CHAPTER I

INTRODUCTION AND DESIGN OF THE STUDY

The civilization of humanity has revealed an urge for mobility paving the way for progress and plenty. The history of this mobility or transport is almost the history of civilization. By moving persons or products from the point of origin to the point of destination, transporters perform one of the most vital activities, at every stage of advanced civilisation. Thus, by examining the history of transportation and the various stages of its evolution, one can assess the extent of economic development and progress of civilization itself. If one considers the “Invention of the Wheel” as one of the greatest transformation points in the history of civilization, then it is fully justified to study transportation and its history, since the “Wheel” has basically transported while it transformed. Therefore, transportation maybe considered as both a cause and consequence of economic development.

After the invention of the ‘Black Gold’ namely crude oil and its by-products like gasoline, petrol, diesel by Rudolf Diesel from Germany and the introduction of combustion diesel engines, transport systems in the world have been revolutionised. The more organized the economic development of a given region is, the more important transportation becomes. Organized economic activity has to make a very important decision and the decision pertains to the
balance between nearness of the production facilities (both of commodities and of services) to the market or to that of the consumers. Therefore, distance becomes a logical problem to be sorted out between the production facilities and the markets where goods and services are sold. Therefore, transportation becomes a part of the economic problem of any progressive community, to be considered and solved with efficiency as one of its objectives.

The benefits of an efficient transportation system are many. It is a prerequisite for sustained economic development and a key infrastructural input for the growth process. It promotes national integration, and also plays an important role in promoting the development of backward regions and integrating them with the mainstream economy by opening them to trade and investment. The economic liberalisation and reforms must then lead to transportation reforms and must be considered as an essential factor responsible for enhanced productivity and competitive efficiency.

1.1. MODES OF TRANSPORT

Since one is interested in the study of transportation in an economic context and the previous text has justified sufficiently the economist’s interest in the problem of transportation, it would be useful to look at the present transportation system in more detail. A useful starting point from the economic
standpoint would be to classify the different transportation alternatives available and evaluate each one on its importance.

Based on the medium used for transportation one can classify the entire transportation system into three parts – (a) Land Transport (b) Water Transport and (c) Air Transport. The land transport uses roads and railways to move things and/or people from one location to the other. Water transport is essential and may be used with advantage where a body of water separates two places. Air transport uses the air routes to move things and/or people between places. Each of these modes of transport has an associated cost, and suffers from certain limitations. In an economically progressive community, all the three modes of transport need to be well organized and efficient.

Air and water transports are primarily used in the case of exports to other countries since the fixed and establishment costs are heavy compared to that of road and rail transportation. Moreover, the operational costs are also high in the cases of water and rail system and hence longer the distance travelled, the cheaper such mode of transport becomes. While road transport is the least risky and the cheapest mode of transport available, for export across continents, roads are absolutely unavailable and unthinkable. The necessity for seamless integration between the three modes of transport for carrying out both domestic and
international trade becomes much more pronounced when economies become global.

Thus, for a growing economy, the problem of transportation is the problem of managing the three modes of transportation efficiently so that boundary-less integration is possible and hence the aforementioned benefits of transport systems be achieved. This management of transportation system necessarily requires the building, operating and maintenance of the necessary infrastructure, technology and manpower which in turn must be aligned with economic goals and growth planning of the overall economic system.

1.2. TRANSPORTATION AND WORKFORCE MOBILITY

In a global business system with a customer-centric focus, speed of delivery of a commodity or service is a key competitive parameter. Availability of a great number of close substitutes increases the sensitivity of the customers to small changes in prices and speed of delivery. This situation leads to shorter product life cycles, which means shortened order-to-delivery cycles. This in turn puts pressure on greater productivity of human resources and hence there will be a greater emphasis on better organization of the workforce. As a result, flexible production schedules, twenty-four hour production processes, reduced machine downtimes and many other features become more common in global business systems.
All these practices lead to the concept of flexible and greatly mobile workforce that can be summoned and put to use at short notices. Such mobility of workforce is possible only with the help of an efficient transport system that can make available efficient transport alternatives. Though the problem of mobility can also be looked at the global level (especially in the case of Information Technology (IT) and Information Technology Enabled Services (ITES) sectors), for manufacturing sector and related service sectors, availability of locally mobile workforce that can meet the above said production (service) standards is a must. Thus, for economies that balance service as well as manufacturing sectors for growth, the local workforce mobility also is an issue that is worth considering.

