CHAPTER – 2

REVIEW OF LITERATURE
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2.1. INTRODUCTION

Transport, in spite of its two dimensional role of creating time and space utilities in the economic development of the country, has not been given adequate importance by the researchers in the past. Since sizeable amount of national resources are tied up in the STUs, a need for measuring their performance in terms of productivity becomes very vital. A number of previous studies on transport industries are readily available in respect of concept, causes and consequences of productivity changes but the studies undertaken on productivity of city services in India were not comprehensive. Hence, it is humbly claimed that the present study, though not fully innovative, is a step in the direction of an indepth examination of trends and determinants of productivity in STUs. To have a comprehensive idea of studies on productivity, a brief review of previous studies is essential. The following are some of the important studies worth referring to in this context.

2.2. PRODUCTIVITY STUDIES IN TRANSPORT SECTOR

The productivity studies made in India and in other countries on various modes of transportation are presented briefly here.

Deakin and George (1965)\(^1\) analysed productivity trends in service industries including urban passenger transport. The most detailed studies of transportation productivity in the United States were conducted by John Kendrick (1966)\(^2\) who studied transportation productivity in the United States. He developed indices of output, inputs, partial and total factor productivity estimates for the transportation industry in the United States for the period from
1948 to 1964. He analysed the productivity separately for rail, air and water ways, local passenger transit, intercity bus and intercity motor trucking. He made use of number of workers as well as man-hours as labour input and revenue passengers as output.

Deakin and Seward (1969)\(^3\) conducted a study on total factor productivity and labour productivity in British Transportation Industries. They used passenger miles as output which was derived by weighting disaggregated passenger mile statistics by base year relative prices. They used man-hours as labour input and capital stock as capital input by using changes in the capital stock valued at replacement cost in base year prices. They concluded that productivity change was influenced by labour skill and managerial efficiency.

The study of the Governor's Task Force on Transportation (1970)\(^4\) analysed the productivity of Boston Metropolitan Mass Transit System with similar mass transit systems in four other cities of the United States. They used vehicle miles as output to measure labour productivity.

Legris's (1971)\(^5\) study was based on measuring and improving productivity in urban passenger surface transport. Roy Choudhury (1971)\(^6\) proved in his study that capital had been a significant input factor in increasing railway service in 1950/51.

The two studies by the Bureau of Labour Statistics as quoted by Rayomond Scheppach et al. (1975)\(^7\) were also relevant. In the first study, production functions for 1956 and 1963 were fitted from individual railroad company data. It used the weighted average of passenger as well as freight charges as output, whereas the number of employees was considered as labour input for measuring labour productivity. An equation for forecasting the relationship of productivity wages and output prices was suggested and the role of capital in the production process was totally ignored. The second study
focused on the derivation of labour productivity measures for regulated portions of the transportation industry. The main contributions of this study were data source specification and the problems encountered in quantifying output and labour input.

The Economic Unit of Railway Board (1975)\(^8\) studied the productivity trends in railways for the period 1960/61-1972/73. They found that an increase in capital stock and employment together accounted for about 98 per cent of the rise in output. The study further stated that if other things remained the same, employment increase would not make any significant addition to output. On the other hand, the additional capital input was the main factor responsible for the growth of output.

Anantha Ramaiah (1976)\(^9\) used certain concepts for measuring internal and external productivities. The internal productivity measures were fleet utilisation, fuel efficiency, service cost, revenue per kilometre operated, etc. External productivity measures related to the service rendered to the consumers such as average waiting time for service, average journey time, safety and comfort.

Santhosh Sharma (1976)\(^10\) made a pioneering study in the productivity parameter in road transport system and also discussed economies and diseconomies in nationalised bus operation in the areas of fuel, tyre management and traffic management.

