU (16.06 per cent) and low in BEST (-32.17 per cent). The reasons for the decline in TFP under Kendrick and Solow
measures had attributed to the existence of comparatively lower growth rate of output than the weighted sum of the growth rate of labour and capital inputs in most of the selected SRPTUs. Further, it is noticed that the capital intensity had also adversely influenced the TFP.

8.6.4. TRENDS IN MATERIAL PRODUCTIVITY

A decreasing trend of MP had been reported in most of the undertakings in the study, except in MTC. The mean value of MP in most of the units had been comparatively more than base year level and it was more in MTC (118) and less in PCMT (51). The growth rate of MP had increased in three corporations, viz. MTC, AMTS and PMT but decreased in PCMT, KMTU and BEST. The rate of decline in growth rate was higher in PCMT (4.14 per cent) and lesser in AMTS (0.37 per cent). The reason for decrease in MP in all study units except MTC was due to more consumption of material input (vide Table 5.5 in chapter- 5).

8.6.5. TRENDS IN FUEL PRODUCTIVITY

The fuel productivity had shown an increasing trend in PMT, MTC and AMTS, whereas a decreasing trend in PCMT, KMTU and BEST. The mean value of FP had been comparatively more in PMT (119) and less in PCMT (46). The growth rate of fuel productivity had been increased in MTC (1.6 per cent), AMTS (0.21 per cent) and PMT (0.18 per cent), whereas in the remaining undertakings it had been declined during the period of study. The negative trend of FP was higher in PCMT (4.59 per cent) and lesser in BEST (2.49 per cent). The decrease in FP was due to increase in fuel cost than increase in gross revenue.
8.6.6. TRENDS IN TYRE PRODUCTIVITY

The tyre productivity had shown an increasing trend in PCMT, MTC and AMTS, whereas a decreasing trend in BEST, KMTU and PMT. The mean value had been more than base year in most of the units and less in KMTU and PCMT. The annual growth rate of TP had shown a positive trend in PCMT (1.86 per cent), MTC (1.57 per cent) and AMTS (1.24 per cent). On the other hand, it showed a negative growth of 3.10 per cent in KMTU, 3.03 per cent in BEST and 1.05 per cent in PMT. The reason for decrease in TP was due to more use of tyre input in KMTU, BEST and PMT when compared to the other corporations.

To sum up, the trends in LP, CP, TFPK, TFPS, MP, FP and TP indicate that the performance of SRPTUs is quite unsatisfactory with the exception of increasing trend of TFPS, MP, FP and TP in MTC, TFPS and TP in PCMT, TFPS in KMTU, FP and TP in AMTS and FP in PMT.

From the above observations, the following inferences are drawn:

Fare per passenger -kilometre had increased at a lesser rate than the increase in the cost of labour, capital and various components in material cost. This had led to the decline in labour productivity, capital productivity, total factor productivity and material productivity.

The decline in capital productivity and total factor productivity can also be traced to the increasing capital intensity.

The decline in load factor was one of the reasons for the decline in the output.

The size had influenced the labour productivity and total factor productivity in Kendrick measure in all the study units and capital productivity
in all units except in MTC. It had not influenced material productivity, tyre productivity and fuel productivity.

The capital intensity had promoted labour productivity in PMT and KMTU but was insignificant in other units. It influenced material productivity and fuel productivity only in PMT and AMTS. In PCMT it retarded LP, MP and TP. On the other hand, in PMT, AMTS, MTC and BEST capital intensity retarded capital productivity.

The load factor had promoted labour productivity and capital productivity in BEST and AMTS. It also promoted material productivity in PMT, KMTU and PCMT. It had influenced fuel productivity and tyre productivity in PMT, KMTU and PCMT.

The quality of service had promoted labour productivity in PMT only and retarded in BEST and KMTU. It promoted material productivity and fuel productivity only in BEST and retarded capital productivity, tyre productivity and total factor productivity in BEST. Further, it promoted total factor productivity and retarded both material productivity and tyre productivity in PMT. In PCMT quality of service retarded the tyre productivity and not influencing any productivity.