Passenger mobility in India relies heavily on rail and road. On an average, an Indian travelled 287 Km in 1950-51 out of which 187 Km was by train and 100 Km was by bus. During the past five and a half decades their annual travel figure jumped to about 3000 Km of which 385 Km is using rail and the rest 2615 Km is by road.\(^3\)

Since the road is the most viable alternative for transport at the local level, the passenger transportation system merits deeper and serious thinking. The next section develops the general context of passenger transportation in India and goes into examining the various related issues.
1.3 TRENDS OF RAIL-ROAD PASSENGER MOBILITY

It is noted that there has been a sharp shift in the share of the railways in the total traffic. The share of road transport has been increasing over the years, from 34.95 per cent in 1996 to 91.25 per cent in 2009, whereas the share of railways has come down from 65.05 per cent to 8.75 per cent during this period\(^4\). The trends in rail and road share of passenger movement are given in Table 1.1.

<table>
<thead>
<tr>
<th>Year</th>
<th>Percentage of Rail Passenger Service</th>
<th>Percentage of Road Passenger Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-96</td>
<td>65.05</td>
<td>34.95</td>
</tr>
<tr>
<td>1996-97</td>
<td>51.42</td>
<td>48.58</td>
</tr>
<tr>
<td>1997-98</td>
<td>45.11</td>
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</tr>
<tr>
<td>1998-99</td>
<td>39.97</td>
<td>60.03</td>
</tr>
<tr>
<td>1999-2000</td>
<td>33.11</td>
<td>66.89</td>
</tr>
<tr>
<td>2000-01</td>
<td>29.8</td>
<td>70.2</td>
</tr>
<tr>
<td>2001-02</td>
<td>26.35</td>
<td>73.65</td>
</tr>
<tr>
<td>2002-03</td>
<td>20.15</td>
<td>79.85</td>
</tr>
<tr>
<td>2003-04</td>
<td>15.92</td>
<td>84.08</td>
</tr>
<tr>
<td>2004-05</td>
<td>12.46</td>
<td>87.54</td>
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<td>2005-06</td>
<td>10.64</td>
<td>89.36</td>
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<td>90.28</td>
</tr>
<tr>
<td>2007-08</td>
<td>9.15</td>
<td>90.85</td>
</tr>
<tr>
<td>2008-09</td>
<td>8.75</td>
<td>91.25</td>
</tr>
</tbody>
</table>

Figure 1.1
Trends in Rail and Road Share in Passenger Movement
While comparing the future demand for buses and other modes of travel such as cars and jeeps, the demand for buses will be more than that for other modes. It is estimated by the Planning Group that the passenger traffic demand for buses will increase at the rate of 8 per cent whereas that for cars, taxis and jeeps will increase at the rate of 7 per cent compound per annum\(^5\). The projections based on these estimated passenger mobility are given in Table 1.2

### TABLE 1.2

**FORECASTS OF PASSENGER MOBILITY**

**BY ROAD AND RAIL**

(Passenger Kilometres in Billion)

<table>
<thead>
<tr>
<th>Year</th>
<th>Road</th>
<th>Rail</th>
</tr>
</thead>
<tbody>
<tr>
<td>1995-96</td>
<td>2412</td>
<td>339</td>
</tr>
<tr>
<td>2000-01</td>
<td>3688</td>
<td>390</td>
</tr>
<tr>
<td>2005-06</td>
<td>5421</td>
<td>441</td>
</tr>
<tr>
<td>2010-11</td>
<td>7572</td>
<td>489</td>
</tr>
<tr>
<td>2015-16</td>
<td>9960</td>
<td>532</td>
</tr>
</tbody>
</table>

Figure 1.2
Forecasts of Passenger Mobility by Road and Rail

Year

Passenger Kilometres in Billion

Road
Rail
1.4 PASSENGER TRANSPORT IN INDIA

India’s passenger transport for the short and medium distances is essentially bus oriented. Buses even compete with the railways by offering night trips in the long distance segment. Buses enjoy a distinct edge over other modes of transport because of their flexibility and accessibility to a large number of villages and towns. Buses per passenger yield higher economy in the use of road space, incur lower fuel consumption and lower cost of operations.

India is a vast country with an area of 32.76 lakh square kilometres and about 80 per cent of the population living in almost six lakh villages. It is predominantly an agrarian economy as about 60 per cent of the people take it up as an occupation. By 2001, over 285 million Indians lived in cities, more than in all North American cities combined (Office of the Registrar General of India 2001). There has been especially rapid growth of the very largest metropolitan areas such as Mumbai, Kolkata, and Delhi, which now exceed 10 million residents each. Chennai, Hyderabad, Ahmedabad, and Bangalore each have more than 5 million residents. And 35 metropolitan areas have population exceeding one million, almost twice as many as in 19916.

