Chapter – II

Review of Literature
2.1 INTRODUCTION

This chapter deals with the brief review of literature relevant to the study. The reviews presented in this study were related to the Indian Railways and foreign Railways. To have a comprehensive idea of these studies on operational efficiency, a brief review is desirable and also an attempt is made to identify the research gap.

2.2 REVIEW OF LITERATURE

Johan Holmgren (2013)\(^1\) evaluates the efficiency of public transport operations undertaken in Swedish countries using stochastic frontier analysis with annual data from 1986 to 2009 for 26 Swedish countries. He observed that the cost efficiency as the ratio of minimum cost to observed cost, the overall (average) cost efficiency for the industry fell from 85.7 per cent in the eighties to 60.4 per cent for the period from 2000 to 2009. Possible explanations for the development include increased emphasis on route density as well as higher environmental and safety requirements.

Bogart and Chaudhary (2012)\(^2\) have analyzed the trends in Indian Railways performance, the effects of ownership and regulatory policies, and the impact of railways on the Indian economy. Authors signified that the dividend guarantees and government ownership had effects on Railways performance. There is an increasing market integration and national income that could have used to aid Indian economic development.

Bogart and Chaudhary (2012)\(^3\) estimated the total factor productivity for Indian Railways from 1874 to 1912. The study denotes that the Railway industry Total Factor Productivity (TFP) growth to substantial, averaging 2.5 per cent per annum and generating a three per cent social savings for the Indian economy. The authors observed that Indian Railways had higher TFP growth than most sectors in India and compared favourably with TFP growth for Railways in other countries.

Pedro Cantos, José Manuel Pastor and Lorenzo Serrano (2012)\(^4\) analyzed the impacts of the deregulating and restructuring measures in the European Railway sector. They estimate efficiency levels (using a sample with information of 23 European national rail systems from 2001 to 2008) using alternative approaches. They also estimate the
effects of the reforms on inefficiency levels and found that the rank obtained are similar, and that the best way to foster an increase in efficiency is always by combining vertical and horizontal reforms in the rail industry.

**Bishnoi and Sujata (2010)**[^5] the paper examines the economic profitability and productivity of Haryana state road transport undertaking. They investigate the total factor productivity, total price performance and economic profitability. They have found that total factor productivity was decreasing from the year 1988-1989 to 1992-1993.

**Ashwini Deshpande and Thomas E. Weisskopf (2010)**[^6] made the empirical analysis of productivity in the Indian Railways in order to determine the policy of reserving jobs for scheduled castes and scheduled tribes that has actually reduced productive efficiency in the Railway system. They found that there was no evidence that affirmative action in hiring had reduced the efficiency of the Indian Railways. On providing tentative support for the claim that greater labour force diversity boosts productivity.

**Toshiya Jitsuzumi and Akihiro Nakamura (2010)**[^7] made a study titled “Causes of inefficiency in Japanese Railways: Application of data envelopment analysis for managers and policymakers” They explained compensate for Railways lack of complete discretion in changing location of their operations or increasing or decreasing these operations since they are a regulated service. The proposed method was applied to 53 Japanese Railway operators and identified several key characteristics related to their inefficiencies, and developed optimal subsidies designed to improve performance.

**Sriraman (2009)**[^8] the study observed that “Lack of transport connectivity and trade facilitation, and high transport costs increase the risk of marginalization of many economies especially in developing countries”. Enabling legal and regulatory frameworks, and access to global transport networks, are paramount to transport, logistics and trade facilitation. For a country’s economy, the transportation sector is often viewed as an important barometer of growth. The location of activities based on considerations help to achieve minimum transactions costs.

**Cristina Barbot, Alvaro Costa, and Elena Sochirca (2008)**[^9] analyse the efficiency and productivity of airlines using two different methodologies: data envelopment analysis and total factor productivity, additionally investigate which factors account for
differences in efficiency. The findings show that low-cost carriers are in general more efficient than full-service carriers, efficiency and the dispersion of both data envelopment analysis and total factor productivity indexes amongst airlines differ according to geographical areas, labour is the only input that definitively influences productivity, and larger airlines are more efficient, suggesting the existence of economies of scale.