The labour management relations retarded labour productivity in BEST, MTC, AMTS and PMT. It retarded capital productivity in all the units except PCMT and retarded total factor productivity in BEST, MTC and AMTS.

8.7. DETERMINANTS OF PRODUCTIVITY

In chapter-7, the annual variations in LP, CP, TFP, MP, FP and TP have been regressed by five postulated determinants of factor productivity growth, viz. scale of operation or size of firm, capital intensity, quality of service, load factor and labour—management relations.
8.7.1. DETERMINANTS OF LABOUR PRODUCTIVITY

1. The regression co-efficient of net output turned out to be statistically significant in all the undertakings under study. It implies that there is a scope to increase labour productivity by increasing net output. However, net output has no impact on LP in MTC since it is not statistically significant.

2. The negative trends in statistical observations have been found in capital intensity in most of the sample units. Capital intensity had affected the LP in BEST, MTC, AMTS and PCMT adversely but in PMT and KMTU positively resulting in improved LP. However, LF is significantly positive only in three undertakings, viz. PMT, KMTU and PCMT indicating scope to increase labour productivity by investing more and more on fixed assets per labour. For instance, one per cent increase in K/L had led to an increase of LP by about 0.7 per cent increase in the case of PMT. This could be attributed to the productivity gains through the increasing capital intensity. On the other hand in PCMT, K/L had shown a decrease of 0.4 per cent in LP.

3. The most crucial factor for increasing labour productivity in BEST and AMTS was load factor. Since it was statistically significant and it has positively influenced the LP. However, LF had no impact on LP in MTC, PMT, KMTU and PCMT. It indicates that the growth in load factor had not generated LP in most of the study undertakings.

4. On the other hand, co-efficient of quality of service had been negative in all the study units except PMT and it was statistically significant in BEST and PMT. It shows that QS had affected LP only in BEST and PMT and had not affected in other four sample units. It implies that poor quality of service has adversely affected only in two sample units and in other four sample units it has not affected the LP.
5. Co-efficient of time had been significant with a negative sign in the entire selected sample SRPTUs. It implies that deteriorating labour–management relations had adversely affected labour productivity during the study period.

It is clear from the labour productivity function that net output, and labour management relations had found to be statistically significant in explaining variations in labour productivity in most of the selected SRPTUs. On the other hand, K/L, LF and QS were found to be statistically significant in explaining variations in LP in two or three sample undertakings. Generally, the growth of size, K/L and LF has been enhancing labour productivity, whereas the deteriorating QS and labour–management relations have been depressing labour productivity. Generally, the growth of size, K/L and LF increase LP, whereas the deteriorating QS and labour management relations depress Labour management.

8.7.2. DETERMINANTS OF CAPITAL PRODUCTIVITY

i. In most of the sample units co-efficient of net output had been positive and significant in explaining capital productivity. It implies that capital productivity had been generated by scale of economies in all undertakings.

ii. Capital intensity had been negative in all sample undertakings but statistically significant only in BEST, MTC, PMT and PCMT. Evidences indicate that increasing K/L had retarded CP in BEST, MTC and less in PCMT.

iii. The regression co-efficient of load factor had been positive in all sample units but statistically significant only in BEST, AMTS and KMTU. It implies that there is a scope to increase CP by increasing load factor in BEST, AMTS and KMTU. It appears that LF had no influence on the variations in the capital productivity of MTC, PMT and PCMT.
Generally, CP is generated by increasing load factor (proxy for capacity utilisation).

iv. The co-efficient of quality of service had been negative in all the study units, but significant in BEST and PCMT and had not influenced CP in the case of remaining four units, viz. MTC, AMTS, KMTU and PMT.

v. Further, the co-efficient of time had been significant in majority of undertakings but with a negative sign which indicates deteriorating labour-management relations had depressed capital productivity in majority of selected SRPTUs.