Sathyanarayana (1978)\(^11\) analysed productivity through cost reduction in Andhra Pradesh State Road Transport. To achieve cost reduction in the areas of fuel, tyre, store and personnel, he advocated having a sound system of technical, operational and managerial control in the organisation. Cost reduction measures substantially improved the productivity in all the major areas as stated above during the study period.
Jayasanker (1979) made an attempt to evaluate the efficiency of Andhra State Road Transport Corporation with regard to labour, capital and total factor productivity, wage rate, utilisation of capital assets, product prices, quality of service and retained earnings.

Sathyanarayana Rao (1981) used vehicle productivity index and labour productivity index to measure efficiency. Vehicle productivity index revealed the optimum vehicle utilisation. He used seat-kilometres per unit of labour cost as well as seat-kilometres per employee to calculate labour productivity index.

Maheshchand (1981) measured labour and capital productivity by using passenger seat-kilometres as output, and number of persons employed as labour input and fleet held as the capital input. He concluded that the productivity of the State Road Transport Corporation, which was operating with more than 1500 buses in mofussil services, was higher than in city services.

Ganeshan (1982) in his study on labour and work system concluded that the management had a greater role to play in improving the productivity of labour and vehicles.

Dalvi and Srinivasan (1983) while analysing productivity of State Transport Undertakings in India found that productivity increase was mainly due to the increase in fuel efficiency, increase in output due to the increase in the utilisation of vehicle and generation of more vehicle-kilometre.

Venkateswaralu (1984) used physical and financial terms of output to analyse the productivity of Indian Airlines. He used gross value added as financial output; and estimated labour and capital productivity as well as capital intensity.
Santhosh Sharma (1985)\textsuperscript{18} in his book on "Productivity in Road Transport - A Study in Innovative Management" pointed out that sound organisational framework and management system play an important role in increasing productivity.

Moshe Kim (1985)\textsuperscript{19} measured intertemporal efficiency differentials in the bus transport sector and calculated average cost differentials through time. These average cost differentials were decomposed into the factor inputs, scale economy and efficiency. He used two basic functions, viz. production function and cost function for analysing productivity. Since the direct estimation of production function is problematic, he used cost function for productivity analysis. He concluded that average cost had declined and efficiency had risen in bus transport. His result contrasts with the experiences in other transport sectors.

Agarwal (1987)\textsuperscript{20} observed an increasing trend of labour, total factor productivity and a decreasing trend of capital productivity in the Indian Airlines and the Air India. He recommended that the management should pay special attention to the use of capital resources. He concluded that total factor productivity is directly related to labour and capital productivity.

O' Donnel Obeng (1987)\textsuperscript{21} studied 77 bus transport systems using extensive cross section data set compiled from the United States Urban Mass Transportation Administration Statistics. He concluded that the capacity utilisation, route miles, the peak hour bus ratio and the ratio of staff had inverse relationship with labour, fuel, capital and total productivities, whereas speed and the ratio of employer to employee had direct relationship with productivities.

Gowhance (1989)\textsuperscript{22} stated that productivity is the best means to bridge the gap between cost and revenue. In State Transport Undertakings labour productivity and vehicle productivity are considered as critical for maximising
revenue and profit. He also stated that load factor, age of vehicle etc, also influence productivity.

Sumanth (1990)\textsuperscript{23} pointed out that capital investment, capital intensity, capital utilisation, government regulations, labour unions influence and management are some of the factors that affect labour productivity.

Oum (1992)\textsuperscript{24} assessed productivity using index number, regression analysis, operation research based technique and data envelopment analysis.

Muraleedharan (1994)\textsuperscript{25} attempted to analyse the relation between the profitability and productivity in selected State Transport Undertakings in India. He concluded that i) net profit is not related to the productivity of factor used; ii) high positive correlation exists amongst operating margin, fuel and capital productivity. However, operating profit is independent of labour productivity and tyre productivity; and iii) close relationship exists between total factor productivity and operating profit.

Hensher and Daniel (1995)\textsuperscript{26} explained the cost efficiency and cost effectiveness of private and public bus operators in Australia. They analysed the total factor productivity and partial productivity of labour, capital and energy.