**Vijayarani and Kesavan (2008)**\(^{10}\) analysed the performance of transport corporation on fleet, traffic, maintenance, fuel and oil material, personal and financial management. The result of the study revealed that the corporation had improved both the utilization of capital resources and the indicator on the performance of the corporation after the amalgamation.

**Alivelu (2008)**\(^{11}\) made a study on productivity performance on Indian Railways considering two outputs and three inputs factors from 1981-82 to 2002-03. He analyzed partial productivities and total factor productivity (TFP). He observed that fuel and labor efficiency increase productivity and thus reduce the cost of production on Indian Railways.

**G. Raghuram and Rachna Gangwar (2008)**\(^{12}\) had made the attempt on Indian Railways in the past twenty years issues, performance and challenges. Authors say that “Nearly 70 per cent of Indian Railways revenues come from the freight operations. Coal alone accounts for nearly half of the bulk traffic carried. Passenger business accounts for nearly 60 per cent of Indian Railways total transport effort, in terms of train kilometers, but yield less than 30 per cent of the total revenues. Suburban services account for 57 per cent of the originating passengers, but contribute only eight per cent for the passenger revenue”.

**Sharma and Manimala (2008)**\(^{13}\) analyzed the turnaround in a relevant theoretical perspective and make reasonable assessment as to the sustainability of the turnaround of Indian Railways. The result indicates that the Indian Railways being in higher than initial stage of financial turnaround, is the alignment of the strategies with the diagnosis of sickness such as operational inefficiency, lack of market orientation, lack of focus on core and lack of resources for growth.

**Pavlyuk Dmitry (2008)**\(^{14}\) in his study on “An efficiency analysis of European countries' Railway”, uses stochastic frontier analysis for estimating efficiencies of Railway systems in European countries. He considers Railways as a system which uses its length of
lines worked, numbers of cars and wagons, staff strength and a scale of market such as number of habitants and tourists for transporting passengers and freights. The result of the study found that the Railway systems show huge variations in technical efficiency between different countries and also between freight and passenger transportation within the same country.

Ming-Miin Yu and Erwin T.J. Lin (2008)\(^{15}\) have estimated passenger and freight technical efficiency, service effectiveness, and technical effectiveness for 20 selected Railways of other countries for the year 2002. The study revealed that these measures differ significantly. Since the multi-activity network data envelopment analysis models the reality of Railway operations, one can gain further insights from the estimated results and thus propose strategies for improving operational performance.

Competition Commission of India (2007)\(^{16}\) a study was conducted with the objectives of studying the passenger road transport segment competition policies - interstate and intrastate. The study uses the Competition Index such as resisted time, permit charges for more than one region, permission to change time table. Efficiency Index, namely surplus before tax, percentage of fleet utilization, effective kilometer per staff per day, kilometer per liters, accidents per effective kilometers.

Desh Gupta and Milind Sathye (2007)\(^{17}\) made a study entitled “Financial Turnaround of the Indian Railways - Good Luck or Good Management”. They analyzed the factors that led to the turnaround of the Indian Railways from a low performing organization to a high performing one. The study indicates the environmental factors (good luck) contributed in a substantial way to the success of Indian Railways.

Rohit Bharill and Narayan Rangaraj (2007)\(^{18}\) in their study on “Revenue management in Railway operations: A study of the Rajdhani Express, Indian Railways”, an attempt is made to derive elasticity estimates between key mode choices internal to the railways. They concluded by saying that revenue management through differential pricing is suggested as a means to increase revenue on average.

Crafts et al., (2007)\(^{19}\) revisited the issue of the productivity performance of Britain’s Railways with an improved dataset and modern cliometric. They found that there is a slowdown in total factor productivity growth between the year 1850 and 1870, after which it stabilized at about 1.1 per cent. An analysis of company-level productivity
performance reveals large discrepancies in Total Factor Productivity growth and substantial cost inefficiency. The evidence suggested that there was managerial failure in companies with agency problems in a context of collusion and high entry barriers. A wider implication is that the neoclassical exoneration of late-Victorian British management may be less convincing for the services sector than for manufacturing.