Passenger transport in India can be classified into two – rail and road. Out of total passenger movement of the country, 90 per cent is met by road transport while railways carry the remaining 10 per cent at present. The villages are
physically spread throughout the length and breadth of the country, and no mode of transport other than road transport can adequately and effectively meet the demand for transport arising out of the growing economic, social, health, cultural and religious needs of the villagers. Though railway facilities are available, these are mainly confined to certain parts of the district and only limited number of the people can derive benefit from this facility. Among different modes of transport bus transport occupies an important place. About 80 per cent of inter-district trips and 66 per cent of the intra-district trips are made by buses.

Passenger roadways is capital intensive. The value of the capital goods namely the vehicle, unlike other industrial capital goods and machinery, depreciate rapidly resulting in scrapping of the vehicles within a period of 6 to 7 years. The value of a new ordinary passenger vehicle is now around Rs.16 to Rs.20 lakh. Given the high incidence of insurance premium, road and passenger tax levied by various states and the staff emoluments, maintenance cost and given the fact that most of the vehicles are underutilized, the margin is under severe pressure. Furthermore, it is the absence of mandatory requirement to order readjustment of passenger fare with reference to the increase or decrease in input cost. The States for political considerations, always utilize this deficiency.

1.5 TRANSPORT SCENARIO IN INDIA

Any attempt to develop the country or to improve the living standards of the people, must begin with the development of villages. But, these villages are
physically spread throughout the length and breadth of the country, and no mode of transport other than road transport using buses can adequately and effectively meet the demand of transport arising out of the growing economic, social, health, cultural and religious needs of the villagers. Thus, an attempt to improve the transport system in the country has to give the highest priority to bus transport system. As said earlier, buses carry more than 80 per cent of public transport in India and rail transport carries less than a third of public transport passengers.

India has nearly 2.55 million kilometers of roads: 1.45 million kilometers of surfaced roads and more than 1 million kilometers of roads constructed of gravel, crushed stone, or earth (Table 1.3)\(^8\) More than two hundred and ten highways, just under 2000 kilometres in total length, are rated as national highways, but they carry about 40 per cent of the road traffic. The share of transportation investments in total public investment declined during the period from the early 1950s to the early 1980s; real public transportation investment also declined during much of that period because of the need for funds in the rest of the economy. As a consequence, by the early 1980s the transportation system was barely meeting the needs of the nation or preparing for future economic growth. Many roads, for example, were breaking up because of overuse and lack of maintenance.
TABLE 1.3
ROAD LENGTH IN INDIA 1999-2009

<table>
<thead>
<tr>
<th>Year</th>
<th>Surfaced (KMs)</th>
<th>Unsurfaced (KMs)</th>
<th>Total (KMs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>1169854</td>
<td>939106</td>
<td>2108960</td>
</tr>
<tr>
<td>2000-01</td>
<td>1263364</td>
<td>1039151</td>
<td>2302515</td>
</tr>
<tr>
<td>2001-02</td>
<td>1363127</td>
<td>1035661</td>
<td>2398788</td>
</tr>
<tr>
<td>2002-03</td>
<td>1308420</td>
<td>1019936</td>
<td>2328356</td>
</tr>
<tr>
<td>2003-04</td>
<td>1355380</td>
<td>1041270</td>
<td>2396650</td>
</tr>
<tr>
<td>2004-05</td>
<td>1390598</td>
<td>1025480</td>
<td>2416078</td>
</tr>
<tr>
<td>2005-06</td>
<td>1414547</td>
<td>1032120</td>
<td>2446667</td>
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<tr>
<td>2006-07</td>
<td>1420489</td>
<td>1062855</td>
<td>2483344</td>
</tr>
<tr>
<td>2007-08</td>
<td>1426430</td>
<td>1093591</td>
<td>2520021</td>
</tr>
<tr>
<td>2008-09</td>
<td>1450379</td>
<td>1100231</td>
<td>2550610</td>
</tr>
</tbody>
</table>

Source: Various records of National Statistics, Department of Road Transports, Government of India.