On the whole, the estimated equations had been found to be statistically good fit and with reasonably high explanatory power in all the sample undertakings. Net output, load factor and time were found to be statistically significant in explaining variations in capital productivity. Generally, the growth of net output, load factor and quality of service increase capital productivity, while the growth in capital intensity and deteriorating labour – management relations have been decline capital productivity.

8.7.3. DETERMINANTS OF TOTAL FACTOR PRODUCTIVITY

1. The co-efficient of net output had been positive and is statistically significant for the variations in TFPK in most of the selected SRPTUs. It implies that TFPK had increased by rising scale of production. On the contrary net output had been significant in PMT under Solow measure of TFP. However, net output had no impact on TFPK in PMT and PCMT as well as on TFPS in BEST, MTC, PMT, KMTU and PCMT.

2. The co-efficient of K/L had been negative and insignificant in almost all the sample units, whereas it had been positive and insignificant in most of the undertakings in TFPS and significant only in AMTS. It indicates that capital
deepening had adversely affected total factor productivity in Kendrick measure, whereas in TFPS it had not affected total factor productivity.

3. The co-efficient of load factor had been positive and significant in three sample units, viz. AMTS, PMT and KMTU in TFPK. Whereas, negatively insignificant in explaining variation in MTC and PCMT. Surprisingly, LF was significant only in PMT in explaining variations in TFPS. It indicates that the increase in load factor increases total factor productivity.

4. The co-efficient of quality of service had been negative in most of the sample units and statistically significant in accounting for the differences in TFPK in BEST, PMT and KMTU. Whereas the TFPS was positively significant in BEST and PMT, it was and negatively insignificant in other undertakings. It indicates that the quality of service has both the effects of increase and decrease in TFP under both Kendrick and Solow measure.

5. The relationship with time had been negative and significant in most of the sample undertakings except PCMT in TFPK. Whereas, it had been negative and significant only in BEST, AMTS and PMT in respect of Solow index. It implies that labour-management relations deteriorated total factor productivity in both TFPK and TFPS measures.

It is clear from the productivity function of TFP that net output and time had been found to be statistically significant in explaining variations under Kendrick measure of TFP in most of the simple undertakings. On the other hand, K/L, LF and QS are found to be statistically significant in two or three corporations explaining variations in TFP under Kendrick measure. On the other hand, time is found to be statistically significant in explaining variations in three undertakings, viz. BEST, AMTS and PMT under Solow measure of TFP. The remaining four variables are found to be statistically significant in one or two undertakings while explaining variations under Solow measure. Generally, while growth in net output and load factor generates total factor productivity and
capital deepening, quality of service and deteriorating labour-management relations depress total factor productivity.

8.7.4. DETERMINANTS OF MATERIAL PRODUCTIVITY

i. The regression co-efficient of gross output had been positive in most of the undertakings and insignificant in all the undertakings implying that there is no scope for increase in MP by increasing gross output.

ii. The co-efficient of capital intensity had been positive in most of the undertakings and statistically significant only in PMT in exploring variation of material productivity. Evidences indicate that increase in capital intensity will increase in material productivity.

iii. The co-efficient of load factor had increased the MP in all sample units under study but it is statistically significant only in KMTU, PCMT and PMT but had no influence in BEST, MTC and AMTS. It indicates normally the growth of load factor generates MP in most of the study units.

iv. On the other hand, the co-efficient of quality of service showed a positive impact and is statistically significant in BEST. It implies that the quality of service improved MP only in BEST and in other five undertakings it had no effect in MP.

v. Co-efficient of time had insignificant with a negative sign in almost all the sample units selected for study. It implies that deteriorating labour-management relations adversely affects material productivity during the study period.

It is clear from material productivity function that except co-efficient of load factor variable, other four independent variables’ co-efficient were found to be statistically insignificant in explaining variation of material productivity in
almost all the study undertakings. Generally, the growth of gross output, capital intensity and load factor increase material productivity and the deteriorating quality of service and labour–management relations depress material productivity.

