CHAPTER IV

THEORETICAL BACKGROUND AND BRIEF HISTORY OF URBAN PUBLIC TRANSPORT
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CHAPTER IV

THEORETICAL BACKGROUND AND BRIEF HISTORY OF URBAN TRANSPORT

4.1. INTRODUCTION:

This chapter is divided into two sections. First section deals with the conceptual and theoretical framework and section second deals with Historical Development of Urban Transport.

Section I

4.2. CONCEPTUAL AND THEORETICAL BACKGROUND:

The purpose of this section is to study the concepts related to the research work.

4.2.1. Administration and Management:

In practice, these two terms are used interchangeable because both involve the same principles. Somehow, the word management has become popular in business enterprises where economic performance is of primary importance. On the other hand, the term administration is preferred in government departments, hospitals, religious trusts, educational institutions and other non-business organizations.

Administration:

The English word ‘administer’ is derived from a combination of two Latin words ad and ministrae meaning to serve or to manage. Literally, the term ‘administration means management’ of affairs- public or private.
Definitions:

The concept of administration is defined by various authors in the following ways:

E N Gladden “Administration is a long and slightly pompous word, but it has a humble meaning, for it means, to care for or look after people, to manage affairs---is determined action taken in pursuit of a conscious purpose”.

Felix A. Nigro. “Administration is the organization and use of men and materials to accomplish a purpose.”

Herbert A Simson “In its broadest sense, administration can be defined as the activities of groups cooperating to accomplish common goals”.

Oliver Sheldon States that-
Administration is that function in industry which is concerned with
- Determination of a corporate policy,
- Co-ordination of finance, goods/services production and distribution,
- The settlement of the compass (structure) of the organization and
- The ultimate control of the executive

The primary function of the administration is to lay down the corporate objectives and the policy to achieve these. Financial administration of the enterprise is the second important function of the overall administration. The third important function of the administration is to decide about the size of organizational structure, which in turn, depends on:

- degree of decentralization of power and authority,

Level of specialization, and degree of division of work contemplated. The fourth important function of the administration is to exercise control over management.
According to Wheeler, “Administration is fundamentally the direction of affairs. It is a purposive action, and to an increasing degree, it is informal, rational and deliberate action, it is overwhelmingly concerned with the choice of ends, ways and means for attainment of the desired results. The three main elements are:
- formulation of goals
- choice of ways and means, and
- The direction of the people for the same group purpose.”

Allen defines Administration as “comprising all the functions that the manager of an enterprise is expected to perform in realizing the objectives chosen.” He further states, “Administration is a total of planning, organizing, co-coordinating, motivating, controlling and operating work.”

Management:

Management is the art of getting things done by a group of people with the effective utilization of available resources. An individual cannot be treated as a managing body running any organization. A minimum of two persons are essential to form a management. These persons perform the function in order to achieve the objectives of an organization.

Peter F Drucker states, “Management is an organ, organs can be described and defined only through their function”.

According to Terry, “Management is not people, it is an activity like walking, reading, swimming or running. People who perform management can be designated as manager, members of management or executive leaders.”

Kimball and Kimball, state “Management embraces all duties and functions that pertain to the initiation of an enterprise, its financing, the establishment of all major policies, the provision of all necessary equipments, the outlining of the general form of organization under which the enterprise is to operate and the selection of the principle officers.”
Management is the sum total of the following activities:

- Determining objectives, plans, policies and programmes;
- Securing resources (men, money, materials, machines, methods, markets); cheaply and smoothly to produce and distribute as per predetermined course of action for realizing the targets;
- Putting all the resources into operations and controlling their performance through sound organization
- Providing a sense of achievement to the workforce in the operation through proper motivation;

Every managerial function involves the determination of the objectives as well as planning the means of achieving them and ensuring that the necessary tasks are carried out as planned.

4.2.2. Organization- The word ‘Organization is derived from the word ‘organism’ which means an organized body with connected interdependent parts sharing common life. When a group of persons working together to achieve a common goal, the problem such as who decides what issues, who does what work and what action should be taken on the basis of certain conditions may arise.

Haney, states that “organization is a harmonious adjustment of specialized parts for the accomplishment of some common purpose or purposes.”

Allen Clarifies, “The process of identifying and grouping the work is to be performed, defining and delegating responsibilities and authority and establishing relationships for the purpose of enabling people to work most effectively together in accomplishing objectives.”

6
The organization in which managers operate comprises of many interrelated subsystems such as a human (social) subsystem, an administrative (structural) subsystem, an informational (decision making) subsystem and an economic (technological) subsystem.

The Economic subsystem will concentrate on the work to be done and its cost effectiveness. The decision making subsystem will focus on the key decision areas and the informational needs to keep the system operating. The main concern of the structural subsystem will be on the organizational structure, authority and responsibility setup within the organization. Whereas, the human or social subsystem will look into the motivational aspects and needs of organizational members and the type of leadership necessary. 

Administration is the legislative determinative or planning function and it is concerned with the overall supreme policy – framing and decision making authority. Management is an executive function in charge of over-all direction of human efforts and getting work done through other people. Management is primarily concerned with the carrying out the broad policies laid down by the administration.

Organization is the framework or medium to exercise managerial functions. Management is an effective execution. Administration is an effective direction. Administration devises the organization, management uses the organization. Administration defines goals; management tries its best to achieve those goals. Organization is the machine to be used by management to discharge managerial functions to accomplish the set goals.
4.3. MAIN AREAS OF MANAGEMENT:

4.3.1 Financial Management-

Finance may be defined as the art and science of managing money. The major areas of finance are (i) financial services and (ii) managerial finance/corporate finance/financial management. While financial services are concerned with the design and delivery of advice and financial products to individuals, business and governments within the areas of banking and related institutions, personal financial planning, investments, real estate, insurance etc. Financial management is concerned with the duties of the financial manager in the industry.

According to Nalini Dave, “Financial Management is concerned with efficient utilization and adequate regulation of all expenditure and income. It includes judicious acquiring, spending, borrowing and investing of capital, credit and funds employed in the business”.

4.3.2 Production Management:

“Production management deals with decision making related to production process so that the resulting goods or services are produced according to specifications in amounts and by the schedules demanded, and at a minimum costs”.

Thus production management is concerned with the decision making regarding the production of goods and services at a minimum costs according to demand of the customers through management process of planning, organizing and controlling.

In order to attain these objectives, effective planning and control of production activities is very essential. Otherwise the customers shall remain unsatisfied and ultimately certain activities will have to be closed.
4.3.3 Human Resources Management/Personnel Management

HRM/Personnel management can be seen as that part of the management tasks which is concerned with the human resources of the organization and their contribution to its effectiveness.

HRM’s central concern is the efficient utilization of human resources.

C H NorthCott, states that “Personnel management is an extension of general Management, that of prompting and stimulating every employee to make his fullest contribution to the purpose of business.”

According to Dave Yoder, “The management of human resources is viewed as a system in which participants seek to attain both individual and group goals.”

Personnel management is basically concerned with “men at work” and with their “group relationships” with a view to achieve the objectives of the organization through their maximum personnel contribution towards the work goal achievements. ¹¹

4.3.4 Marketing Management

Philip Kotler states that “the process of planning and executing the conception, pricing, promotion, and distribution of ideas, goods and services to create exchanges that satisfy individual and organizational goals.”¹²

Research work is related to working efficiency of NMMT undertaking, the theoretical aspects relating to productivity and efficiency are being presented to some extent here below:
4.4. PRODUCTIVITY:

productivity is an economic concept showing the effectiveness of factors used in producing goods or services. It is a key index of efficiency and represents the relationship between output and input.

Peter F. Drucker states that “Productivity means the balance between all factors of production that will give the greatest output for the smallest efforts.”

According to M. Banerjee “The word productivity usually means the ratio of wealth in the form of goods and services and input of resources used up in that output”.

V.R.K. Menon defined the productivity as “It implies development of an attitude of mind and a constant urge of final better, cheaper, quicker, easier and safer ways of doing a job, manufacturing a product and producing service”.  

Paul Mali proposes a productivity index in the form of a ratio:

\[
\text{Productivity index} = \frac{\text{Output}}{\text{Input}} = \frac{\text{performance achievement}}{\text{resources consumed}} = \frac{\text{Effectiveness}}{\text{Efficiency}}
\]

4.4.1. Effectiveness:

Effectiveness refers to accomplishments of a set of targets. Productivity concepts emphasis the accomplishments of set targets. Without set results there is no productivity.

Efficiency stresses how well resources are being used for accomplishments of set target. High productivity suggests minimum use of resources.
Basically a road passenger transport system produces seat kilometers for serving the community. Improving productivity will mean producing seat kilometers, being the most perishable commodity, by keeping costs as low as possible and at the same time ensuring the desired level of passenger satisfaction. To achieve this, of course there would be a number of action areas that could bear a great deal of scrutiny. It is in these areas that components of productivity exist and various factors pertaining to these areas have to be scientifically analyzed, if productivity is to be seriously contemplated. Productivity will engulf all areas such as (a) fleet utilization (b) vehicle utilization (c) crew utilization (d) carrying capacity, (e) avoidance of cancellation (f) minimization of breakdowns (g) conservation of fuel (h) improving tyre performance (i) quality assurance in respect of incoming stores (j) avoidance of accidents (k) reduction of staff cost (l) improvement of earnings (m) cost reduction etc and involve a well knit action plan on the part of operator, user, society and government.

4.4.2. Efficiency:
According to the encyclopaedia of social sciences “It is the sense of ratio between input and output, efforts and results, expenditure and incomes, cost and the resulting pleasure.”

The term efficiency, however, is subject to a variety of interpretations. It has been rightly stated that “like so many terms having a very large and indeterminable connotation, the term efficiency is so wide and porous that there is little interpretation that can successfully resist.”

Efficiency is basically an input-output relationship. In practice laying down standards for output or input is also a difficult task indeed.