To improve road transportation, significant efforts were initiated in the 1980s to build roads to link major highways, to widen THE existing roads from single to double lanes, and to construct major bridges. These road-building achievements represent an impressive expansion from the 1950s. However, even though a total of 400,000 kilometers of roads of all kinds have been laid, more than 25 per cent of villages still have no road link, and about 60 per cent have no all-weather road link. These statistics, however, mask important regional variations. Almost all villages in Kerala, Haryana, and Punjab are served by all-weather roads. By contrast, only 15 per cent of villages in Orissa and 21 per cent in Rajasthan are connected with all-weather roads. The quality of roads, including major highways, is poor by international standards.
Figure 1.3
Road Length in India - 1999-2000

In Kilometres

Surfaced
Unsurfaced

2008-09
2007-08
2006-07
2005-06
2004-05
2003-04
2002-03
2001-02
2000-01
1999-2000
The central and state governments and some transport companies share responsibilities for road building and maintaining roads. The Ministry of State for Surface Transport administers the national highway system, and the public works departments of the respective states maintain state highways and other state roads. Municipalities, Districts, and Gram Panchayats maintain minor roads. Still other roads, about 22,000 kilometers in total in 1991, are under the jurisdiction of the Border Roads Development Board, a central government organization established in 1960 to facilitate economic development and defence preparedness, especially in the north and north east.

Currently, public bus transport in India is provided through a multiplicity of mechanisms. These include the following:

- Own services which are operated by the Road Transport Undertaking (RTU) using its own fleet Kilometer Scheme under which, private buses are hired to run services as required by the State Road Transport Undertaking (SRTU).

- Direct permits under which permits have been given directly by the State Transport Authority (STA) to private operators for providing transport services on specified routes. The buses are owned and operated by the private permit holder who also collects the fares. The fares, routes and other aspects of service are as allowed by the STA
under the Motor Vehicles Act, 1988. These operators are independent and have no relationship with the SRTUs.

- Road transport in India is operated by both public sector and private sector. The participation of the state in road transport commenced in 1950 and since then State Road Transport Undertakings (SRTUs) have been formed in every State.

The establishment of the State Transport Undertakings (STUs) in India in the 1960s and 1970s did women services in linking towns and villages across the country, particularly in the western and southern parts. Transport demand in India has increased substantially, due to increases in population as a result of both natural increase and migration from rural areas and smaller towns. Availability of motorized transport, increase in household income, and increase in commercial and industrial activities has further added to transport demand. In many cases, demand has outstripped the capacity. Greater congestion and delays are widespread in Indian roads and indicate the seriousness of transport problems.

1.6 GROWTH OF VEHICLES IN INDIA

There has been a rapid growth in the number of total vehicles registered in the last five decades, which are about 68 million registered vehicles as on 31 March 2009\textsuperscript{10}, as is evident from the figures in Table 1.4.
Along with the rise in vehicle population, the increased mobility demand is reflected in rising utilization rates of private vehicles. The problem has been accentuated by the gradual reduction in the share of public transport in India reflected in the declining share of buses in the total vehicle fleet in the country, where the proportion of buses registered has declined from over 5.03 per cent in 1981 to just over 0.75 per cent in 2008-09.
The rapid increase in the number of motor vehicles in India calls for urgent measures to deal with the resultant congestion and pollution. In particular, encouraging a greater use of public transport instead of personal vehicles and thereby checking the trend of increasing shift towards the use of personal vehicles is the key to addressing the problem of congestion and pollution. Unless the quality of public transport services improves substantially, the trend of increasing preference for personal vehicles would continue. This calls for a complete change in the mindset of the operators. It is extremely important that the provision of public transport services be restructured to ensure service delivery that matches consumers’ expectations.

The historical account given above is mainly to illustrate that public sector has been brought into bus transport not as a prejudice against socialism but as an absolute necessity in the face of private sector's inability to operate efficient and adequate service meeting social obligations.

The growth and performance of State Transport Undertakings during the last 40 years are no mean achievement. As on 31st March 2009, there were as many as 67 nationalised road transport undertakings with a fleet strength of about 1.17 lakh buses employing over 7.5 lakh employees\textsuperscript{11}. 
The STUs carry 63.3 million passengers per day. Even with the percentage of nationalised buses being estimated at 19.49 per cent, the total capital invested is over Rs.3463 crore. The kilometres covered annually by these STUs cross about 126486.72 crore, the particulars of which are given in Table 1.5.