Jameela (2006)\textsuperscript{20} has analyzed operational efficiency of selected state road transport corporation in South India. She interpreted that operational efficiency is related to more passenger kilometers which depends on more running kilometer per day. She has applied financial and physical performance to measure and judge the operational efficiency. She has found that revenue and expenses were increased, but rate of increase in expenses were increased higher than that of revenue.

Martland (2006)\textsuperscript{21} analyzed the productivity enhancement of rail industry in U.S. by asking the question whether productivity improvement has led to financial performance enhancement. The study indicates that Railway productivity increased to five per cent per year, there is a decline in rail prices, and financial performance was also not performing a large amount progress. The long-term productivity trends in future are at the end when there was decline in the rate of productivity and increase in rail rates.

Ravichandran and Surya Prasad (2005)\textsuperscript{22} in their article “Reviving Gujarat State Road Transport Corporation (GSRTC): An agenda for action” examine that the broad action plan to revive GSRTC would need restructuring the routes, rationalize manpower, outsource non-core activities, improve and control cost of operations, replace the buses due for condemnation and augment fleet size, price fixation based on demand and supply, and focus on customer service to achieve revenue stability and increase in contribution.

Fariba Alamdari and Simon Fagan (2005)\textsuperscript{23} revealed in their study that low cost operation has been a very successful business model. The performance of business models of ten longer established US and European low-cost carriers are analyzed and evaluated against the original model. His analysis indicates that although an increasing number of ‘hybrid’ low-cost models are achieving low operating cost, offering low fares and returning attractive operative profit margins, there is a case for recommending adherence to the original model to ensure greater profitability.
Natalia and Subroto (2003)\textsuperscript{24} found out that the concept of satisfaction is influenced by five variables 1.Service quality, 2.Product quality, 3.Price, 4.Situation and 5.Personality. This study attempts to examine the satisfaction level of service quality of domestic airline travellers in India for six airlines ease of bookings through the website or Call centre; Hassle free check or efficient ticketing staff or regular announcements during flight delays at airport, on time performance of flights, In-flight experience, baggage handling and value of money.

Puri (2003)\textsuperscript{25} in his paper suggested that India has long suffered from transport bottlenecks, mainly because of budgetary constraints and managerial inefficiencies. He explained that the “Market principles” are being applied for the development of transport infrastructure and services. Budgetary funds are being utilized to make private investment in fixed infrastructure more attractive.

José Baños-Pino, et. al (2002)\textsuperscript{26} in their study on “The allocative efficiency measure by means of a distance function: The case of Spanish public Railway”, estimated a system of equations for the inputs distance function and cost shares using annual data over the period from 1955 to 1995. Using this procedure they checked the presence of persistent allocative inefficiency, in particular a systematic overutilization of labour and underutilization of capital. Moreover, the empirical evidence that, since 1984, management contracts have improved the input allocation in Spanish Railway.

Krishnamoorthi (2001)\textsuperscript{27} in his study on “State transport undertaking-an analysis”, gives the reasons for poor financial performance of state transport in Tamil Nadu. The major reasons were rise in cost of operation, administered price system and social obligation costs. Thus the state transport undertaking suffered from an accumulated loss of more than Rs. 2000 crores and highly dependent on grand and subsidies of the state Government for their survival.

Pedro Cantos and Joaquín Maudos (2001)\textsuperscript{28} in their study entitled “Regulation and efficiency: the case of European Railway” have estimated both cost and revenue frontier functions. They calculated the losses associated with both cost and revenue inefficiencies as well as inefficiencies on the cost side. The result of the study shows the existence of significant potential losses of revenue, which can be explained above all by
the strong policy of regulation and intervention reigning during the period. A better commercial policy and a supply adapted to market conditions seem to be two unavoidable requisites for the future of European rail policy if the companies' financial burdens are to be reduced.

Tim Coelli and Sergio Perelman (1999) analyzed multi-output distance functions to investigate technical inefficiency in European Railway. The result indicates a strong degree of correlation between the input- and output-orientated results for each of the three methods such as data envelopment analysis, corrected ordinary least squares and constant returns to scale. They conclude with the suggestion that a combination of the technical efficiency scores, obtained from the three different methods, be used as the preferred set of scores. This idea is borrowed from the time-series forecasting literature.