David et al. (1995)\textsuperscript{27} analysed the public bus operators in Australia. The gross total factor productivity index for each operator together with a partial productivity indices of labour, capital, maintenance and other inputs are reported and regression based analysis was undertaken to establish the regulatory influences on relative productivity for the period 1991/92.

Krishnan (1995)\textsuperscript{28} examined the trends in and determinants of productivity of selected State Transport Undertakings in Tamilnadu. He analysed productivity in terms of labour, capital productivity as well as total factor productivity using Kendrick and Solow measure. He used value added in real
term as output, wages and salaries in real term as labour input, and gross fixed
assets in real term as capital input. Further, he used scale of operation, capital
intensity, load factor and labour management relations as independent variables
to find out the factors that influence productivity. He concluded that almost all
the productivity (LP, CP, TFP) declined in his sample units. The reasons for the
decline in productivity were the size of organisation and the labour management
relation in most of the undertakings in his study.

Pierre Wunsch (1996)\textsuperscript{29} analysed labour productivity of urban transit
systems in Europe. He used conveyance kilometre as well as seat-kilometre as
output and number of employees as labour input.

Made Gowda (1996)\textsuperscript{30} made an attempt to evaluate manpower
productivity of almost all the STUs in India during ten year period ending
1993/94. He concluded that the unremunerative fares, delay in the revision of
fares, inadequate fare revision, incessant increase in the prices of inputs and
social costs borne by STUs, in addition to the inefficiency of human resources
result in a fall in man-power productivity.

Agarwal (1997)\textsuperscript{31} used a number of parameters, viz. more vehicles and
fleet utilisation, more average daily kilometre, high occupancy ratio, less bus
staff ratio, minimum breakdown and accident, conservation of fuel, increased
life of tyres, improving services routes, staff productivity, minimisation of
cancellation, delay to evaluate performance of vehicle, labour, capital, fuel
productivity and profitability.

Michael water and Fok (1997)\textsuperscript{32} estimated partial productivity and total
productivity of Canadian National Railway and Canadian Pacific Rail
throughout the period 1956/91 using index number procedures. In order to make
absolute comparison as well as overtime, multilateral indices were used. They
used single factor productivity and compared their performance with US Rail
Industry. They applied multilateral Tomquist index of total factor productivity.
They concluded that both railways showed modest improvement in aggregate capital productivity over the years. The material productivity had declined in both railways prior to 1981 and then after the growth of productivity slightly increased. The total factor productivity growth of Canadian Railways lagged behind the US railways' performance during 1980s.

Varghese and Dingra (1998)\(^{33}\) analysed the role of urban bus transport system. They stated that poor co-ordination between supply and demand at peak hours, traffic congestion, low operating speed, operation of uneconomic routes, lopsided operational policies, decline in load factor, low labour productivity, increase in price of inputs, delay in revision of unremunerative fares were some of the reasons for running of urban bus companies at a loss.

Bhuvaneshwari (1997)\(^{34}\) analysed the partial and total factor productivity of 12 STUs in Tamilnadu for a period of 12 years. She used value added in real term as output, total number of employees as labour input and gross fixed assets in real term as capital input. She used Kendrick and Solow index for measuring total factor productivity. She concluded that the partial, factor productivity of labour and capital had declined, whereas the total factor productivity increased in most of the units in her study.

Ramanathan (1999)\(^{35}\) examined the productivity assessment of twenty nine public sector organisations in the bus transport systems in India. Most of the undertakings were using their fuel efficiency, whereas capital stock and labour were not used efficiently. The age of fleet, nature of terrain, average number of passenger per bus per day and the proportion of urban services were the significant factors affecting the productivity. He used fleet size as capital input, total number of staff as labour input and diesel consumption as material input. Passenger kilometre was employed as output. He concluded that of the twenty nine operators considered in the study, only two were found to be relatively efficient.
Cantos et al. (1999)\textsuperscript{36} in their study used frontier approach to analyse total factor productivity in European Railway Companies by using Malm Quist Productivity Index. They used a non-parametric approach that enables changes in productivity due to variation in efficiency and technical changes. Improvement in technology was the only factor that influenced productivity. Further it was found that the high degree of autonomy was the root cause for the technological development.