<table>
<thead>
<tr>
<th>Year</th>
<th>No. of Buses</th>
<th>Passenger carried (in crores)</th>
<th>Effective KMs (in crores)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1999-2000</td>
<td>110300</td>
<td>223062.14</td>
<td>108303.32</td>
</tr>
<tr>
<td>2000-01</td>
<td>111084</td>
<td>246288.54</td>
<td>111245.12</td>
</tr>
<tr>
<td>2001-02</td>
<td>111042</td>
<td>241978.20</td>
<td>110326.52</td>
</tr>
<tr>
<td>2002-03</td>
<td>113826</td>
<td>239075.01</td>
<td>114207.84</td>
</tr>
<tr>
<td>2003-04</td>
<td>114689</td>
<td>236872.53</td>
<td>117246.22</td>
</tr>
<tr>
<td>2004-05</td>
<td>114970</td>
<td>241695.75</td>
<td>118909.62</td>
</tr>
<tr>
<td>2005-06</td>
<td>115218</td>
<td>234348.43</td>
<td>120939.99</td>
</tr>
<tr>
<td>2006-07</td>
<td>115229</td>
<td>219668.55</td>
<td>120369.19</td>
</tr>
<tr>
<td>2007-08</td>
<td>116309</td>
<td>219481.63</td>
<td>125411.22</td>
</tr>
<tr>
<td>2008-09</td>
<td>117324</td>
<td>231028.50</td>
<td>126486.72</td>
</tr>
</tbody>
</table>

Source: Various publications by CIRT, Pune.
Figure 1.4
Total Buses, Passengers Carried and Effective Kilometres
1.7 STATE TRANSPORT UNTERDATINGS (STUs) AN IDEAL EMPLOYER

The State is an ideal employer and does not exploit its workers. It pays adequate salaries along with other related benefits to its workers. The STUs stand favourably in comparison with the best-organised private sector so far as their salary structure is concerned. They are not lagging in any respect so far as the related benefits are concerned. They provide housing facilities, medical attention, and gratuity to their workers. A number of STUs have also taken up the Social Benefit Schemes like Payment of Tuition Fees and Scholarships to the children of their workers.

1.8 STATEMENT OF THE PROBLEM

In a developing economy like India, road passenger transport deserves a high priority, as it forms the backbone of the passenger mobility system and is the principal carrier across the country.

Even after five and a half decades of nationalisation, passenger mobility suffers both in volume and quality because the supply of road passenger transport facilities is not keeping pace with the rising demand.

There are both external and internal factors that govern the quantity and quality of services offered to passengers in an omni-bus system. Traditionally, the
performance of the operators of the transport system providing service to the travelling public, covering factors of production to increase output and to reduce unit cost of production is, no doubt important. In a transport system, there are three actors – the major actor being the user of the system- the passenger - whose points of view must be considered. (The other two players being the Transport Operators and the Government). He represents the raison d’etre of the system and therefore, his point of view is a vital part of the system. The user of the system is the first to realise the system’s quality. It is, therefore, apparent that productivity and efficiency of the operator- TNSTU – Tirunelveli division operating in Tirunelveli district in this case - must be synchronized with the satisfaction of the users.

Hence, the present study focuses on the economic performance of the Tamil Nadu State Transport Undertaking – with special reference to Tirunelveli division.

### 1.9 OBJECTIVES OF THE STUDY

The study has the following objectives:

1) To evaluate the operational performance of the State Transport Undertakings in India and Tamil Nadu.

2) To analyse the physical performance of Tamil Nadu State Transport Corporation (TNSTC) at Tirunelveli.
3) To analyse the financial performance of Tamil Nadu State Transport Corporation (TNSTC) at Tirunelveli.

4) To exhibit the profile of the respondents and the factors influencing them in choosing/availing the services of their preferred operators.

5) To examine the factors discriminating the passengers using Government and Private buses at Tirunelveli.

6) To analyse and examine the relationship of profile variables of the respondents and their levels of satisfaction and

7) To suggest a few measures for improvements to be made by TNSTU – Tirunelveli operating in Tirunelveli district to enhance the quality of the services being provided to the public.

1.10 RESEARCH DESIGN

The present study is interested in evaluating the operational performance of a public sector undertaking namely Tamil Nadu State Transport Corporation in Tirunelveli region. In this study, the secondary data of State Transport Undertaking in Tirunelveli pertaining to the last six years have been analysed to reveal the operational performance. So, it is quantitative in nature.