Efficiency is a relative concept and that caused another difficulty in measurement of efficiency.

Prof. Sargent Florence and Gilbert Walker have suggested two broad tests of efficiency, viz (i) the primary test and (ii) the alternative test. Under primary
test they have suggested that in “state trading a surplus or avoidance of loss when subtracting aggregate cost from aggregate prices (i.e. covering cost or break even) seem to us, with four proviso, still the primary test of efficiency.”

Under the alternative test, they have suggested the following five tests, (i) growth in productivity (ii) the growth in staff employed (iii) industrial morale and goodwill (iv) keeping out of trouble and a joint test 16

While considering the productivity and efficiency, quality of service cannot be ignored. The user of the system also contributes major inputs to the operation of the system and is the first to realize the system's output. In terms of input he contributes his time, out of pocket costs and fares, accident risks and personnel efforts. In terms of output, he receives the trips completed in the system plus a level of comfort and contentment. It is, therefore, apparent that productivity and efficiency must be synchronized with the satisfaction of the users. 17

**Components of Efficiency**—It consist of 4 M i.e. Efficiency of Men, Machines, Materials and Money.

**Factors Affecting Efficiency:**

Factors like cost, wage, technology, management, working conditions, quality of raw material, labour organization, welfare activities and training and education.18

**4.5. CONCEPT OF SERVICE:**

A service is an act or performance offered by one party to another. Although the process may be tied to a physical product, the performance is essentially intangible and does not normally result in ownership of any of the factors of production.
Services are economic activities that create value and provide benefits for customers' specific times and places, as a result of bringing about a desired change in or on behalf of the recipient of the service. Services are those separately identifiable, essentially intangible activities which provide want satisfaction, and that are not necessarily tied to the sale of a product or another service. To produce a service may or may not require the use of tangible goods. However, when such use is required, there is no transfer of title (permanent ownership) to these tangible goods.

One common method of defining a service is to distinguish between the core and peripheral elements of that service. The 'core' service offering is the necessary output of an organization which are intended to provide the intangible benefits customers are looking for. Peripheral service are those which are either indispensable for the execution of the core service or available only to improve the overall quality of the service bundle. Services include all economic activities whose output is not a physical product or construction is generally consumed at the time it is produced and provide added value in forms (such as convenience amusement, timeliness, comfort or health) that are essentially intangible concerns of its first purchaser.  

According to American Marketing Association,

"Services are the activities, benefits or satisfaction which are offered for sale or are provided in connection with the sale of goods."

According to Sir William Beveridge: Services refer to social efforts which include government to fight five giant evils, wants, disease, ignorance, squalor and illness in the society."

Another expert says services can also be defined as an action of organization (s) that maintain and improve the well being and functioning of people.

Services can also be defined as a human effort which provides succour to the needy. It may be food to a hungry person, water to a thirsty person, medical
services to an ailing person and education to a student, loan to a farmer, transport to a consumer, communication aid to two persons who want to share a thought, pleasure or pain.

Provision or system of supplying public needs e.g. transport (in special) (the Oxford Reference Dictionary)

Characteristics of a service:

The distinct characteristics of services are

1. **Intangibility**: Services are intangible. They are not physical objects. According to Carman and Uhl a consumer feels that he has the right and opportunity to see, touch, hear, smell or taste the goods before they buy them. This is not applicable to services. The buyer does not have any opportunity to touch, smell, taste the services.

2. **Perishability**: Services too are perishable like labour. Service has a high degree of perishability. Here the element of time assumes a significant position. Services are not storable.

3. **Inseparability**: Services are inseparable. They are often interlinked with one another. Services and their providers are closely associated and hence are not separable. Donald Cowell states goods are produced, sold and then consumed where as the services are sold and then produced and then consumed.

4. **Heterogeneity**: The perceptions of the service provider and the service receiver are different. Hence it is difficult to standardized the service.
5. **Ownership:** Since a service is not physical in nature, it cannot be owned by the service receiver.

6. **Simultaneity:** Services cannot move through channels of distribution and cannot be delivered to the potential customers and users. Services are produced and received at the same time.

7. **Quality Dimension:** Quality aspect is the nucleus of any service dealing. The service industry requires a measurable tool for quality measurement. The service provided can be measured as per the level of satisfaction which the customers are satisfied. Services can be distinguished on the quality of services provided by the service provider to the service receiver.

8. **Flexibility:** Services are often related to flexibility. Nature of service is often fluctuating. For instance, the mobility of passengers is increased during the vacation time.  

**Different types of services:**

- The distinct types of services need individual focus while taking decisions regarding their organizational set up. They are mentioned below:

**Primary Activities:** Mining, agriculture, farming, fishing, etc.

**Secondary Activities:** Activities related to manufacturing processes.

**Tertiary Activities:** Services, catering domestic needs like:

- **Business services:** Consultation (legal, documentation, outsourcing, database management, software solution, etc) finance, banking, insurance, and maintenance.
• **Trade service**: Retailing, whole selling and allied activities.

• **Infrastructure services**: Communication, transportation, and warehousing.

• **Social/personal service**: Community halls, travel and tourism, restaurants and healthcare,

• **Entertainment**: Cinema, music halls, clubs (social, sports)

• **Public Administration**: Education, Government administration (Municipal services/Police/Crematory)

• **Welfare (Other than Government)**: NGOs social groups etc.  

**Concept of Services Marketing:**

We term marketing a function by which a marketer plans, promotes and delivers goods and services to the customers or clients. In the marketing of services, the providers are supposed to influence and satisfy the customers or users.

The concept services marketing have gained prominence very recently. The emergence of a number of services generating organizations in almost all the areas engineered a strong foundation for development of services marketing, specially in the developed countries of the West which could get a place in the developing countries like ours in the due course.

The perception of service marketing focuses on selling the services in the best interest of users/customers. It is concerned with a scientific and planned...
management of services which make possible a fair synchronization of the interest of providers as well as the users. The services generating organizations realized the interest of customers and thereafter they were compelled to assign due weightage to the interest of the society in the face of the holistic concept of the management.

Marketing a service is meant marketing something intangible. It is marketing a promise. It is more selling yourself.

Following are the key points regarding the concept or perception of services marketing.

- It is a managerial process of managing the services.
- It is organized efforts for providing a sound foundation for the development of an organization.
- It is a social process helping an organization to understand the emerging social problems and to take part in the social transformation process to justify its existence in the society.  

4.6. MEANING AND NATURE OF TRANSPORT:

The word ‘transport’ has been derived from the Latin word ‘transportare’ trans means across or the other side and portare means to carry from one place to another.

Transport, in a general sense of the term, means carrying men and materials from one place to another, thereby resulting in a creation of place and time utilities. It also involves movements of goods and services from places where their marginal utility is less to the places where their marginal utility is high.

The social, economic and commercial progress of a nation largely depends on transportation system. A well managed transport system acts as a catalyst of economic transformation.
If the wheels take rest all the manufacturing, merchandising, banking and other business cannot exist. Along with socio economic transformation even the process of cultural transformation stops if we stop the movement of wheels.

The demand for transport is a derived demand, because the demand for transport arises only after the raising of demand for goods and services. On the one hand, production and consumption pattern in different sectors of the economy decide the fortunes of the transport, on the other the demand for an organized transport system opens up new avenues for capital investments and employment. At the same time the fiscal and the monetary policies of the government may accelerate or decelerate the demand for transport services.

W.E. Ogburn states that it is the de facto barometer of economic, social and commercial progress and has transformed the entire world into one organized unit. It carries ideas of inventions to the people and has considerably contributed to the evolution of civilization. 25

Classification of Transport:

Transport has been classified as follows:

(A) Land Transport: (i) Rail (ii) Road (iii) Tram
(B) Water Transport (i) Inland (ii) Coastal (iii) Overseas
(C) Air Transport: (i) Internal (ii) International
(D) Pipelines
(E) Miscellaneous: (i) Trolleys, (ii) Elevators (iii) Parachutes (iv) Sledges (v) Spacecrafts 26

4.7. URBAN TRAFFIC MODES:

One striking feature of urban transport is that the fast and the slow modes, motorized and non motorized vehicles all varieties of light and heavy
traffic animal and animal carts the most modern automobiles and their ramshackle, rickety, smoke-belching ancestors- all share and compete for road space. The variety of these modes is shown in fig no. 4.1.27

**Fig. 4.1**

Urban Transportation System in India

- **Freight**
  1. Heavy commercial vehicles
  2. Light commercial vehicles
  3. Three wheelers
  4. Animal carts
  5. Hand carts

- **Passenger**
  **Road Based**
  1) Buses
  2) Trams
  3) Cars
  4) IPTS
  5) Two wheelers
  6) Three wheelers
  7) Cycle
  8) Pedestrians

  **Rail Based**
  1) Sub-urban Trains
  2) Light Rail Trains(LRT)
  3) Metros
4.8 VOLUME AND TREND OF URBANIZATION IN INDIA:

India shares most characteristic features of urbanization in the developing countries. Number of urban agglomeration/town has grown from 1827 in 1901 to 5161 in 2001. Number of total population has increased from 23.84 crores in 1901 to 102.7 crores in 2001 whereas number of population residing in urban areas has increased from 2.58 crores in 1901 to 28.53 crore in 2001. (table 4.1). It reflects a gradual increasing trend of urbanization. India is at acceleration stage of the process of urbanization. 28