8.7.5. DETERMINANTS OF FUEL PRODUCTIVITY

1. The regression co-efficient of gross output in MTC, KMTU and PCMT showed a positive impact, but in BEST, AMTS and PMT, it showed a negative impact on fuel productivity. In all units it is not statistically significant. It implies that gross output has no impact of FP in all the single units understudy.

2. Capital intensity had positive in most of the study units but statistically significant only in AMTS and PMTS in explaining the variation in FP in all the selected SRPTUs. It indicate that there had been a scope for improving FP only in the above two units by investing more and more fixed assets per labour.

3. The load factor had positive in all the study units. But it is statistically significant in BEST, PMT, KMTU and PCMT and has no impact in MTC and AMTS, since its regression co-efficient is insignificant. It indicates that the growth of load factor had generated fuel productivity only in four undertakings, viz. BEST, PMT, KMTU, and PCMT.

4. The co-efficient of quality of service had positive in most of study units, whereas it is statistically significant only in BEST. It showed that quality of service had improved fuel productivity only in BEST and in other undertakings it had no effect on fuel productivity.
5. Co-efficient of time had insignificant in all the study units. It implies that deteriorating labour-management relations had not affected the fuel productivity during the study period.

It is clear from the fuel productivity function that co-efficient of LF variable had influenced FP only in BEST, KMTU, PMT and PCMT, capital-intensity had influenced AMTS and PMT, whereas QS had influenced BEST and labour-management relations in PCMT and size had no influence in any one of the sample undertakings. Generally, the growth of gross output, load factor and quality of service influence the fuel productivity, while the growth in capital-intensity and deteriorating labour-management relations decline the fuel productivity.

8.7.6. DETERMINANTS OF TYRE PRODUCTIVITY

1. The regression co-efficient of gross output showed both positive and negative impact of tyre productivity in the sample units, but is statistically significant only in PMT and PCMT. It implies that gross output had no impact in most of the study undertakings.

2. The co-efficient of capital intensity had positive in most of the sample units and is statistically significant in PMT. On the other hand, in PCMT and BEST, capital intensity retards FP. Evidences indicate that the increase in K/L had increased TP in PMT and had decreased in PCMT and BEST.

3. The co-efficient of load factor had found positive in most of the undertakings and is significant and promotes in BEST and PCMT, whereas insignificant and negative in AMTS and PMT. It indicates that the increase in load factor had increased TP in BEST and PCMT.

4. The co-efficient of quality of service had found negative in all the sample units and is statistically significant only in BEST, PMT, and PCMT, whereas
in the remaining undertakings it had no effect. This indicates that the quality of service had retarded TP only in BEST, PMT and PCMT.

5. The relationship with time had positive in most of the sample units and is statistically significant in PCMT. It implies that labour-management relations had influenced tyre productivity only in PCMT.

It is evident from the tyre productivity function that co-efficient of LF had influenced TP in BEST and PCMT. Labour-management relations had influenced TP only in the PMT K/L had retarded tyre productivity in BEST and PMT and gross output had retarded tyre productivity in PMT and PCMT.

To conclude, it may be summed up as follows:

➢ Labour and capital productivities had declined in all the selected units during the study period.

➢ Total factor productivity had increased only in PCMT, KMTU and MTC.

➢ Material and fuel productivities had been achieved in MTC, AMTS and PMT.

➢ Tyre productivity had been quite encouraging in most of the units except in KMTU and PCMT.

➢ The decline in labour, capital, total factor and material productivities had been influenced more by the increase in the cost of labour input, capital input and various components of material inputs than by the lower rate of increase in output (total revenue).

➢ Except size, other factors, viz. capital intensity, load factor, quality of service and labour management relations had retarded both labour productivity and capital productivity in most of the study units.
Size, load factor and capital intensity had positively influenced total factor productivity; whereas, quality of service and labour management relations had retarded total factor productivity in most of the study units.