Muraleedharan (1999)\textsuperscript{37} analysed the labour and capital productivity of Kerala State Road Transport Corporation with other STUs in India for a period of 12 years. The output was measured as fleet kilometre, capital as the number of buses on the road and labour as the number of staff members on duty. Economies of scale and efficiency were estimated using Cobb-Douglas production function. The results of the estimation were remarkable. He found that labour was more utilised, while capital was utilised to a lesser degree. Output elasticity of labour was much higher than that of capital. He came to the conclusion that fleet utilisation and bus utilisation in KSRTC were much lower than in the counter parts in other State Transport Undertakings.

Sri Sanjay Kumar Singh (2000)\textsuperscript{38} estimated the growth and relative level of productivity of the STUs for a period of 14 years using index number approach. The estimates of TFP were also compared with revenue PKMs per employee and available PKMs per employee. Productivity indices were computed to evaluate the productivity growth in passenger road transport industry. He found that TFP was positively related to output and load factor.

Made Gowda (2000)\textsuperscript{39} attempted to test the hypothesis that the city transport services is a big burden on the State Road Transport Corporation in India. Fuel productivity, kilometreage fuel cost, kilometreage total cost, kilometreage revenue cost recovery index and kilometreage profit or loss were
used to test the hypothesis. He concluded that the hypothesis framed was an acceptable one.

Sanjay Kumar Singh (2001) revealed in his analysis of 9 STUs covering a period of 14 years that most of them recorded productivity growth overtime and cost savings through technological changes. In the initial years of the study, only 5 STUs exhibited productivity growth, whereas at the end of the study period all the 9 STUs exhibited productivity growth. During initial years, average operating cost was the minimum at the production level of 10-15 billion PKMs, which increased to 15-20 billion PKMs during the end of the study period. He pointed out that the operating cost depends not only on technological progress but also on the level of production, operating characteristics and input factor prices. The technological changes indicate both productivity growth as well as changes in the structure of technology.

2.3. PRODUCTIVITY STUDIES IN OTHER SECTORS

The following studies made on productivity in public enterprises other than SRPTUs are found necessary and hence they are included.

Balakrishna (1953) in his study claimed that the measurement of productivity was done in terms of unit labour requirements. He employed physical output per man-hour in the case of individual industries. They were useful in making inter regional comparison but when two periods of time were taken into account, they did not lend themselves to easy computations.

Beri (1962) estimated partial and total factor productivities index for cement, cotton textiles, iron and steal and sugar for a period of eight years. His study revealed an evidence of increasing return to scale, high efficiency, and increased capital intensity, presence of technological change and low elasticity of substitution in sugar industry.
Mukerji (1963)\textsuperscript{43} in his study made an attempt to find the effect of localisation on productivity assuming other factors remaining more or less constant. He concluded that localisation had no effect on productivity indices.

Diaz Alejandro (1965)\textsuperscript{44} analysed labour productivity differentials between industries in USA and Argentine Republic. Labour productivity differentials between underdeveloped and fully industrialised countries should be larger in labour intensive industries than in capital intensive industries. The general tendency verified in this study did not significantly hamper the likelihood of substantial industrial exports from semi industrial countries.

Mukarji (1966)\textsuperscript{45} examined productivity movements in Jute and textile industries from 1900 to 1958 and found that productivity and real wages were almost completely unrelated except for a brief period.

Rajagopalan Sivamaggi and Venkatachalam (1968)\textsuperscript{46} examined trends in wages in eight different product industries and compared them with trends in labour productivity. The index of labour productivity was constructed from the figures obtained by dividing value added in constant process of man-hours. The increase in labour productivity may be partly associated with the increase in fixed capital per unit of labour and improvement in management techniques.

Raj and Mehta (1968)\textsuperscript{47} examined the capital intensity and the productivity of labour and capital for large scale industries during 1946/63. They measured labour productivity by value added per employee and capital productivity by value added per unit of capital. They observed that capital intensity had increased by nearly 100 per cent between 1948-53 and 1958-63.