Table 4.1
Population of India by Residence

<table>
<thead>
<tr>
<th>Census years</th>
<th>Number of Urban agglomeration/town</th>
<th>Total population</th>
<th>Urban population</th>
<th>Rural</th>
</tr>
</thead>
<tbody>
<tr>
<td>1901</td>
<td>1827</td>
<td>238396327</td>
<td>25851873</td>
<td>212544454</td>
</tr>
<tr>
<td>1911</td>
<td>1825</td>
<td>252093390</td>
<td>25941633</td>
<td>226151757</td>
</tr>
<tr>
<td>1921</td>
<td>1949</td>
<td>251321213</td>
<td>28086167</td>
<td>223235046</td>
</tr>
<tr>
<td>1931</td>
<td>2072</td>
<td>278977238</td>
<td>33455989</td>
<td>245521249</td>
</tr>
<tr>
<td>1941</td>
<td>2250</td>
<td>318660580</td>
<td>44153297</td>
<td>274507283</td>
</tr>
<tr>
<td>1951</td>
<td>2843</td>
<td>361088090</td>
<td>62443709</td>
<td>298644381</td>
</tr>
<tr>
<td>1961</td>
<td>2363</td>
<td>439234771</td>
<td>78936603</td>
<td>360298168</td>
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<tr>
<td>1971</td>
<td>2590</td>
<td>598159652</td>
<td>109113977</td>
<td>489045675</td>
</tr>
<tr>
<td>1981</td>
<td>3378</td>
<td>683329097</td>
<td>159462547</td>
<td>523866550</td>
</tr>
<tr>
<td>1991</td>
<td>3768</td>
<td>844324222</td>
<td>217177625</td>
<td>627146597</td>
</tr>
<tr>
<td>2001</td>
<td>5161</td>
<td>1027015247</td>
<td>285354954</td>
<td>741660293</td>
</tr>
</tbody>
</table>

Source: Various census reports
4.9. URBAN TRANSPORT AND CITY EFFICIENCY:

Many cities in India have grown at an unprecedented rate in recent years, and this growth is expected to continue in the foreseeable future. In 1951 only five cities in India had populations in excess of 1 million: Kolkata (4.67 million), Mumbai (2.97 million), Delhi (1.43 million), Chennai (1.54 million), and Hyderabad (1.13 million). By 2001, however, there are 35 cities in India whose population topped 1 million, and by the end of the year 2021 they are expected to be at least fifty.

Fast growing cities in India have nurtured business and industry and have provided jobs and higher incomes to many migrants from rural areas. Thus, it is important that cities function efficiently – that their resources are used to maximize the cities’ contribution to national income. City efficiency largely depends upon the effectiveness of its transport systems, i.e. efficacy with which people and goods are moved throughout the city. Poor transport systems stifle economic growth and development, and the net effect may be a loss of competitiveness in both domestic as well as international markets.

Although Indian cities have lower vehicle ownership rate (number of vehicles per capita) than their counterparts in developed countries, they suffer from worse congestion than cities in industrialized countries. In Kolkata, for example, average speed during peak hours in CBD area goes down as low as around 7 kms per hour. This indicates both the amount of time and energy that are wasted and the scale of opportunity for improvement.

Spending on transport is too often influenced by notion of political prestige than by rational calculations of economic growth. Most Indian cities spend too much on politically attractive but costly facilities, such as elevated roadways and mass rail transit system, instead of making modest labour-intensive road improvements, extending city streets, and promoting low-cost bus operations. Since, as per the World Bank Study, rail subways can cost as much as $100
million per kilometer, the money spent building just a few meters of subway could be used instead to construct or upgrade several miles of streets.

Transport demand in most of the Indian cities has increased substantially due to increase in population as a result of both natural birth rates and migration from rural areas and smaller towns. Availability of motorized transport, increases in household income, and increases in commercial and industrial activities have further added to it. In many cases, demand has outstripped road capacity. Greater congestion and delays in both passenger and commercial traffic are widespread in Indian cities and indicate the seriousness of their transport problems. As a result, costs—particularly fuel costs—increased substantially, and affecting commerce and industry. A high level of pollution is another undesirable feature of overloaded streets. The result has been a serious decline in productivity and city efficiency, a drain on city and national budget, and strain on urban institutions. The transport crisis also takes a human toll. Statistics indicate that traffic accidents are a primary cause of accidental deaths in the Indian cities.

4.10. CURRENT URBAN TRANSPORT SCENARIO IN INDIA:

On an average, during peak hours in Mumbai, the actual occupancy in a suburban train is in excess of 4000 passengers, which have maximum desirable capacity of 2600 passengers. Most of the Indian cities have more or less similar traffic congestion. Estimates for the metropolitan cities show that approximately 80 million trips will need to be catered to per day whereas, only 37 million trips are being provided by the available rail and bus mass transport facilities. Furthermore, as per the World Bank Study, for every extra one million people in a developing city an extra 3.5 to 4 million public transport trips per day are generated. Considering the population growth in most Indian cities, the urban transport infrastructure thus needs to be increased manifold in decade or so, if the gap in the demand and supply has to be eliminated29.
4.11. OPERATIONAL PERFORMANCE AND SERVICE QUALITY INDICATORS:

City bus services worldwide are faced with heavy demand for service, steep rise in capital and operating cost and a lack of resources. Hence, it is necessary to ensure that whatever reasons are available to them are put to the most effective and efficient use. There is also a need to evaluate the operational performance of a bus service and the standard of service being provided by it to the traveling public.

For these purposes the international Bank for Reconstruction and Development/World Bank has devised a set of performance indicators and quality standards.

(A) Operating Performance Indicators:

A summary of key performance indicators as may be applicable to the present study organization – Navi Mumbai Municipal Transport, is being presented below.

1. Passenger Volumes:

A significant indicator of productivity is number of passengers carried in relation to the capacity of the bus system. Measured in terms of the average number of passengers per operating bus per day a reasonably well managed bus system should produce results in the following range:

<table>
<thead>
<tr>
<th>Sr.No</th>
<th>Type of Bus</th>
<th>Crush capacity</th>
<th>Passengers per bus per day</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>single deck bus</td>
<td>80</td>
<td>1000-1200</td>
</tr>
<tr>
<td>2</td>
<td>single deck bus</td>
<td>100</td>
<td>1200-1500</td>
</tr>
<tr>
<td>3</td>
<td>single/double deck bus</td>
<td>120</td>
<td>1500-1800</td>
</tr>
</tbody>
</table>

Several factors have a direct bearing on these results, system that achieve high vehicles kilometers usually carry more passengers. Similarly, figures for passengers per bus will tend to be high with rapid turnover resulting from a high
proportion of short passenger trips. Where supply is unable to cope with demand, overloading can be expected and passengers per bus will tend towards or even exceed the top end of the scale. Therefore, this indicator should not be considered in isolation.

2. Fleet utilization:

The proportion of the bus fleet that can be put into service each day has a direct bearing on the productivity of the system. It is indicative of the effectiveness of bus maintenance, spares procurement and stock keeping as well as staff recruitment and management. Fleet utilization expressed as a % of total fleet, is usually calculated by dividing the total number of buses running during the morning or evening peak period by the total fleet size (excluding any buses that are beyond repair) with adequate maintenance and staff management, it should be possible to achieve fleet utilization of between 80%-90%. Fleet utilization may fall well short of this range because of a lack of maintenance facilities or skills, problems over the supply of spare parts, tyres or fuel or where there are labour or union problems. On the other hand very high utilization can be achieved when repairs and maintenance are carried out by adequately equipped skilled machines working on buses over night or during peak period.

3. Vehicle kilometers:

A further indicator of the productivity of a bus fleet is the total distance traveled by the buses in service, i.e. vehicle kilometers. This is usually expressed in terms of average kms per operating bus per day. For a reasonably well run bus service, it should be in the region of 210 to 260 kms.

The results, however, will be greatly influenced by traffic and road conditions, hours of operation, breakdown, the number of stops and the turnaround time (vehicle hours of operation provide another measure, but details of operating house for each bus usually are not readily available.) Vehicle distance can be
measured and verified from a number of sources, such as tackometer readings, route distance and trips as well as fuel consumptions.

4. Breakdowns in service:
   An indication of the maintenance and driving standards is the proportion of buses that break down in service and require either assistance from a mobile repair unit or attention at the depot. A reasonably well maintained fleet would expect to have breakdowns at a rate of no more 8% to 10% of buses in operation each day. In addition to poor quality of maintenance and driving skills, traffic congestion, bad road conditions and tropical climatic conditions are particularly inclined to give rise to breakdowns and need to be taken into account when assessing this measure of performance.

5. Fuel consumption:
   Fuel consumption will depend on the size and the load of vehicles, engine type and the gradients and traffic conditions encountered on route. Maintenance and driving standards will have a considerable influence as well. Measured in terms of liters per 100 vehicle kilometers, fuel consumption of a well run bus system should fall within the limit of 25 to 50 liters per 100 km. (for regular buses)

6. Staff Ratios:
   The size of the staff employed to put buses into regular service provides a clear indication of the efficiency of the bus system. The following ranges should be expected.

   Total staff employed per operating bus: 3.0-8.0
   Administrative staff: 0.3-0.4
   Maintenance staff: 0.5-1.5
   Traffic staff: 2.2-6.1
In practice, a number of factors may have a strong influence on the staffing ratio. Staff ratios towards the top of the range can be expected in countries where labour cost are low and operations are likely to be labour intensive, for example, manual cleaning as opposed to mechanical cleaning excessively high total staffing ratios occur where labour laws or union regulations inflate the bus operation and make it difficult to relate manning scales to the size of the operation. In particular, it may not be possible to reduce staff when services are curtailed. On the other hand, very low total staff figures are found in small operations.

7. Accident Rate:

The level of accidents will provide some indication of the standard of driving and maintenance, but will be greatly influenced by traffic conditions in particular the volume of pedestrians. A comparison should, therefore, be made with the traffic accidents rate for other vehicles operating in the same area in a well run bus system operating under moderate conditions accident per 100000 bus kms are likely to be in the region of 1.5 to 3.0.