Poulose (1998) in his study on ‘Evolution of financial management of Indian Railways’ explicates that during the middle of nineteenth century the Indian Railways worked for the initiatives of the government and not in response to the public demand. The Railways should perform efficient function with commercial viability coupled with adequate customer - orientation. The employee faces unprecedented challenges in raising resources, operating the services, maintain financial viability, up-grading accounting revamping traffic costing, instituting activity-based accounting supported by a scheme of cost and profit centers evolving appropriate management information system etc.

Nanjundappa (1998) made a study to analyze the Indian Railways pricing and finances. The study denotes that Indian Railways finances should get restructured to suit the requirement of the commercial enterprise. Taking the total financial scenario of the country, further continuances of indiscreet subsidies and neglecting efficiency in financial management of Railways can lead to further destabilizing and destroying one of the most successful public enterprises of the government of India.

Anand (1998) attempted to study the reforming Indian Railways financial management, the problems in broad terms in three parts- present state of affairs (The malady), distortions and dilemmas (The symptoms), and the way out (The remedy). He found that the major difficult area of Indian Railways financial management is not ‘resource crunch’ but its diminishing contribution in the national transport market,
stagnation in operating efficiency and in traffic carried, undifferentiated and uncommercial character of its investments, and its distorted tariffs construction. The major failure in commercial enterprise ethos, culture and attitude are not changing for a long period but it is necessary to face the emerging challenges in the competition, customer-driven market and high cost investment in the place of its old monopolistic position and low capital that enjoyed before.

Verma (1998)\textsuperscript{33} in his study “In pursuit of a productive relationship”, analyzed cost of social burdens, actual cost of capital and productivity indices. He also observed that gross inefficiency is not the one that led to financial problems in Railways but the productivity indices show consistent improvement over the period of study. The Railways performance can be improved when there is growth in Railways volume of business, improvement in operating efficiency and financial position of the Railways is in terrible strains. It is caused due to inability in fixing cost-based tariffs, follows optimum product-mix, rationalizes routes and services, huge social burdens and increased cost of borrowed capital. The appropriate government policies are necessary to improve in this respect.

Dalvi (1998)\textsuperscript{34} aimed to describe the concept of value capture for benefit assessments as a mean of raising resources to finance rail projects with special reference to urban rail project. He pointed out regarding the problem arise in the application of value capture, such as value increase from transit projects, the incidence of value capturing and value capture for funding Bombay metro. He described the application of this method to Hong Kong and Los Angeles and concludes that there has been a model in this regard, notwithstanding in a development country such as USA.

Singal (1998)\textsuperscript{35} has examined the policy on urban mass rail transit of Indian Railways. He analyzed the forecast of travel demand of 23 cities for the year 2001. He suggested that when financing in more expensive mass transport services requires watchful consideration and privatization by means of sufficient concessions to provide an adequate level of return to the investors. Cross-subsidy, such as contribution a combined rail-cum-bus franchise for the whole city can lift the financial returns to a satisfactory level.

Sriraman (1998)\textsuperscript{36} made a profound study on financing Railway infrastructure in India. The study indicates that the benefits of rail transport to be realized in a more
significant way, the system has to recognize the need of its users and reorients policies accordingly. He recommended that the scheme may possibly be more efficient under a different type of organization set up only then can a truly economic and social function for the Railways, is often envisaged, be expected to emerge and successful.

**Shanti Narain (1998)** in her study on “Meeting the challenges” says that “According to recent World bank review Railway crises have occurred because they have not been encouraged or allowed to respond in time to changes in the economies they serve and the external environment in which they operated”. She also analyzed causative factors, operational strategies such as freight traffic, passenger traffic and strategies for attracting private capital. She concluded by saying that when challenges are tackled in point of time, the Railways would maintain to discharge their key role in the modernization of the Indian economy. The Railway always efficiently faced such challenges in the past and without doubt it will face the same in future also.