Sinha and Sawhney (1970)\textsuperscript{48} analysed wage productivity relationships in cotton textiles, cement, sugar, jute, paper and paper products for a period of 14 years. They concluded that increase in productivity ranged from 4.7 per cent in
cement and sugar whereas it was 1.9 per cent per annum in cotton textiles. Total factor productivity also increased over a period of time in these industries.

**Benerji (1971)**\(^{49}\) analysed partial and total factor productivities in Indian manufacturing industries from the year 1946 to 1964. Labour productivity was measured by gross value added per person and capital productivity by dividing gross value added by capital. He concluded that increase in labour productivity was achieved mostly through capital deepening and decline in capital and total factor productivities for the study period.

**Annamalai (1978)**\(^{50}\) in his study computed both partial and total productivity ratios by using Kendrick measure. He concluded that total factor productivity increased by about 1.3 per cent per annum for the whole period in the case of Indian cotton textile industry and 0.5 per cent increase in the case of Tamilnadu cotton textile industry.

**Mehta (1980)**\(^{51}\), who examined productivity in cotton industry, computed partial and total factor productivities by Solow and Kendrick measures. The total factor productivity measured by both measures showed a downward trend. Labour and capital showed a diverse trend. Labour productivity in many industries increased significantly. However, capital productivity did not increase but decreased in many industries. Labour and capital showed an inverse relationship. Accordingly, he concluded that capital intensity need not increase labour productivity.

**Jaishankar (1982)**\(^{52}\) attempted to find the interrelationships between productivity, output, employment and cost: using labour productivity as the criterian and median as the statistical tool. He selected a group of 23 industries and divided them into ‘high productivity industries’ group and ‘low productivity industries’ group. The study indicated that Indian industries had on the whole become more capital intensive during the period of study.
Arya (1982) analysed productivity trends of the Mysore Cement Company Limited from 1966 to 1975. Labour productivity and capital productivity had exhibited an increasing trend till 1971 and then declined. On the contrary total productivity showed an increasing trend during 1973-75, while the combined productivity of labour and capital showed an upward trend during 1970-72.

Mukherji (1983) measured partial and total factor productivities and its growth in the factory sector of Bihar and made comparison with All India Trends during 1950-67. His study revealed that the index of labour productivity of Bihar just about doubled, while at the All India level, the increase was more than double. Capital productivity index at the State level and All India level declined by as much as 71 per cent and 67 per cent respectively. The index of total factor productivity declined significantly both at the State and the All India levels. The rate of decline was marginally higher at the state level.

Arun Ghose (1984) examined some efficiency parameters of the steel, cement and sugar industries. He highlighted the reasons for the low productivity and brought out the absence of any direct link between investment and efficiency. He pointed out that the private sector sugar industry was by and large highly inefficient today and that the totality of policies affecting the sugar industry was not calculated to promote efficiency and higher productivity.

Alam Khan (1984) observed that labour productivity and capital labour ratio had increased, whereas capital productivity had declined in manufacturing industries of Bihar. On the other hand, capital productivity had declined as a result of capital deepening and substitution of capital for labour. Further, the Solow measure of the total factor productivity had declined steadily in most of the selected industries.
Annamalai (1986)\textsuperscript{57} analysed the relationship between productivity and price. He used unit factor cost and partial factor productivity to compute the overall unit cost and total factor productivity relationship between these measures and price index to compute the overall unit cost and total factor productivity. He found a declining tendency in total factor productivity which caused the cost of production to increase. Increase in labour productivity was equally matched by increase in the wage rate. Invariably capital productivity declined in all manufacturing industries. In a majority of study units, negative trends in material productivity were noticed.

Dabir Alai (1987)\textsuperscript{58} estimated total factor productivity rates for the large scale manufacturing industry using Kendrick and Solow measures for a period of six years. His study concluded that the manufacturing sector was dominated by industries whose total factor productivity had remained positive over the period.