8. Dead mileage:

Dead mileage (sometimes called light mileage) is the term applied to the length of journey that are not revenue earning. In other words, journey that are made when buses are not in service and passengers are not being carried. This usually depends on the location of overnight parking and maintenance depots in relation to the start and finish points of the bus services. Dead mileage for a reasonable efficient system would be in the region of 0.6% to 1.0% of the total vehicle mileage (effective kms.)
9. Cost of Bus Service:

The costs of bus service are mainly dependent on local labour and fuel costs, but are greatly influenced by the efficiency of operation and management as well as by traffic and road conditions. The total cost of bus services (operating costs depreciation and interest) in mixed traffic should be in the region of Rs. 9 to Rs.22.5 per passenger kms. Significantly lower costs may indicate highly efficient operations; the results often are due to excessive overloading or other deficiencies in the supply of services.

10. Operating ratio:

In order to be self sufficient and to avoid the need for subsidies revenue should cover costs and show a small surplus to stimulate investment and growth. To meet these requirements the operating ratio (total revenue divided by operating cost, including depreciation) should be in the region of 1.05:1 to 1.08:1

(B) Service Quality Indicators:

Acceptable levels of service will differ very considerably from one city to another and are greatly influenced by income levels, the value placed on time, geographic and climatic conditions, availability of alternative modes, traditional standards, public attitudes and ethnic characteristics. Clearly there is no set of standards that could be universally applied to the quality of bus service in any particular city. Nevertheless, there are a number of attributes that services possess that can be measured values have been placed on these by various authorities to provide indicators of the quality of service in their cities. Using these with caution and having due regard for the influence of other factors provide a rough measure of comparative levels of service.

1. Waiting time:

A major factor in the overall quality of service is the time passengers have to wait at bus stops for buses. This is often judged to be the primary indicator of
service quality perceived by the passengers. The findings of a study establish the following levels of quality for waiting time.

- 0-3 minutes: Good
- 4-11 minutes: Regular
- 12-19 minutes: Bad
- Over 20 minutes: Very bad

Taking into consideration the different factors of conditions that may prevail, it is suggested that to achieve a reasonable level of service, the average waiting time should be in the region of 5 to 10 minutes with a maximum waiting of 10 to 20 minutes. The lower end of these ranges would apply to fairly short journeys with high frequency services and the upper limit would apply to long journey and low frequency services.

2. Walking distance to Bus stop:

   The distance that passengers have to walk to and from bus stops are indications of the coverage provided by the bus services. Generally, in reasonably well served urban areas, passengers should expect to find a bus stop within 300 to 500 meters of their home or work place. Distances in excess of 500 meters may be acceptable in low density areas, but the maximum distance that passengers have to walk to and from a bus stop should not exceed 1000 meters. Considering on the one hand, the delays caused by too closely spaced stops and on the other hand, the inconvenience of widely spaced stops, the optimum spacing of bus stops along routes in dense urban areas is likely to be in the region of 300 to 400 meters.

3. Interchange between Routes and Services:

   The need to change buses (or to other modes) adds to the time spent waiting and to the inconvenience experienced by the passengers. It may also add to the passengers’ direct cost e.g. when a second fare is levied. In a well designed bus
system the majority of commuters should not need to interchange during their journeys to or from work. In a large city, many commuters might be expected to interchange once (e.g. travel on two routes) bus less than 10% should be required to interchange more than once.

The World Bank reports that despite very serious difficulties faced by bus systems throughout the world, there are many that are able to achieve and in some cases exceed, the level of performance and standards suggested above. Certainly, the lower ends of the ranges indicated for standards of service should be achievable by the most reasonably well run bus system and are the very least that the public are entitled to expect. However, as the income rise there will be a growing demand for better quality transport, and if the bus services are to retain their passengers’ standards need to be improved. 30

SECTION II

Historical Development of Urban Transportation

Introduction:

This section deals with historical development of urban public transportation in the world and India.

Throughout recorded history, human beings have strived for freedom, independence and mobility. The first two freedoms and independence are guaranteed because of the democratic setup. Mobility is provided through modern technology and the current state of personal affluence, although one notices deterioration in this respect, most people can travel when where, how, and with whomever they wish for centuries, urban residents travelled within the city by walking. Transportation was not a major problem because cities were small, and
all points within the city were accessible on foot within reasonable period of time. Only the rich enjoyed the luxury of riding.

With the industrial revolution of the nineteenth century, cities began to grow and expand in population and with this growth came the need for traveling greater distances, which in turn increased the demand for improved means of transportation. Thus, animal drawn vehicles became common place as means of public and private transport.

This brought about new dimensions in transportation and a new form of traffic congestion.

In the days of animal drawn vehicles, most city streets not paved to provide a smoother riding surface and to permit one horse to the work of several many transit companies built street railways for horse drawn transit vehicles.

The first public transportation was introduced by the Romans, who established a system of vehicles for hire during the regions of Emperor Augustus and Tiberius. These two or four wheel wagons were stationed at inns every 5 or 6 miles along the fine highways for which the Romans were famous.

Coaches that ran on regular schedules between major towns appeared in Europe during the 16th century. Stage coaches were introduced in the 17th century. The first form of public transportation to operate solely within cities was the hackney carriage, the forerunner of the taxi, which appeared is Paris and London shortly after 1600. The name came from the French world haquenee, meaning a horse of middling size and quality used for riding but not for war or hunting. It soon came to mean a horse for hire and then a vehicle as well. By 1700 there were about 600 hackneys operating in London the name has survived. Some U.S. cities have a Hackney Bureau that issues “hack licenses” for taxicabs.

In 1962 the French philosopher Mathematician Blaise Pascal obtained a patent from the king and began a low fare coach service on five fixed routes in Paris.

As the 19th century opened the average person walked to work.
4.12. LANDMARKS IN THE HISTORY URBAN MASS TRANSIT

The Land mark in the history of urban mass transport is as follows:

1662  Blaise Pascal inaugurated low-priced coach service on five routes in Paris. He died in the same year, and service ceased after 2 years.

1819  The era of urban transit arrived with a stagecoach line in Paris. A new vehicle called the omnibus was introduced in 1825.

1827  The first urban transit service in the United States began – a stagecoach line running on Broadway in New York City.

1829  Regularly scheduled omnibus service was initiated in London. In 1832 it was made legal to pick up and discharge passengers along the route.

1832  The first horse drawn street railway in the world opened in New York City.

1838  The first suburban railroad line in the world began service in London. The first U.S. commuter trains ran from Worcester to Boston in 1843.

1855  The first horse car line in Europe began operation in Paris.

1863  The world’s first subway began operation in London. Trains were pulled by steam locomotives, and it was called the sewer railway.

1868  The first elevated railway in the world opened in New York City. Cable traction proved unsuccessful, and it was converted to steam locomotives.
1870  A pneumatically operated subway was opened in New York City. Only 300 feet long, it ceased operation after 3 years. The tunnel is still there.

1872  The Great Epizootic killed thousands of horses in east coast cities and caused a crisis for operators of horse-drawn railways. They began looking for other means of propulsion. Cincinnati got its first inclined railway. These were later built in Los Angeles, Pittsburgh and Duluth and on the New Jersey Palisades.
An elevated railway (the S-Bahm) opened for service in Berlin.

1873  Andrew Hallidie successfully demonstrated the cable car in San Francisco. Regular service started a month later.

1880  Construction of a railway tunnel under the Hudson River was halted when a cave-in killed 20 workers. Work was resumed in 1902, and the Hudson Tubes (now used by PATH trains) were finally opened in 1908.

1881  The world’s first electric trolley service was opened in suburb of Berlin. Werner von Siemens was the inventor.

1882  Cable cars started running in Chicago in January, proving that climate was no barrier to the technology. Eventually lines operated in 30 U.S. cities. Chicago had the second largest system, after San Francisco.

1883  The first interurban electric railway in the world began service at Giant’s Causeway in Northern Ireland. This line lasted until 1949.

1888  Frank J. Sprague opened a 12 mile electric streetcar system in Richmond. Its success stimulated wide development of electric trolley system.
1890  The first electrically powered subway in the world was opened in London. It was very successful. And by 1906 an extensive network was in place.

1892  The South Side elevated line was opened in Chicago. At first trains were pulled by steam locomotives; electric trains began running in 1895.

1896  In May, Budapest became the second city in the world with underground transit (actually a tram line). In December, Glasgow became the third with a 6.6 mile loop powered by cables.

1897  Boston became the first city in the United States with a subway when a streetcar line under Tremont Street began operation. The tunnel is still in use. The Chicago Loop was completed. By this time all elevated trains were using electricity. They had the multiple unit system invented by Sprague, in which every car has its own motor.

1899  The first motor buses in the world went into service in London.

1900  The first Metro line in Paris was opened for service.

1901  The first monorail line in the world, 8 miles long, began operation in Wuppertal, Germany. It is still in use.

1902  Berlin’s first subway (the U-Bahn) was opened.
1904 New York City's first subway line was opened; it ran under Fourth Avenue and Broadway from the Brooklyn Bridge to 145th Street. This was the first line with four tracks, for local and express service.

1905 The first motor bus line in the United States went into service, with double deckers running on Fifth Avenue in New York City.

1907 Rapid transit came to Philadelphia with a combination subway and elevated line along Market Street.

1910 The first trackless trolley line in the United States was opened in Hollywood, California. It was preceded by others in Europe.

1912 A parties of officials traveled from Boston to New York City by streetcar, using a dozen lines and going via Worcester, Springfield, Hartford, New Haven, and Bridgeport. The total fare would have been $2.40.

1913 The first subways line in Latin America was opened in Buenos Aires.

1914 Jitney service appeared in Los Angeles, posing a great threat to the streetcar business. Jitneys were soon outlawed in most U.S. cities.

1917 In the worst transit accident in U.S. history, 97 persons were killed in a subway crash at Malbone Street in Brooklyn, New York.

1919 Madrid's Metro was opened. It long led the world in passengers per route-mile, due to the split workday, with four peak periods.
1923  This was the peak year for streetcar patronage in the United States – 13.6 billion passengers.

1926  A-3 mile tunnel for streetcars was opened in Sydney, Australia.

1927  The Ginza line in Tokyo was opened - first subway in Asia.

1935  The first line of the Moscow subway was opened. The Moscow system now carries more passengers than any other in the world.