**Vijaya (1998)** made a study on Railway Planning in India: A spectrum and perspective view. In the case of capital cost, rail transport capital intensive and cost of construction of a Railway line to branch line standards cost higher than the road, designed for low density of traffic. The study revealed that Railways should facilitate to raise resource for their growth by rationalizing their fare and freight structure, which would be in the interest of public and other rail users in the long run.

**Anand (1998)** made a study on a perspective plan on gauge conversion. He says that the position in the year 1989 to1990 showed that the operating ratio on the multiple gauge system as a whole was 171 per cent as against 81 per cent of broad gauge and 91.5 per cent for Indian Railways. Indian Railways suffers a loss of about Rs.1200 crores on the multiple gauge system. He finally recommended to accelerated development, apart from generating the required traffic capacity at least cost and in least time, improve the financial viability of Indian Railways, cut down on transhipment, and increase the mobility and utilization of asset on the broad gauge system.

**Manikutty (1998)** has made the dynamic research in the area of Indian Railways finances and assets. He examined the revenues and expenditure of Indian Railways, productivity of investment of one crore in different areas by calculating the
marginal return of investment. The study reveals that the marginal productivity of investment is the highest for wagons. He concluded that Indian Railways will be unable to face the challenges in the year ahead unless some major changes are brought in the future.

Verma (1998)\textsuperscript{41} has evaluated the impact of investment on the productivity of the Railways, or rather the productivity of various zonal Railways. In this context it is worth having a look at the traffic unit per unit of capital employed by different Railways at different point of time. He analyzed marginal productivity of total investment and marginal productivity of combined input. The study signifies that the best way of determining the quantum of investment may be the relative volume of work.

Verma (1998)\textsuperscript{42} made another study entitled “Marginal Productivity of Railway Investments: Part 2”. He explained about the two methods of measuring the efficiency of capital utilization i.e. average capital output ratio and incremental capital output ratio. It has been later shown that both these methods are not applicable to Indian Railways situation. Two other methods are proposed based on an indexed approach, namely indexed capital output ratio and indexed incremental capital output ratio. These two approaches are more relevant in Indian Railways situation. Finally he concluded that additional investment in a Railway should be more or less in the ratio of its output to the total output of Indian Railways. If this does not happen, overcapitalization may take place.

Subramaniam (1998)\textsuperscript{43} attempted to study the relationship between the operational efficiency and financial performance of Indian Railways. This study aimed to attempt the correlation of indicators of utilization of asset and of financial administration. He covers total traffic output, track utilization, staff productivity and wagon and engine utilization. He says that improving the operational efficiency must be translated into corresponding financial performance. The tested correction index is found to be very poor. So another correlation is attempted on simulated financial and operational efficiency variable. It results in significant correlation establishing the importance in alignment of tariff to input costs to reap financial benefits from operational efficiency improvements.

Verma (1998)\textsuperscript{44} had made an attempt to identify the problems of the existing concept of operating ratio and develop the modified operating ratio. He elaborated that the operating ratio should be representative of the operations, be as comprehensive as reasonably
possible and least subject to arbitrariness. The existing ratio does not meet all criteria. So the modified operating ratio is total working expenses divided by gross earnings has been suggested to meet the criteria.

Verma (1998)\textsuperscript{45} has also examined the productivity of capital investment and identifies the main area where possibilities of cost reduction may be explored. He used three indices such as (i) physical (ii) financial (iii) financial -cum- physical. The study signifies Profitability ratios such as profitability related to sales and profitability related to investment. The result revealed that the large surplus is inescapable. Cost-based tariff is limited so the only the alternative is increase in volume of traffic, attracting higher rate traffic, increase productivity of asset and resource to minimize additional investment and reduce operating cost.

Hansan Iqbal (1998)\textsuperscript{46} in his study entitled “Business orientation on Indian Railways through cost management” analyzed costing structure under techniques of three levels such as functional unit or activity centre level, divisional level and zonal head quarter’s level. He concluded by saying techniques combined with the divisionalisation of revenue, are necessary in Indian Railways efforts towards financial viability and sustainable competitive strength.