Arunday Saha (1987)\textsuperscript{59} reviewed labour, capital and total productivities by applying Craig and Harris model and Taylor and Davis model. He pointed out that technology, management, motivation, culture, skill and education were some of the factors influencing productivity.

Singh and Ahamed (1991)\textsuperscript{60} attempted a study of production efficiency of automobile industry in India between 1965 and 1985. They found that the labour productivity in the case of industry as a whole and motor vehicles and parts specifically had registered an increasing trend. On the contrary, capital productivity in the case of industry as a whole had declined over the period.

Ahluwalia (1991)\textsuperscript{61} attempted to analyse the long term trends in total factor productivity and partial productivity in the organised manufacturing sector in India for a period of twenty seven years. The role of factor input growth and total factor productivity growth in value added were also explored. For almost all the 63 industries, capital intensity showed a strong and significant upward
trend. Labour productivity showed a significant positive growth for fewer industries accounting for 64 per cent of the value added in manufacturing. The trend in capital productivity was dominantly downward.

Sawhney (1991)\textsuperscript{62}, while explaining material productivity, highlighted selection of appropriate method of stocking, handling and processing of materials, reclaiming wastage or salvage as some of the factors which affected overall material productivity. He claimed that improvement of material productivity could be regarded as a continuous process and pointed out some factors as generally responsible for a low productivity.

Samir (1991)\textsuperscript{63}, while explaining the measurement of operational efficiency, used partial productivity measurement. Both sales value and quality were taken as output and these were weighted by standard selling price selected for the base year. Wages and salaries and net value of fixed assets and networking capital at real value were taken as input for labour and capital productivity.

Chandrasekaran and Sridharan (1993)\textsuperscript{64} estimated total factor productivity and partial factor productivity of cotton industry in India for a period of 14 years. They used estimates of input elasticities, neutral technical progress, returns to scale, Cobb-Douglas production function, constant elasticity of substitution and variable elasticity substitution. They found that labour productivity had increased at a higher rate than capital productivity. Low capital productivity observed in their study was due to managerial factors. They concluded further that the organisational factors such as managerial skill, morale and motivation of work force contributed to a better utilisation of capital and labour.

Anita (1993)\textsuperscript{65} analysed total factor productivity and partial factor productivity for various public sector groups from 1971/72 to 1987/88. For estimating the growth rate of total factor productivity, Cobb-Douglas and
constant elasticity substitution production function were used. She concluded that the estimates to total factor productivity for steel group and consumer group showed a falling trend.

Gangadhara, Deyar and Yedapathithaya (1993)\(^66\) also evaluated the trend of partial and total factor productivity of public enterprises. They concluded that labour and capital productivity had not been to the desired efficiency level and total factor productivity indices also showed negative growth due to under utilisation of capacity.

Kinchang Soo (1994)\(^67\) employed the Malm Quist Index to measure productivity growth for a sample of newly industrialising countries as well as Japan over a period of 14 years. This Index allowed the identity whether efficiency change or technical change improved productivity. He concluded that the technical change significantly drove productivity growth, whereas improvements in efficiency were insignificant.

Hina Sidhu (1995)\(^68\) examined partial and total factor productivity for a period of 12 years. He concluded that capital productivity recorded lower growth rate than the labour productivity due to increasing capital intensity resulting from modernisation of existing plants and adoption of improved process technology by the new industrial units. On the other hand the total factor productivity registered an increasing trend in all manufacturing industries.

Deepak Gupta (1995)\(^69\) analysed the partial and total productivities trends using value added in Indian capital goods industry and its three sub groups, viz. non-electrical machinery, electrical machinery and transport equipment. It revealed that capital goods industry was going through a process of capital deepening. The continuous decline was found in capital productivity in all the three sub-groups of capital goods industry together with continuous increase in labour productivity. On the other hand, capital intensity indicated that
capital deepening was yet to reflect in capital efficiency. A negative total productivity growth was recorded by non-electrical machinery group in the latest period.