1936  The first PCC streetcars began service in New York City. They were developed in an effort to standardize equipment in the transit industry.

1937  Paris became the first large city in the world to abandon streetcars. It was followed by Manchester (1949), London (1952), Edinburgh (1956), Sydney (1961), Glasgow (1962), and Bombay (1964).

1943  Chicago’s first subway began operating under State Street.

1946  This was the peak year for transit riding in the United States- 23.4 billion passengers. Patronage on subway-elevated systems also peaked in 1946; on buses, in 1948; and on trackless trolleys, in 1949.

1949  The Long Island Railroad went bankrupt, initiating an era of decline for commuter railroads. It was the largest commuter carrier in the United States, but it carried little freight. It was bought by New York State.

1952  The last PCC streetcars made in the United States arrived in San Francisco.

1954  The Yonge Street line was opened in Toronto – Canada’s first subway.
1955  Cleveland’s one rapid transit line was put into service. This was the first postwar subways construction in the United States

   Services were discontinued on the Third Avenue elevated line in New York City, and the structure was removed the following year. There followed a major real estate boom along third avenue.

1956  Rubber tyre trains began operation on one line of the Paris subway in the first demonstration of this design. It is used in the Montreal and Montreal the Mexico City subways, both built with French assistance.

   The last streetcar in New York City was abandoned. Detroit and Dallas did likewise the same year. Kansas city took this step in 1957, Chicago in 1958, Washington, D.C., in 1962 and Los Angeles in 1963.

1958  A rapid transit line was opened in the median strip of the Congress Expressway in Chicago – the first use of this concept. Similar lines were opened in two other Chicago expressways in 1969 and 1970.

   The Highland Branch of the Boston and Albany Railroad was electrified and added to the Boston transit network as the Riverside Line.

1962  An Alweg monorail line, 1.2 miles long, was built in Seattle for the World’s Fair. It is still in operation.

1964  The Skokie Swift went into service as a 5 mile extension of Chicago’s rapid transit system. It had been part of a railroad line.
An Alweg monorail line opened between downtown Tokyo and Haneda Airport.

1966 The New York City transit strike caused a partial shutdown of the city for 12 days, with high absenteeism. The settlement stimulated a nationwide trend to higher transit wages and subsequent fare hikes.

Montreal’s Metro was opened in anticipation of the World’s fair held the following summer.

1968 Cleveland extended its rapid transit line to Hopkins Airport, becoming the U.S. city with rail service to its airport.

1969 The first exclusive busway in the world was opened on the Shirley Highway in Virginia, leading to the Washington CBD.

The Lindenwold rapid transit line was opened between the New Jersey suburbs and downtown Philadelphia.

Mexico city’s Metro initiated service.

The first new subway in central London in 60 years was opened the Victoria Line, connecting several existing lines. It is 10.5 miles long and cost $170 million. It was the first rail system in the world with automatic fare collection. At the opening ceremony, Queen Elizabeth II had to borrow the fare, as the Queen never carries cash.

1970 One lane of a New Jersey expressway leading to the Lincoln Tunnel was set aside for buses during the morning rush hour. It carries over 500 buses per hour probably the highest bus volume in the world.
1972 The first section of the Bay Area Rapid Transit system was opened. Because of computer problems, trains did not run in the tunnel under San Francisco Bay until 1974. The final cost for BART was $1.6 billion.


1974 The Dallas Fort Worth Airport opened, including the AIRTRANS system of driverless vehicles connecting terminals, parking lots, and a hotel. It has 13 miles of guide way and 14 stations.

1975 A major demonstration of dial-a-ride service in Haddonfield, New Jersey, ended after a 3 year trial. Federal funding ended, and the state of New Jersey declined to take over. Peak rideship was 1300 persons per day. The major demonstration of personal rapid transit (PRT) began in Morgantown, West Virginia. The 2.2 mile line connected the downtown with the University of West Virginia. The line was later extended; there are now five stations.

1976 The first segment of Washington’s Metro opened for service. Later extensions brought the system to 89 miles with 74 stations by the end of 1993. A Los Angeles judge halted the Santa Monica diamond lanes project after 21 weeks because no Environmental Impact Statement had been filed. It took two lanes from regular traffic and reserved them for buses and car pools. It was unpopular, and no effort was made to revive it.
1977 A bizarre slow motion collision of two trains on Chicago’s Loop left 11 persons dead and 189 injured when four cars left the tracks. It was the worst transit accident in Chicago’s history.

1978 The first light rail system in North America went into service in Edmonton, Canada. The line has now been extended to 6.5 miles.

1979 The first segment of Atlanta’s MARTA subway opened. The system was eventually expanded to 32 miles and 29 stations. A 9.6 mile contra flow lane for buses and vanpools the longest in the United States went into operation on Interstate 45 in Houston.

1980 The Tyne and Wear Metro opened in Newcastle, England, as Great Britain’s first light rail system. The network now comprises 34.5 route miles.

1981 A 7.8 mile light rail transit (LRT) line opened in Calgary, Canada. A second line opened in 1985, and a third in 1987 in time for the Winter Olympics. San Diego opened the first light rail line in the United States. The Tijuana Trolley runs 16 miles from the CBD the Mexican border. A second line was completed in 1989; the system now has 31.9 route miles.

1983 Baltimore opened a subway 8 miles long and costing $797 million.

1984 Service began on the 11 mile South Line of Miami’s heavy rail transit system. A 1.9- mile people mover system was opened in 1986. Chicago opened an 8 mile heavy rail extension to O Hare Airport, located in the median strip of the Kennedy Expressway. It cost $ 196 million.
1986  The Vancouver Sky Train opened in anticipation of a World’s fair. It was the first fully automated rail line in North America. The final cost exceeded $1 billion Canadian.

MAX service began in Portland, Oregon. The 15 mile light rail line, which runs along the Banfield Expressway, cost $240 million.

Buffalo completed a 6.4 mile light rail line. The cost was high ($550 million) because most of the route is underground.

1987  Sacramento opened the first line of its 18.3 mile light rail system in March, the second line in September. It costs $176 million.

General Motors, long the dominant U.S. bus manufacturer, agreed to sell its transit bus division to the Transportation Manufacturing Group of Greyhound Corporation.

The new orange Line of Boston’s heavy rail system opened, replacing evaluated tracks built in 1901. The 4.7 mile facility cost $743 million.

Cairo opened the first subway in Africa in October. It connects two suburban railroad lines and permits through running.


Detroit's downtown people mover opened in July. A dozen vehicles move in one direction around a 2.9 mile loop with 13 stations.

1990  Los Angeles opened the Blue Line in July, marking the return of rail transit after 30 years. The 22 mile light rail line connects downtown Los Angeles and Long Beach. It costs $877 million.
In September, Seattle opened a 1.3 mile bus tunnel under the CBD. It cost $450 million. Specially, designed buses switch to electricity when they enter the tunnel.

1992 Baltimore opened the first link of its central light rail line in May.

1993 The Los Angeles subway, called the Red Line, began service in January. It is 4.4 miles long and cost $1.4 billion. Construction of an extension is already underway.

Part of St. Louis light rail line, Metro link, was opened in July. It will stretch 18 miles from Illinois through downtown to Lambert Airport.

1994 Denver opened a light rail line, 5.3 miles long, in October. Construction of an 8.7 mile extension has been approved.

4.13. HISTORICAL DEVELOPMENT OF URBAN PUBLIC TRANSPORT IN INDIA:

Road transport in India has been known from the very earliest times. The great Empires of historic times, of the Mauryas and the Guptas, had constant communication with their outlying Dominions and neighboring states. Building of roads was considered for administrative necessity as well as for public convenience, amongst the primary duties of the government, which the more popular, ambitious and successful ruler never failed to discharge. That tradition was continued during the later ages also when indigenous, rule yielded place to the alien. Some of the more enduring creations of the Pathan and the Mughal days, like the Grand Trunk Road, remain to this day as monuments to the public spirit of those Rulers, and bear evidence to the prevalence of considerable commerce and industry in those days.
The internal trade of the country was served very largely by these roads, supplemented by rivers and the coastal seas. Large caravans of merchants, traders and famous craftsmen of all kinds frequently journeyed from place to place, and used all known means of transport on these roads. Human porters and pack animals, like donkeys, horses, bullocks, yaks camels, or elephants, carts and carriages of all description carried both goods and passengers in large volumes over long distance in varying degree of economy, efficiency, comfort and even luxury.

The demand for passenger services in big cities and towns has increased in recent years due to a high density of population. Passenger vehicles available in India are tramways, motor taxis, motor rickshaws, bicycle, cycle rickshaws, horse carriage and buses.

4.13.1. Railways:

In 1849 the Great Indian Peninsular (GIP) Railway Company was incorporated by an Act of the British Parliament along with the East Indian Railway Company. The GIP railway laid the tracks for the first railroad in India, that was between Thane, and Bombay. On April 16, 1853, the 21 mile long rail road was inaugurated. The first trains had extremely uncomfortable third class coaches. There were no seats, and the windows could be reached only by rather tall people. These coaches were called, quite appropriately, ‘bakra gadi’.

In 1885 the Bombay Baroda and Central Indian Railway Company was incorporated and undertook to build a line from Surat to Bombay work commenced in the same year, and was completed in 1864. In 1863 a railway line to the Deccan over the Bhor Ghat was inaugurated by Sir Bartle Frere. BB&CI started the first suburban line, between Virar and a station in Bombay Backbay, in the year 1867. In the beginning, there was only one train each way every day but the number of trains began to increase from the 1870’s. In 1872 the line was extended to Arthur Bunder in Colaba.
The Harbour line of the GPI was started in February 1925. About the same time, electrification of the suburban railways began.