Load factor had influenced material productivity in all the units and capital intensity in PMT and AMTS. Further, the quality of service had retarded material productivity. Besides, the fuel productivity had been influenced by load factor in most of the units and capital intensity in AMTS and PMT only, whereas the quality of service had promoted fuel productivity in BEST only. Furthermore, tyre productivity had been retarded by capital intensity and quality of service in most of the units.

SUGGESTIONS

In view of the above conclusion, the following suggestions are offered to improve productivity in the selected State Road Passenger Transport Undertakings:

♦ During peak hours, when there is demand for a full bus load, more number of non-stop or limited stop bus services may be operated especially between important destinations. This will attract the city commuters and as a result, it will help to improve productivity by increasing output (both in terms of passenger-kilometres and revenue).

♦ Proper evaluations of routes and occupancy rates in each stage are very important for changing the route pattern and by eliminating un-remunerative stages. This will help to reduce excess capital investment in buses. As a result, the capital productivity will improve.

♦ The fares charged by SRPTUs are generally lower than the economic costs resulting in operating losses. The system which does not recover the economic costs may not be justified on the principles of economic theory,
and therefore, periodical fare revision deepening upon cost ratio will certainly improve the productivity may be implemented at least once in every two or three years.

♦ Improved load factor will give additional passenger-kilometres and so additional revenue. It can be done through economically viable route planning and crew scheduling. It helps to improve output and thereby increases productivity.

♦ Pilferage and revenue leakage must be effectively tackled to avoid any drain on the productivity.

♦ An effective work pattern must be put in place so that maximum work output is achieved with minimum staff strength. The staff per vehicle has more as a result, the labour cost increased there by reduced labour productivity. Hence staff strength must be in conformity with labour productivity.

♦ The fall in passenger-kilometre is mainly due to i) people preferring rail travel as the fares are comparatively low; ii) people using the personal transport iii) clandestine operators taking advantage of the situation by operating tempos, matadors and vans normally used for carrying goods for passenger transport and iv) shrinking travel activity due to fall in quantum of travel performable.

♦ Fuel consumption is very much dependant on the number of stops, a vehicle has to perform in a day. Frequent changes in gears, acceleration and stopping increases the fuel consumption. One way of improving fuel conservation is to rationalise the number of bus stops by avoiding frequent stopping. This will in turn improve fuel productivity.
Material cost per passenger-kilometre can be reduced with efficient inventory control, purchase policy, reclamation of engine and spares and retreading of tyres. As a result the material productivity will increase.

Poor maintenance of engine and other parts contribute to nearly 5 per cent of additional fuel consumption. Therefore, higher importance is to be given to the maintenance of vehicles, particularly when they get older. This problem is generally occurring in almost all the undertakings under study because the average age of the total fleet is 9 to 11 years. This will influence material productivity and fuel productivity.

The SRPTUs would do well if they properly utilise their human capital through practising better human relations. This can be achieved through proper co-ordination and motivation, thereby help to achieve a higher output with the existing labour input. This will increase productivity.

The quality of service can be improved by reducing accidents. Accidents can be reduced by giving proper training to drivers and also by providing attractive incentives for accident-free driving. A reduction in accidents will in turn, improve productivity.

As the breakdown ratio has its impact on productivity, it must be brought down by tuning the engines periodically. And engine maintenance can be improved by offering incentives to work shop maintenance staff. The outgo on incentives will be amply off set by the loss of revenue due to breakdowns.

Transit time reduction may be achieved through an appropriate infrastructure measures, changes in the service level and increased transit ridership. If vehicle travel time decreases, the average speed of the vehicle increases which in turn increases the productivity of the vehicle.
Though the responsibility for productivity improvement rests with management, it extends to the employees, commuters, as well as the Government. With the joint efforts of all, the management can initiate any novel method to achieve the said objectives.

Inter connectivity of functional units of SRPTUs will facilitate management decision making and thereby improve productivity.

To be precise, the survival of SRPTUs depends on improvement of their productivity in labour, material and capital in various aspects. Thus, the problems high-lighted in this study may necessitate an exhaustive study on the productivity branchwise of each SRPTUs.