1.10.1 Collection of Data

The researcher has structured the questionnaire of this study with the help of her supervisor, and the officials of the Department of State Transport
Corporation. Eminent persons in the field of passenger transportation also helped with necessary and relevant data about bus commuters which helped the researcher in framing the questionnaire with relevant variables. Data for the study were collected both from primary and secondary sources. Details collected through the structured questionnaire formed the primary data. The secondary data are drawn from various journals and annual reports of STU, Ministry of Surface Transport, Government of India, Central Institute of Road transport, (CIRT) and Association of State Road Transport Undertakings (ASRTU), New Delhi. The primary data are collected from the respondents with the help of pre-structured interview schedule.

1.10.2 Sampling Frame

The study is based on sample survey. The total number of population in Tirunelveli District 8,56,789 (2001 census) was considered and using two way self weighted proportionate stratified sampling. A sample size of 500 respondents were considered and interviewed for the present study. This method was originally used by Dr. John Gunaseelan in his study entitled ‘Public Sector Road Corporation: A Comparative Study with Private Sector (1998)\(^{17}\). In the two way self weighted proportionate stratified sampling, the number of units to be drawn in proportion from each stratum is in the same proportion as they stand in the universe.
In this study, gender and age groups have been considered as stratification variables. In Tirunelveli District, the gender, both male and female is in equal proportion and the other variable considered for the sampling purpose, namely age is in the order of 25.24 percent of the population belonging to the age group between 15 years and 24 years, 22.86 per cent of the population belonging to the age between 25 years and 34 years and 51.90 per cent belonging to the age group of above 55 years. This sampling scheme has considered gender as one stratification variable and age as another stratification variable. So, this scheme could be named as two way self weighted proportionate stratified sampling.

1.10.3 Construction of Tools and Pre-Test

To understand the selected socio-economic and demographic characteristics of the bus commuters, the researcher prepared a structured questionnaire.

To measure the dependent variables, namely attitude towards transport, infrastructural facilities and other activities, the researcher constructed itemized statements, with the help of experts in the field of passenger transportation. The discussion with the research supervisor, review of relevant literature in passenger transport industry and discussions with a few regular commuters of bus transport helped the researcher identify the number of variables, the rating scale and tools to be used for the analysis of data.
1.10.4 Framework of Analysis

After the data collection was over, the collected data were analysed using suitable statistical techniques such as Mean, Chi-square test, Factor analysis and Discriminant Analysis. The Statistical Packages for Social Sciences (SPSS 10) has been used for the analysis.

1.11. PROFILE OF THE STUDY AREA

In this short profile of the study area, information relating to the location, size, climatic conditions, demographic features, the several sectors of the economy, the working class and the places of importance are presented to serve as source material for further understanding.

Tirunelveli is a historically popular southern district of Tamil Nadu. This district is popular socially, economically, literarily and culturally in Tamil Nadu. The leaders and people of this district have played a remarkable role in the freedom struggle of the country. Their contribution is cherished even today. Many academicians, industrialists and agricultural experts have come from Tirunelveli district.

Location

Tirunelveli district lies between 8°05’ and 9°30’ of the northern latitudes and 77°30 and 78°25’ of the eastern latitudes. It is located in the southern part of the State of Tamil Nadu which is surrounded by Virudhunagar District on the
north, Thoothukudi District on the east, Kanyakumari District on the south and the high Western Ghats on the west. The total area of the district is 6823 sq.kms.
Soil and Climatic Features

As far as the natural features are concerned, Tirunelveli district has a place of prime importance. There are two main varieties of soil here namely red soil and black soil. It enjoys a tropical climate generally with minor changes. The normal temperature varies between 32.3°C and 38.5°C at mean maximum and between 21.4°C and 27.1°C at mean minimum. The district has the hottest climate condition from March to May with the mercury touching 38.5°C at the highest. The climate becomes very cool from November to February each year.

Climatic Condition

Tirunelveli district enjoys an equable climate condition. No serious ups and down are noted. Generally, this district does not suffer from extreme climatic conditions like very hot summer and very chill winter. Usually, the months of April, May and June are very hot and late November, December, January and early February are cool. As soon as the southwest monsoon sets in, the temperature comes down. The maximum temperature is 30°C to 31°C. The mean daily minimum during the chill months is between 22°C and 23°C.

The relative humidity during the year, is between 55 and 65 per cent in the interior parts of the district. During the northeast monsoon season the humidity is nearly 65 per cent. Comparatively the coastal parts are more humid.
Land Use Pattern

The Tirunelveli district has cultivable land, forest area and fallow land.

Table 1.6 presents the necessary information.