4.13.2. Road transport:

Bombay tramways were proposed as early as 1864, but a contract for their construction was given to Stearns and Kittredge only in 1873. They were to run the line for 21 years. The first trams, between Parel and Colaba were drawn by teams of six to eight horses. When the tramway started in 1874, Stearns and Kittredge had a stable of 900 horses.

The Bombay Tramway Company Limited was formally set up in 1873. The Mumbai municipality was given the right to buy up the concern after the first 25 years or after every period of 7 years thereafter. After this contract was entered into between the Bombay Tramway company and the municipality, the government of Mumbai enacted the Bombay tramway Act, 1874, under which the company was licensed to run a tramway service in the city. In 1905 a newly formed concern, “The Bombay Electric supply and Tramways Company Ltd” bought the Bombay Tramway company and the first electrically operated tram-car appeared on Mumbai’s roads in 1907. The passing years aggravated the problem of rush hour traffic and to ease the situation, double decker trams were introduced in September 1920.

Pursuant to the option given to it under the Deed of concession granted to the Bombay Electric Supply and tramways Co. Ltd, the Brihan Mumbai MahanagarPalika acquired on 7th August 1947, the assets of the combined undertaking, namely the operation of tramways and distribution of electricity in the city of Mumbai as a going concern. By mutual agreement, the corporation also took over the operation of the bus service, which was run by the BES & T Company Ltd.

Thus, the Bombay Electric Supply and Transport Company was municipalized and came to be known as Bombay electric supply and transport
undertaking. The BEST Company came into existence on 7th August 1905; it was
dissolved on 6th August 1947, to make room for the BEST Undertakings. Now the
ownership of the concern came to the municipal corporation. The BEST undertakings was the first public enterprise in the country.

The BEST Company Ltd purchased from the Bombay tramways company
the right to run the road transport service in the city. However, it was not a direct
transaction between the Bombay tramways company and the BEST Company.

On 12th March 1901, the municipality informed the Tramways Company
that it was taking over the transport system under the agreement concluded
between the company and the municipality on 12 March 1873. Simultaneously, by
a contract, the civic body gave the Brush Electric Company of London the sole
right to run an electric tram service in the city as well as to supply electricity. On
27th June, 1905 the Bombay Electric Supply and Tramways Company was
established in London under the English companies Act, and on 22nd July 1905, it
was registered in Mumbai under the Indian companies Act of 1882. The Bombay
tramways company, the Bombay municipality, the Brush Electrical Company and
the BEST Company signed an agreement on 31st July 1905 by which the BEST
Company was granted the monopoly for electric supply and the running of an
electric tram service in the city.

The Calcutta Tramways company was formed in 1880 and tram car were
put into service in 1881. Early tramcars in Calcutta were drawn by horses. Their
carrying capacity was limited, and speed was very slow. After a few years, steam
locomotives were introduced to draw them. It was then a very noisy form of travel.
Horses and locomotives disappeared from the scene since 1901 when electricity
was harnessed to pull tramcars in Calcutta. They were faster, cleaner and less
noisy. This marked a real advance in Calcutta’s mode of transport. It was very
cheap to travel from one end of Calcutta to another with few paisa only.

This means of transport gained popularity and more tramcars were put into
service. It was boon to workers mostly who had to travel long distance to reach the
places of their employment. Petrol driven buses became rivals to tramcars and threatened their very existence. To cope with this horrifying situation the Calcutta tramways company made some improvement on the design of tramways. Old ones were replaced by new and improved ones. In 1931 they contained improved electrical controls, air break and fans and modern implements to ensure smooth running. In May 1951, 440 tramcars were running on the streets of Calcutta and 20 new vehicles were under construction.

Tramways service in Madras city was started in May, 1895. It was managed by the Madras Electric Tramways limited. A few years ago Kanpur and Delhi also provided Tramways service. But as the population of these two cities grew tremendously and the number of other means of road transport rose considerably, it created congestion and at certain points transport bottlenecks also. It was therefore, considered desirable to do away with this mode of transport. Consequently Kanpur dismantled Tramways in 1936 and Delhi in 1960. 36

4.13.3. Bicycle:

The first bicycle was introduced in the world in 1867. It appeared in Indian cities in the beginning of the 20th century. It is a cheap means of individual transport. In 1948 there were only two factories with an installed capacity of 120000 bicycles, in 1956 there were 63 factories with as annual productive capacity of 760000. Out of 63 factories 9 are located in Bombay 7 in Utter Pradesh 16 in the Punjab and 13 in Delhi.

4.13.4. Cycle Rickshaw:

This conveyance was formerly used for carrying passengers on hill stations. The people of refined taste do not like to travel by it. The three wheeled rickshaw first made its appearance in Calcutta.
4.13.5. Horse carriages:

In olden days horse carriage like tangas and ekkas, played important role in carrying passengers from one part of the town/city to another.

Although buses and rickshaws are plying through the streets of almost every Indian city these days, yet horse carriages still hold their sway. 37

4.14. PUBLIC SECTOR BUS TRANSPORT: INDIAN TRENDS:

Passenger Road Transport in India – The Beginning

The role of mechanized transport in India started in the beginning of the nineteenth century and the first motor vehicle was imported to India in 1898. In the earlier years it remained a novelty and luxury meant for the rich. With steady increase in the number of vehicles followed the enactment of several provincial Acts to control and regulate their movement to safeguard the lives of pedestrians and their registration. The (Indian) Motor Vehicles Act 1914 was the first all India enactment dealing with control over the operation of vehicles.

The growth of road transport in India actually began in the early 1920’s as a result of the division of surplus army vehicles to civil market after the First World War. The growth was unprecedented and by the end of 1920’s there were a large number of vehicles operating in various parts of the country. The mushrooming of private vehicles led to unhealthy competition and even rate cutting among operators. Having realized the evils of unbridled competition the Government made various attempts through legislative and administrative measures to control the multiplicity of bus operators but without any appreciable result. The Indian Motor Vehicles Act 1914 could not cope up with the unexpected pressure and the government was forced to supplement the existing Act with various enactments to control and regulate the transport industry within and in relation to the railways.
Mitchell-Kirkness Committee (1932)

A study on Rail-Road Co-ordination initiated by the Mitchell Kirkness Committee (1932) in its report observed that “The evils from the public service motor transport is suffering are largely due to the unemployment amongst buses and their concentration on the more popular routes. We think that the evils attending unlimited competition are now such that the alternative, namely monopoly, would be preferable. In any event we believe a controlled monopoly will be necessary to encourage enterprises on less popular routes”.

The Committee further recommended that “the number of buses on any route should be restricted and that conditions such as issue of time tables, publication of schedule of fares and compulsory insurance of motor vehicles also should be prescribed.” The committee felt that these measures would raise the business to better and more economic levels and that fuller regulation and control would eliminate unhealthy competition and make it possible for bus operators to offer better services to the public.

Transport Advisory Council (1935)

The Transport Advisory Council (1935) appointed by the Government of India observed that the M.V. Act 1914 is no longer adequate to deal with the conditions of growth of motor transport. In the interest of public convenience and the development of a coordinated system of transport much closer control is required than the present Act permits and it is necessary to assume authority and power to regulate transport.

Enactment of Motor Vehicles Act 1939

The recommendations made by various committees like Mitchell and Kirkness Committee (1933), Transport Advisory Council (1935), Motor Vehicle Insurance Committee (1936) and Wedge Wood Committee (1937) enabled the
government to incorporate various provisions in the new Motor Vehicles Act to achieve adequate control and regulation of Motor transport in India. The Motor Vehicle Act 1914 was thus redrafted and a comprehensive Motor Vehicle Act 1939 was promulgated in order to ensure the role of road transport on the basis of healthy competition within the transport industry and also with the railways. The legislation inspite of a number of amendments from time to time made provision for creation of Regional and State Transport Authorities with full powers to grant permits for passenger carriages, public carriers and private carriers. This Act also laid down conditions in respect of bus routes, timings, specifications of vehicles, standards of maintenance, etc. which were to be attached to the permits for the guidance of the permit holder.

Post war Reconstruction Committee (1943)

Later on the Post War Reconstruction Report of the Technical Sub-committee to the Sub-committee on Transport (1943) on the future of road transport and road rail relation also drew attention to the need for “Regular, speedy and comfortable motor service, enforcement of maintenance and other safety measures, prevention of flooding of roads by motor transport concerns, resulting in cut throat competition” and urged that in order to have civilized facilities for travel commensurate with the density of the traffic and service which that traffic can support, the conditions requisite must inevitably results in the replacement of small owners by large companies.

Tripartite Scheme:

The Post War Reconstruction Committee’s recommendation was further supported by the Transport Advisory Council in 1945 and also by the post war policy committee on transport. These recommendations forced several state
governments to use compulsion and persuasion to organize individual operators into bigger units. The scheme which was known as ‘Tripartite Scheme’ by which joint stock companies were to be set up in the states with railways, state governments and motor vehicle operators as share holders with thirty five percent share by railways, thirty five per cent by the concerned state government and thirty percent by the bus operators of the state. The profits accrued from such operations thought that their voice would not be heard in the organization because of the minority share holding. The government having realized the potential of bus transport industry took steps to control and regulate the industry to avoid unhealthy competition within the industry and with the railways. Though further attempts were made to bring the warring bus operators into groups of co-operatives, it did not succeed because of conflicting persuasions of the operators. At the time of independence this was the situation that prevailed in India. The National Planning Committee which was set up in 1939 under the chairmanship of Late Pandit Jawaharlal Nehru in its various reports saw a very clear cut role for public enterprises in various production and service sectors. The 1945 industrial policy resolution which was later on adopted as the First Industrial Policy Resolution of the government of India in April 1948 provided a major role to public enterprises. Because of these reports it was envisaged that public enterprises would operate in all such areas which were strategic for the economy, had economics of scale and catered to the supply of public goods.