Rajeswari Gandam (1998)\textsuperscript{47} in her book titled “Public sector performance of state road transport corporation: A case study of Andhra Pradesh”, examines both the financial and social performance of Andhra Pradesh state road transport corporation both at the state and regional levels. Particularly she dealt with the pricing policies of the transport service as being implemented by the corporation. She described in detail the organizational set up of the corporation along with its various features like capital investment and staffing.

Ching-Wen Liand & Alice Chen (1997)\textsuperscript{48} say that the way to evaluate the performance of a service industry is quite different from the manufacturing industry. Quality evaluation of a service industry can be subjective among individuals or can vary with time or place or both. Taguchi loss function is modified to evaluate performance of a domestic airline industry. Three quality categories with ten identified variables are proposed. Service quality can be quantified and that can be compared objectively. When the performance of a domestic airline is evaluated by cost loss, action is taken when the loss is greater than the competitors.
Sriram and Bagchi (1997)\(^9\) in their study state that the transport sector comprising the Railways, roads, ports and civil aviation has been one of the principal areas of state intervention in India. They conclude that public sector ownership, management and financing of the transport sector in India, however, suffers from several forms of inefficiencies and has been found to be unresponsive to user demand. In the transport sector, this has translated, inter-alia, into encouraging public sector entities to maximize internal resource generation in order to finance future expansion.

Sanjay Singh (1997)\(^{50}\) in his article “Estimating the level of rail-based and road-based passenger mobility in India” has forecasted the level of rail-based and road-based passenger mobility for the next twenty years. S-shaped growth curves have been used to model the development in passenger mobility in India.

Sriramam (1997)\(^{51}\) made a study on state road transport in India that reveals the financial performance of the state roads in the past decade. The author attributed the losses partly to the inefficiency and partly to the uncompensated burden of social obligation and constraints in external operating environment.

Rajeshwar (1996)\(^{52}\) who studied the management effectiveness in transport operations has stated that Delhi transport corporation was not being managed properly, due to mismanagement. The corporation was running into losses. The study reveals that the corporation needs a favourable government attitude in terms of transport policy, simultaneously the working of the organization can be improved by introducing scientific organizational structure. Effective planning and sound financial management can help the corporation to stand in the market.

Das et al (1995)\(^{53}\) analyzed the financial performance of government and private sector granary in Karnataka to analyze the profitability, solvency, liquidity and the turnover of the selected units, financial ratios have been employed, the results revealed that the private granary was financially sounder as compared to Government granary.

Kundu, (1995)\(^{54}\) his study denotes that “It is unlikely that Railways would resort to any major reduction in staff strength, given the strength of their labour union. Railways run the risk of losing the traffic to road transport. Bringing out all these changes would require an innovative and enterprising management policy”. Maintaining a high growth in
traffic revenue, generating a large part of the investible resources internally and, thereby, saving Indian Railways from the debt trap, without hampering the growth in different sectors of the economy, would be a difficult and challenging task.

**Gathon and Pesteau (1995)** in their study on “Decomposing efficiency into its managerial and its regulatory components: The case of European Railway” revealed that the policy implication of such a decomposition is obvious. Management is responsible for just managerial inefficiency, whereas the government is responsible for being slack in regulatory efficiency. Regulatory efficiency is based on indicators pertaining to managerial freedom in pricing, hiring and marketing decisions.

**Muralitharan (1994)** attempted to analyze the relationship 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 among 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.

**Kotnana Rama (1994)** indicates that the multiplicity of agencies at different levels with different roles was not found to be conducive to the rural road transportation system. He has observed that the revenue earnings from the operation of buses in rural areas have been encouraging but the cost of operation went up much ahead of it all along, landing the Corporation in losses year after year. He also explained that prior to the introduction of the bus service, dependence on slow and strenuous means of transport made rural lists more immobile.

**Oum and Yu (1994)** analyze the productive efficiency of the Railway systems in 19 OECD (Organization for Economic Co-operation and Development) countries. They observed that Railway systems with high dependence on public subsidies are considerably less capable than similar Railways with less dependence on subsidies and Railways has a high independence in decision-making for regulatory authorities that have a tendency to achieve higher efficiency.