**TABLE 1.6**

**LAND USE PATTERN IN TIRUNELVELI DISTRICT**

<table>
<thead>
<tr>
<th>SI. No.</th>
<th>Details</th>
<th>Area in Hectares</th>
<th>Percentage to total Geographical area</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Net area sown</td>
<td>136659</td>
<td>20.03</td>
</tr>
<tr>
<td>2.</td>
<td>Area under forest</td>
<td>122055</td>
<td>17.89</td>
</tr>
<tr>
<td>3.</td>
<td>Area not available for cultivation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i)</td>
<td>Land put to Non-agricultural use</td>
<td>96291</td>
<td>14.11</td>
</tr>
<tr>
<td>(ii)</td>
<td>Barren and uncultivated land</td>
<td>27191</td>
<td>3.99</td>
</tr>
<tr>
<td>4.</td>
<td>Other Cultivated Land excluding fallow and</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i)</td>
<td>Terminate passives and other grazing lands</td>
<td>9851</td>
<td>1.44</td>
</tr>
<tr>
<td>(ii)</td>
<td>Miscellaneous tree crops and gores not included in net sown area</td>
<td>8883</td>
<td>1.30</td>
</tr>
<tr>
<td>(iii)</td>
<td>Cultivable lands</td>
<td>79243</td>
<td>11.61</td>
</tr>
<tr>
<td>5.</td>
<td>Fallow lands</td>
<td></td>
<td></td>
</tr>
<tr>
<td>(i)</td>
<td>Current</td>
<td>29466</td>
<td>4.32</td>
</tr>
<tr>
<td>(ii)</td>
<td>Fallow lands other than current Fallow</td>
<td>172669</td>
<td>25.31</td>
</tr>
<tr>
<td>6.</td>
<td>Total Geographical area</td>
<td>682308</td>
<td>100.00</td>
</tr>
<tr>
<td>7.</td>
<td>Area sown more than once</td>
<td>30163</td>
<td>4.42</td>
</tr>
<tr>
<td>8.</td>
<td>Total area cultivated</td>
<td>166822</td>
<td>24.44</td>
</tr>
</tbody>
</table>


Form Table 1.6, it is understood that the total cultivated land area is 23.74 per cent of the total land. The forest area in the district constitutes 17.89 per cent of the total land. The net area sown constitutes 20.03 per cent to the
total area. Out of the total fallow lands 4.32 per cent constitutes current fallow and the remaining 25.31 per cent forms other than current fallows.

**Principal Crops**

In Tirunelveli district, paddy (52.77 per cent to net area sown); sugarcane (5.45 per cent); gingely (1.04 per cent); cotton (5.03 per cent); black gram (0.36 per cent); green gram (.26 per cent) and banana (6.20 per cent in net area sown) are the principal crops.

**Revenue Administration**

Tirunelveli is the headquarters of the revenue administrative setup, the collectorate. There are three revenue divisions; 11 revenue taluks; 19 blocks and 628 revenue villages. There are 435 village panchayats; 38 town panchayats; six municipalities and a municipal corporation.

**Demographic Characteristics**

According to the 2001 Census, the total population of Tirunelveli district was 28,01,194. Out of this total 13,72,082 were male and 14,29,112 were female. The density of population per sq.km was 411. The literacy rate was 76.97 per cent in the total population. The total workers were 11,80,369 and the marginal farmers were 74,326.
Working Population

The total working population of the district is 11,80,369. Among them, agricultural labourers formed 29.57 per cent. In the total population of the district the agricultural labourers formed 12.46 per cent.

Secondary Sector

Industry is the secondary sector of Tirunelveli district. There are a few large scale, some medium scale and a number of small, village and cottage-based industries. The India Cements Ltd, at Thalaiyuthu is a landmark in the industrial map of the district. It has paper, pens, clips, pins, matches and engineering tool making industries. Handloom, mat weaving and beedi making are the notable village industries. The popular, fine and artistic mats of Pathamadai are able to capture the world market. There are 46 registered factories and 357 small scale industrial units in the district.

Infrastructural Facilities

Infrastructural facilities in Tirunelveli district are mostly satisfactory. Yet, as seen in many growing cities and towns, there is scope for further improvements in this direction also.
Transport

There is a well-knitted network of transportation facilities in Tirunelveli district. There are 4,55,115 kms. of surfaced roads and 86,116 kms. of unsurfaced roads. The length of road per 1000 sq.kms. area is 782.58 kms. and the length of surfaced roads per 1000sq.kms. of area is 653.23 kms.