Enactment of Road Transport Act 1950

The public sector participation in passenger road transport services commenced with the passing of Road Transport Corporations Act 1950 under which a State Government could establish a road transport corporation for the whole or any part of the state having regard to:

1) the advantages offered to the public, trade and industry by the development of road transport;
II) the desirability of co-ordinating any form of road transport with any other form of transport;

III) The desirability of extending and improving the facilities for road transport in any area for providing an efficient and economical system of road transport service therein.

This Act not only provided for a monopoly in road transport but a monopoly of government ownership and operation of transportation. The government with this Act not only became a regulator of State Transport but also on operator, operating alongside several other small operators. This created problem since the existing M.V. Act did not recognize the measures of nationalization and was not framed to discriminate the operators from one another.

Role of Planning Commission in the Formation of RTC's

The planning commission in the first five year plan reiterated the policy of forming larger units of bus operators and observed that only large organizations with adequate financial resources could provide workshop and other facilities essential for rendering efficient and economic bus services. The commission further added it was desirable for the existing private operators to amalgamate wherever possible, into big viable units to enable them to achieve better returns and maintain better standards of operations.

The second five year plan document prepared by the Planning Commission stated inadequate development of road transport in the preceding years could be attributed amongst other reasons to the fact that the majority of private operators were small individual owners without resources, who could not extend their operation on sound and business like lines. Viable unit was an expression which referred to a unit of vehicles and not owners of vehicles so that a Joint Stock Company, co-operative society or Union of Operators having an effective control
over the requisite number of motor vehicles could come within the ambit of such a unit.

**Transport Planning:**

The study on Transport Planning appointed by the Ministry of Transport and Communications, Government of India observed that “As long as the industry was based on large number of small units, each owning one or two vehicles, the defects (to which they are subjected) would continue”. The group, therefore, added that “everything possible should be done to encourage the formation of bigger units”.

It is interesting to note that almost every expert opinion has suggested controlled monopoly as the only answer to the evils of unhindered and selfish competition. Instead of going for complete nationalization attempts were made to bring the private sector in groups as cooperatives. This attempt, however, proved futile due to the conflicting objectives of the parties concerned.

**Industrial Policy Resolution 1956:**

In the Industrial Policy Resolution of 1956, road transport was mentioned as one of the twelve items of the schedule B among the listed industries to be “progressively State owned and in which the State will therefore, generally take the initiative in establishing new undertakings, but in which private enterprise will also be expected to supplement the efforts of the State.”

**Motor bus:**

Motor bus service was scheduled to operate from 15th July 1926. It received a hearty welcome from the people, just as the electric tram had.

Like the tram, the Mumbai bus established several ‘firsts’. For the first time in the country, the city had a bus running on diesel oil, a double decker bus and an eight feet wide bus. Another interesting feature: Between 1928 and 1930 each bus carried a letter box for the convenience of the passengers, and the postal service as well.
For several years, it was looked upon as transport for the upper middle class. The B.E.S.T. Company launched its motor bus service on 15th July 1926 with a modest fleet of twenty four vehicles. On 7th August 1947, the municipal corporation took over the company. In 1927, the fleet had expanded to 49. During the twenty one years in between, the fleet had swollen to 242 vehicles. In its first year that is, by 31st December 1926 about six lakhs passengers used the service for 1927 the figure was about 38 lakhs.

More and more passengers were attracted to the bus service. In response to the pleas made by the Government and the Municipal Corporation the company extended its service to the northern part of the city in 1934.

Double-decker buses were introduced in 1937 in order to cope better with the growing traffic. The single-deck vehicle carried 36 passengers. The double Decker could take as many as 58. This and its sheer size and look made the double Decker popular as soon as it was put on the roads.

**Limited Bus Service:**

The first limited bus service in Mumbai, and probably the first in the country as well, started running in February 1940, between Colaba and Mahim. It was specially designed to provide quick transport for those living at or near the northern end of the city. 39

In 1890 motor cars were seen on the roads in Chennai M/s Simpson and Co. played crucial role in development of transport by introducing motor cars an buses in Chennai. 40

The first city bus ran on street of Calcutta in 1922, soon afterwards in many cities private operators began offering city bus services. 41
4.15. CITY BUS TRANSPORT IN INDIA:

Evaluation of organized bus transport:

In India, although the use of buses for carrying passengers began soon after the end of the World War-I, the country’s first-ever Motor Vehicles Act was passed only in 1939, on the eve of the World War II to regulate the spiraling rise in the road traffic. The transport authority created under the Act was charged with the responsibility of overseeing and regulating the loads and the number of passengers carried by the buses, limiting the speeds of the vehicles and fixing the working hours of bus crews. Nevertheless, private operators of bus services, especially operating in the mofussil areas, besides indulging in unhealthy competition among them, also flouted every norm and condition without being afraid punishment, unduly jeopardized the safety of the traveling public and also duped the government of the taxes payable on their operations.

By the time of the country’s independence in 1947, the chaos and the public complaints had reached the crescendo. One of first bold actions of the government of free India for the benefit of the common man, was to enact the passenger road transport corporations Act of 1948, nationalizing the entire passenger road transport activities within the country. Within the provisions of the Act (which was subsequently modified extensively in 1950), four types of passenger road transport agencies came into being:

(I) Government Transport Undertakings
(II) Government Transport Companies
(III) Government Transport Departments and
(IV) Municipal Transport Undertakings

The Act collectively referred to these undertakings as State Transport Undertakings (STU’s). Today in India, a total of 71 STU’s provide passenger road
transport services both in rural and urban areas, and organized under the Association of the State Road Transport Undertakings (ASRTU).

The STU’s according to their different forms may be described as under:

1. **State Road Transport Corporation (SRTC)**

   The STU in a corporation form has been accepted by several States to respond to the travel needs of both urban and rural population. The SRTC,s of Maharashtra, Andhra Pradesh, Karnataka and Gujarat handle maximum passenger traffic in their respective States; the main features of an SRTC are as under:

   a. It is entirely owned by the State Government
   b. It functions within the powers, duties and the responsibilities laid down in the Passenger Road Transport Corporation Act;
   c. Its board members and the managing director are appointed by the State Government;
   d. Being a separate legal entity and enjoying a general freedom of policy making, its business activities are conducted in its own name;
   e. Though, it is wholly owned by the Government, its employees are not civil servants, but are recruited and paid according to its own terms and conditions;
   f. As and when needed, it may raise public deposits to meet its financial needs.

   The following SRTCs in addition to rendering inter-state, inter-city, urban and rural passenger bus service also provide intra-city bus service:

   1) Andhra Pradesh State Road Transport Corporation (APSRTC) provides city bus services in Hyderabad, Vijaywada and Vishakhapatnam;
2) Gujarat State Road Transport Corporation (GSRTC) provides city bus services in Rajkot, Surat and Vadodara;
3) Karnataka State Road Transport Corporation (KSRTC) provides city bus service in Bangalore, Belgaum and Hubli.
4) Kerla State Road Transport Corporation (KSRTC) provides city bus service in Tiruvananthapuram
5) Maharashtra State Road Transport Corporation (MSRTC) provides city bus services in Aurangabad, Karad, Nagpur, Nasik, Ratnagiri, Sangli-Miraj and Satara.
6) Delhi Transport Corporation (DTC) provides city bus service in Delhi and New Delhi

2. Government Transport Company (GTC)

A GTC is incorporated under section 617 of the companies Act, 1956, and in which the Central/State Government holds not less than 51 per cent shares, thereby establishing a controlling interest. This company form of an STU was first brought into being by the Government of Tamil Nadu. Today out of the 31 GTCs in India, providing public transport services to both urban and rural public, more than half operate in the State of Tamil Nadu. The main features of a GTC are as under:

   a. It is a body corporate created under the general law and can sue and be sued;
   b. It can enter into contract as well as secure and acquire properties in its own name.
   c. It is bound only by its own memorandum and articles of association (in reality, since the Government is the majority shareholder, the freedom of operation is severely restricted); it can lay down its own objectives and frame its own rules and regulations for its internal management.
d. It is required by section 619 of the companies Act to submit its audited financial statements and annual reports to the Registrar of Companies of the State;
e. It is liable to pay income-tax.

P.T.C. in and D.A.T.C. in Chennai (Tamil Nadu), C.T.C in Coimbatore (Tamil Nadu) and C.T.C.L. and C.S.T.C. in Calcutta (West Bengal) are the State Government owned transport companies that, in addition to rendering inter city and inter state passenger bus service, also provide intra city bus services.

3. Departmental Transport Undertaking (DTU)

A DTU functions as an executive department and hence, is under the direct control of the Government, providing its services in the urban and rural areas. It normally has monopoly jurisdiction over the area of the State. DTUs have been largely accepted in Punjab, Haryana and some Eastern States. The main features of a DTU are as under:

a. It enjoys sovereign immunity, similar to a state;
b. Its employees enjoy the parity of employment terms with the civil staff of the state;
c. Its activities and operations are controlled by responsible administrative cadre officers of the state;
d. It’s in built system of checks and balances leave less likelihood of misuse/misappropriation of public funds.