**Kulshrestha (1994)** selected a new area of study in the State Road Transport Undertakings. He explains that as the public sector transport has been facing competition...
with other means of transport and from the private operators, bus station management is important. He throws light on the bus station management and offers some practical ways and means to improve the conditions with special reference to Uttar Pradesh State Road Transport Corporation.

**McGeehan (1993)** made a study on productivity development of Irish Railway during the year 1973 to 1983, using a translog cost approach. He found that there has been considerable growth in productivity as there is reduction in fleet size and labour and increase in traffic. Changes in freight handling are found to be significant for productivity growth.

**Uppal and Amandeep (1992)** in their study on “Public sector in India Economy-A critical evaluation management of public sector in India” have pointed out that public sector undertakings has played an important role in the development process of the country. But these undertaking are running into losses. These loss-making organizations are to be converted into profit-making as well as economically viable undertakings. The study emphasized the need of holding public sector units accountable for the performance with regard to the objective of these units. These units must operate at their full capacity and have to become cost conscious if these are to earn profit at an anticipated time.

**Reddy (1988)** investigated the “Financial performance of public transport corporations- a study on Andra Pradesh state road transport corporations”, and exposed that the physical and mental operational performance were good while the financial performance was on the decline. The cause for poor financial performance was due to the increase in cost of operation though there is an increase in fares. The corporation has to perform in the business principles excluding the actual practice, but various policies pursued by the government do not allow the corporation to function on business principles that lead to loss.

**Sailaja (1988)** has made an attempt to provide development of the previous studies, so she takes into consideration the heterogeneous nature of outputs and the inputs. The study period (1950-51 to 1985-86), is sub-divided into three sub-periods. The book values of capital assets are converted into real values by using the Perpetual Inventory Method and found that the average annual growth rates of passenger output and freight output stood at 4.69 per cent and 5.23 per cent correspondingly.
Ramsunder (1987) estimates productivity trends of Indian Railways from 1960-61 to 1985-86 using Kendrick index of total factor productivity. Output is measured as net value added, is obtained from Central Statistical Organization (CSO). The capital series is the same as the gross capital formation series of CSO. The study revealed that the productivity growth varied between 1.5 to three per cent per annum and observed that total factor productivity recorded no increase after 1975-76.

Sinha (1983) focused on “Economics of public enterprises”, and found out that in spite of phenomenal growth and achievement the public sector has come in for sharp criticism. He has stated again that the public sector has primarily been a losing concern, resulting into heavy losses to the exchequer mainly on account of lack of autonomy for managers, adoption of bureaucratic procedures over staffing, over stocking in inventories, unproductive expenditure etc.

Brahmananda (1982) evaluates the productivity using Kendrick index of total factor productivity (TFP) for Indian Railways. His study indicates that the gross capital formation series of Central Statistical Organization (CSO) is based on Capital measure and number of persons employed is taken as labour. During the study period the total factor productivity increased by 1.15 per cent per year on an average.

Srivastava, (1981) presented the historical development of various modes (air, water, road and railway) of transport in India. He has attempted to discuss various operating variables like rates, fares, low productivity, state regulations, administration, competition, financing, aspects of different modes of transport etc. He has analyzed the effect of efficient, cheap and well coordinated development of transport system on Indian economy.

Railway Traffic Enquire Committee (1980) analyzed the financial performance of Indian Railways over a period of 28 years from 1950-1951 to 1978-1979 and divided the period into two parts. Up to 1965-1966, the Railways earned a surplus each year; 1966-1967 to 1970-1971 ended up in deficits. Further Extending analysis from 1985-1986, respectable surpluses were achieved every year. The Railways has also cleared the deferred dividend payments and liquidated the indebtedness to general revenues incurred for supplementing the development fund. The Indian Railways is the one of the few Railway systems earning surplus, and this without any funding from governmental or additional sources to pay compensation for below-cost pricing or uneconomic services.
Chand Mahesh (1980) made an attempt to carry out traffic projections of Karnataka state road transport corporation, which is the fifth biggest public road transport undertaking in India. Four forms of traffic projections viz. number of passengers, passengers’ kilometers, vehicle kilometers and fleet size have been projected. The forecasting was proceeded by construction of five growth models and, then based on forecast error analysis, selecting of the best model. Using the selected growth model, the number of passengers has been projected. Based on passengers’ forecasts, other items of traffic projections have been arrived at by using either regression equation or ratios.