Agarwal (1995)\textsuperscript{70} used turnover per employee, value added per employee, net worth per employee, profit tax per employee, training cost per employee ratios for evaluating productivity and performance of human resources.

Pendse, Baghel and Chaubey (1996)\textsuperscript{71} examined the productivity trend in Vanaspathi Ghee industry for the period from 1973/74 to 1988/89. They used gross value added as output. For capital input, gross fixed assets and for labour input the total emoluments were used. For analytical purposes labour, capital, material productivity and capital intensity were considered. Total factor productivity was also analysed by using Kendrick and Solow index. They concluded that labour, capital, material and total factor productivities in Kendrick index showed a positive trend. On the contrary, Solow index of total factor productivity showed a negative growth.

Ghosh (1997)\textsuperscript{72} observed that in the Malaysian manufacturing sector, the growth of labour productivity depended on output growth. He applied two main specifications of Verdoorns law viz. Kaldorian and Rowthornian. Verdoorn’s law is applicable to this sector although the value of coefficient was not as high as was originally found by Verdoorn. However, although the correlation between output growth and labour productivity was not very high, the direction of causality was the same as was found by Verdoorn.

Johnson (1998)\textsuperscript{73} measured labour productivity by using alternative labour inputs, viz. output per worker, output per rupee of wages and contribution per worker. He found that units of continuous Kiln achieved higher productivity as output per worker and contribution per worker were the highest in modern
technology based factories, whereas productivity differed according to the types of Kilns used in the tile factories.

Kumar (1999)\textsuperscript{74} analysed the trend of partial and total factor productivity using Kendrick, Solow and Divisia indices. The temporal variation in total factor productivity and partial productivity was estimated and it was concluded that there existed inter sectoral difference in productivity trend, while the labour productivity and capital intensity increased, the capital productivity decreased. A positive relationship was observed between total factor productivity and output, whereas a negative relationship was found between total factor productivity and labour- management relations.

Saurabh (2000)\textsuperscript{75} analysed inter- temporal changes in the level of total factor productivity growth in India during 1973/74 and 1995/96. He used capital – labour ratio, skill composition, export intensity, import substitution and industrial concentration as explanatory variables. He concluded that a strong positive relationship was found between total factor productivity growth and output growth. He also stated that import substitution variables were found to have a significant and positive effect on total factor productivity growth in a number of industries.

Radam et al. (2000)\textsuperscript{77} made an attempt to evaluate the efficiency of Malaysian manufacturing industries. They used stochastic frontier production function approach and Cobb-Douglas production function with neutral technological progress using value added and two factor inputs, viz. capital and labour. They concluded that firms with intensive capital achieved rapid growth while those labour intensive firms experienced only minimal increase in efficiency. Factors like captive technology and sources of raw products were important parametres in determining the efficiency levels of firms in the manufacturing industry.
Mohi-ud-Din (2001)\textsuperscript{78} analysed labour, material, overhead and overall productivity in Indian Telephone Industry. He pointed out that labour, material and overhead productivity showed downward trend. The overall productivity also showed downward trend.

Yanrui Wu (2001)\textsuperscript{78} covered 56 steel firms for a period of eight years (1990 - 1997). He used five alternative models viz. the absence of environmental influences, the presence of environmental influences, the environmental factors affecting technical efficiency and technology of production, non-neutral effects of environmental and non neutral effects of environmental factors on both technology and technical efficiency to analyse the influence of environmental factors on productivity performance. He pointed out that environmental factors affect efficiency changes and the structure of production technology.

2.4. CONCLUSION

It is clear from the above review of the studies undertaken in transport sectors that only a few studies have been made on productivity of passenger transport undertakings operating city services abroad (Deakin in 1965 Legris in 1971 and O’ Donnel 1987). In India, Varghees and Dingra in 1998 studied productivity in urban operation of STUs. No researcher has undertaken a detailed study on productivity of STUs operating mainly city service. Hence, the researcher has made an attempt to study solely the SRPTUs operating city services only which will go a long way in filling the gap in the research studies in this area.

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