Hospitals and Power Generation

As far as hospitals and power generation projects are concerned, Tirunelveli district has been showing good progress over the years.

Educational Institutions

Tirunelveli is a pioneering district as far as education is concerned. The twin cities of Tirunelveli and Palayamkottai are regarded as the ‘Oxford of the South’. The district has a large number of educational institutions both Government and private. The details of educational institutions in Tirunelveli district are given in Table 1.7.
TABLE 1.7

EDUCATIONAL INSTITUTIONS IN TIRUNELVELI DISTRICT

<table>
<thead>
<tr>
<th>Sl. No.</th>
<th>Education Institutions</th>
<th>Number of Institutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>University</td>
<td>1</td>
</tr>
<tr>
<td>2.</td>
<td>Arts and Science Colleges</td>
<td>21</td>
</tr>
<tr>
<td>3.</td>
<td>Medical College</td>
<td>2</td>
</tr>
<tr>
<td>4.</td>
<td>Siddha Medical College</td>
<td>1</td>
</tr>
<tr>
<td>5.</td>
<td>Engineering College</td>
<td>12</td>
</tr>
<tr>
<td>6.</td>
<td>Law College</td>
<td>1</td>
</tr>
<tr>
<td>7.</td>
<td>Pre-Primary Schools</td>
<td>201</td>
</tr>
<tr>
<td>8.</td>
<td>Primary Schools</td>
<td>1521</td>
</tr>
<tr>
<td>9.</td>
<td>Middle Schools</td>
<td>394</td>
</tr>
<tr>
<td>10.</td>
<td>High Schools</td>
<td>114</td>
</tr>
<tr>
<td>11.</td>
<td>Higher Secondary Schools</td>
<td>148</td>
</tr>
<tr>
<td>12.</td>
<td>Teacher Training Institute</td>
<td>6</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td><strong>2422</strong></td>
</tr>
</tbody>
</table>

Source: www.nellai.nic.org.

Financial Institutions

The district has a well developed banking system with a network of 254 branches of various banks as detailed below:
Table 1.8 shows that Tirunelveli district has 32 banks, and their branches. They are public sector banks, private sector banks, the Pandyan Grama Bank, the Tirunelveli Central Co-operative Bank, the Land Development Bank, the Urban Co-operative Bank, the Tamil Nadu Industrial Investment Corporation, the Tamil Nadu Industrial Corporation and Rural Employment Promoter Corporation.
1.13 LIMITATIONS OF THE STUDY

1. The study was conducted among the commuters of bus only in Tirunelveli District.

2. All the respondents were asked to answer all the questions and as some information had to be recalled from memory, there could be some memory bias.

3. The variables taken for the study are limited to the significant variables in the pilot study and

4. The passenger satisfaction study was conducted during a limited period, which is from October 2008 to March 2009, and as such the findings may not be applicable to other periods, and other States in India.

1.14 CHAPTER SCHEME

The report is presented in six chapters.

Chapter I, the introductory chapter, provides the meaning of transportation, modes of transport, transportation and workforce mobility, transport scenario in India, growth of vehicles, trends of road passenger mobility, passenger transport in India, profile of State Transport Undertakings, performance of SRTUs, statement of the problem, objectives of the study, design of the study, profile of the study area, limitations and chapter scheme.
Chapter II presents the concept of measurement and a broad and extensive review of research work undertaken so far regarding passenger transportation in India and abroad.

In Chapter III the general profile of STUs all over India, and Tamil Nadu State Transport Undertakings and their performance are reviewed.

In Chapter IV, the physical performance of Tamil Nadu State Transport Corporation with reference to Tirunelveli region was analysed.

In Chapter V, financial performance of Tamil Nadu State Transport Corporation with reference to Tirunelveli region was analysed.

In Chapter VI, performance of TNSTC, Tirunelveli region and passenger bus usage profile and preference were analysed.

Chapter VII consolidates the important observations made in this study. Some conclusions and valuable suggestions are presented, which would enable the TNSTU – Tirunelveli region to enhance the services being offered to the public.
FOOTNOTES


5. Planning Commission, Government of India.


8. Various records of National Statistics, Department of Road Transports, Government of India.

9. The India Infrastructure Report, Ministry of Finance, Government of India, 2005


12. Various publications of CIRT, Pune from 1994-95 to 2003-04


14. Various records of National Statistics, Department of Road Transports, Government of India.