Caves, Christensen, and Swanson (1980) measure the railroad productivity in U.S by using a method based on the neoclassical theory of production for the period 1951 to 1974. They found that railroad productivity grows at an average annual rate of 1.5 per cent per year. Productivity growth is 3.6 per cent per year when conventional measurement procedures of comparison are used. They analyzed (i) estimated cost elasticity’s, rather than revenue shares, as output weights, (ii) actual cost shares, rather than national income shares, as input weights, and (iii) input and output weights which change annually and found out that the productivity growth result is 3.6 per cent.

Vijaya Kumaran (1979) conducted a study on corporate model for Kerala state road corporation. He has pointed out that Kerala government was creating “Zones” for the efficient operations, without much change in the administrative set-up, which has resulted in creating another level in the management hierarchy.

Kishan Rao’s (1975) made a study on productivity in Indian Railways in the year 1951 to 1974 by using the conventional Solow index of productivity to obtain TFP. He employed two different measures of output such as monetary and physical indicators. The result indicates that the measure is not exact as no modification is done for depreciation. The evaluation of capacity utilization is not based on reliable data.

Manjula (1973) has observed that in India the operating ratio (revenue-expenditure) is always above 100 for rail and less than 80 for road transport. She recommends a well-coordinated road transportation system on the basis of such factors as assessment of demand for roads on vehicle requirement, distance from main roads, and coordination of local bodies, land surfaces regional development and employment considerations.
Locklin (1972)\textsuperscript{74} concentrated on the study of rail-road systems. He opined that the government ownership of transport system facilitates the planning and execution of transport system very effectively and the government, in one way or the other, is capable of providing necessary capital.

Roy Choudhury (1971)\textsuperscript{75} made an in-depth study on the range of factors influencing the productivity of Indian Railways for the time period from 1950-1951 to 1970-1971. He says that labour, capital investment, material, employees, etc. are the variables affecting the productivity. He concludes that investment has been the deciding factor in improving the transport sector performance.

Halder (1967)\textsuperscript{76} in his study evaluated the performance of Calcutta state transport corporation for the period from 1964-1965 to 1972-1973. For the lower productivity of the Calcutta state transport corporation, he held the following factors responsible 1) Low fleet utilization (as a result of lack of proper preventive maintenance). 2) Higher absenteeism and 3) Evasion of fare. However, his special contribution lied in applying Linear programming model to the problem of efficient allocation of buses on different routes.

Mathew (1964)\textsuperscript{77} in his book on Rail and Road Transport in India emphasized that the efficiency of the transport Industry as a whole is determined by organizational considerations in the context of unit sizes. He also opined that transport, being a public utility industry, is regulated by government policies in many ways, of which some have a direct or indirect impact on the evolution of size.

Manimala (1991)\textsuperscript{78} after analysing of 28 cases of turnaround suggests that the financial or operational turnaround is only the early stage of the turnaround process. Turnaround may begin with improvements in the financial or operational performance, but it should not end there. The researcher has identified four stages in a complete turnaround, and sustainability is determined on the basis of the stage the organization has reached. It is, therefore useful to classify the strategies adopted by Indian Railways into stages and then attempt a theoretically convincing answer to the question of sustainability.

Parmer (1960)\textsuperscript{79} in his study entitled “Performance of Gujarat state road transport corporation from the year of its inception 1960 to 1985-86”, confirmed that the performance is satisfactory as far as the infrastructure and public utility services are
concerned. On the other hand, as a commercial venture it is a drain on the limited resources of the state because of huge losses and recommended the differential pricing and effective management to attain the optimum efficiency and productivity so as to make up the losses.

Barger (1951) was the first man to carry out a study in urban passenger transport for the period from 1889 to 1946. He measured labour productivity and capital productivity using effective kilometers and real value added as the outputs and number of employees and number of business as inputs. He completed by saying that the productivity efficiency of transport sector in United States is good.
REFERENCE