Inspite of these advantages, however, inadequate delegation of power causes delay in action and occasionally losses in the DTUs. Out of the total 8 DTUs in India, only the CHINTU provides city bus services in Chandigarh.
4. Municipal Transport Undertaking (MTU)

An MTU is the urban passenger transport service. The Municipal Corporation is bound to by law to restrict its operations to the city limits and the nearby areas. The main features of an MTU are as under:

a. The entire working, including policy making and controlling, are managed by the municipal transport sub committee, which is formed from among the elected municipal members. The committee is headed by one of the members as its chairman;
b. There is an absence of professional experience at top management level;
c. The Municipal Commissioner, belonging to the State's administrative cadre, acts as the head of an MTU;
d. It has to meet its funds requirements only from allocations in the municipal budget;

Municipal Transport undertakings in India are prevalent only in Maharashtra. Currently, there are 12 MTUs operating in India out of which eight are in Maharashtra namely,

- BEST (Brihan Mumbai Electric Supply and Transport)
- PMT (Pune Municipal Transport)
- KMT (Kolhapur Municipal Transport)
- TMT (Thane Municipal Transport)
- PCMT (Pimpri-Chinchwad Municipal Transport)
- SMT (Solapur Municipal Transport)
- NMMT (Navi Mumbai Municipal Transport)
- KDMT (Kalyan Dombivili Municipal Transport)

Besides Maharashtra two MTUs are in Gujarat AMTS (Ahmadabad Municipal Transport Service) and JMTS (Jamnagar Municipal Transport Service), One in
Punjab- LMTC (Ludhiana Municipal Transport Service) and One in Karnataka BMTC (Bangalore Metropolitan Transport Corporation)

Evidently, different corporate forms of ownership of city bus transport service have evolved and prospered at different places, depending on the local situation. 42

Benefits of City Bus Service to Urban People:

The various means that urban people use to meet their conveyance needs may be broadly classified as:

1. Personalized Vehicles: Bicycles, Scooters, Motorcycles, Cars, Jeeps, etc.
2. Intermediate Public Transport Vehicles: Cycle and Auto rickshaws, taxi

Among all these, city buses, being a public utility, are the most useful means of intra-city travel to the larger population. Some of the benefits of a city bus service may be described as:

1. A planned, organized and cheap omni system reduces traffic congestion in the central part of the city and on the busy streets at peak hours. A single bus carries more than 50 passengers, which is in far excesses of cars, rickshaws and taxis.
2. With regards to overall fuel consumption, single city bus compares very favorably with other motorized modes of public transport. Savings in fuel costs ultimately reflects in the savings in foreign exchange.
3. Greater the number of small personal and public vehicles on road, greater is the noise and air pollution in the city central areas, which is ultimately harmful to the people in the entire city. A city bus service helps to reduce these levels to a greater extent;

4. An efficient city bus service helps in solving vehicle parking space problems created by 2 and 4 wheelers in the city centers.

5. City buses are cheap and economic means of urban travel for poor and middle class people, for whom the high fares of rickshaws and taxis are unaffordable. These also economically meet the travel needs of school children and elderly persons.

6. Maximum use of city buses for intra city travel curtails vehicular accident rates since fewer personal vehicles would be on the road.

7. An efficiently run city bus service ultimately contributes to the optimum utilization of the intra-city road network, by meeting the travel needs of the large number of people with fewer vehicles causing less wear and tear of the road, with less disturbances to the environment.

### 4.16. PROBLEMS OF MUNICIPAL TRANSPORT UNDERTAKINGS:

The Bombay Municipal Corporation Act 1949 makes it obligatory for the municipal corporations, municipal councils and other local self government bodies to provide educational, health, social, cultural, and transport facilities to the populations in their jurisdictions for improving the overall quality of their life.

Transport is a part of the process of development, which in itself has to consider two major aspects, first the urbanization trends, and secondly, the optimum utilization of urban transport and its management. Both these aspects have a particular significance in the cities of India. In view of the legislative provision cited above, it is binding on a municipal body to provide an efficient
transport system for the benefit of the population within its jurisdiction and in the adjoining areas.

In a city, urban transport is a basic necessity as the city is spread over a wide area. Shortage of residential space is inherently linked with the growth of the city and people keep moving their residences out into the suburban to overcome it. Efficient urban transport thus becomes all the more necessary for enabling people to travel between their workplace and the residence. Also, both the residential and the commercial areas of a city have their own needs of service and supply personnel, who come to rely on public transport for traveling from one place to another. Efficient city transport system thus enables people to live at one place and work at another, without causing overcrowding and congestion at one place only.

City transport thus is an essential ingredient for improving the quality of urban life as well as of the rural life in the adjoining villages. Efficient city bus service involves the movement of goods, merchandise and service from places where their marginal utility is low to places where it is high.

As the city grows and the density of its population increases, the efficiency of the city bus system should also rise. At the same time, proper bus sheds, buildings and proper roads should be constructed for the smooth running of buses to avoid inconvenience to the public at large. If the municipal authorities desire to protect the environment and to ensure reasonable mobility on the city roads, efficient and strong city bus transport is the answer. However, municipal transport undertakings largely face the problems like: (i) poor conditions of roads, (ii) traffic congestion, (iii) vehicular accidents, (iv) scarce finance.

The city bus system, by the nature of its operations, is mostly a loss making proposition, because of the fluctuations in travel demand during peak and off peak hours of the day. Similarly, in order to win the confidence of the city commuters, it has to maintain a reasonably good frequency or service level. One-way traffic regulations, particularly during the peak hours, result into fall in earnings per bus km. though the government wants to protect city environment, it never considers
bus transport as a public utility and hence, never oblige the municipal transport undertakings, even though the city may contribute maximum to the State and Central exchequer by way of excise duty, sales tax, income tax, profession tax, etc. Even the mother organization, i.e., the municipal corporation, does not spare the city bus undertakings from paying octroi duty, property tax, wheel tax, etc. 43

A municipal transport undertaking cannot unilaterally increase the fares; at the same time, it has to provide transport to the physically handicapped, students, police, freedom fighters, etc., at concessional rates. Narrow and congested roads reduce bus speed, thereby affecting vehicle utilization and productivity. The cost of auto components and salaries of the employees are beyond their control. As a result, the losses mount year after year and the cumulative losses erode the capital of the undertaking. Consequently, the growth of personalized vehicles and intermediate public transport is faster in the absence of an adequate and efficient bus system. The vicious cycle goes on making the urban transport environment miserable.

A study on requirement of buses reveled that there should be minimum 30 buses per lakh population for a city having 1 million or less population, 35 buses for 1 to 2 million population and 40 buses for 2 to 3 million population. Beyond 3 million populations, light rail transit is required to support the bus system. 44

Daily collection from the sale of tickets is the main source of income for city bus services, but these collections fall short for meeting the expenditure on the following counts: (i) cost of operations, (ii) fleet maintenance and repairs, (iii) staff salaries and wages, and (iv) bus operations on social amenity routes. Unlimited use of personalized and private transport results in congestion, pollution and slowing down the vehicle speed and increasing the accidents, ultimately reducing the revenue by way of daily collection of a city bus service.

Financing of the city bus transport has emerged is a major concern during the recent years. Uneconomic fares, increasing social burden and lack of priority
to public transport have considerably affected the city bus system. For many municipal corporations, it has not been possible to finance the city bus service to the extent it is desirable.

Due to inability or the reluctance of the passengers to pay an economic fare for the city bus service, it is necessary to find ways in which the city bus undertakings can reduce internal inefficiencies and maximize services offered in terms of both quality and quantity. It is time that these organizations start doing their best in making its bus services more and more passenger-oriented.

**Characteristics of a City Bus Service:**

City bus service is a 'facility service', in which the service provider, that is, the city bus undertaking comes to the service receiver, that is, the bus user.

The basic characteristics of the city bus service are:

1. It is a perishable to a higher degree, e.g. a seat in a bus heading towards a particular destination must be occupied before the bus commences its journey; if it remains unoccupied, it is a waste;
2. it is inseparable from the bus, bus staff and the bus user;
3. It is created and offered at the same time
4. It is intangible, but the satisfaction or otherwise derived from it remains with the bus user;
5. It is highly heterogeneous, in the sense that it has to be used by the bus user to evaluate it;
6. it is highly location-specific, that is it is available only in a specific geographical area;
7. It has time and space specific demand pattern, that is, the demand goes up during the peak hours for certain locations;
8. it is collectively oriented, that is, a bus may ply with a single passenger on board but its overall orientation is towards carrying the capacity.
The concept of adequacy of transport services assumes to avoid overloading by matching supply of seat-kms to the demand for passenger km and also consider minimization of the total travel time of the passenger and travel hazards. In planning the adequacy, therefore, the emphasis generally is on: (i) better accessibility to minimize access time, (ii) better frequency of trips to minimize waiting time, (iii) appropriate service mix according to the demand to minimize the running time of different categories of buses, such as ordinary, express, non stop service, (iv) adequate capacity- single decker or double decker buses, depending upon the passengers with minimum number of changeovers or transfers.

Another important aspect of the quality of service is the operational efficiency, which includes: (i) regularity of operations (ii) punctuality of service, (iii) cleanliness and comfort provided in the bus, (iv) courtesy shown to the passengers (v) reliability of the service to complete the trip and the schedule without breakdown; (vi) safety of passengers, (vii) patient hearing of the complaints and suggestions of the passengers.  

The success of any municipal transport undertaking as well as its patronage by the traveling public depends upon these qualities. Unfortunately, there are very few organizations in the country that are sensitive to the change in the travel habits of the commuters.

**City Bus System Planning:**

If the city bus system has a higher capacity for carrying passengers, it helps in minimizing the per capita road use and energy consumptions and also attracts more commuters. Still, due to the inherent strengths of the personalized and para-transit modes such as quick availability, reliability and the facility of journey from origin to destination, some people would still like to use them. The endeavour of
the city bus transport system, therefore, should be to catch the student and worker commuters, which are almost 80 per cent of the total commuters. If these commuters shift towards city bus transport, the traffic congestion, which is highest in the morning and evening peak hours, can be minimized as the use of personalized and intermediate public transport modes will be less. The most important tool in this regard is traffic and commuter surveys. Following surveys are effective in planning the routes and subsequently, scheduling the trips based on the demand position:

1. **Origin-Destination Surveys:** These surveys would reveal the direction and magnitude of the traffic flow for developing scientific route network based on the movements and needs of the traveling public.

2. **Loading Surveys:** These surveys reveal the sector wise density of traffic along the route. A sector is a section of the route between two sub-focal points. The surveys help in the re-alignment of the trips and adjusting them according to the density between two sub-focal points.

3. **Waiting Time Surveys:** As the nomenclature states, these surveys indicate the waiting time of the passengers for the bus service at various hours of the day and guides supplementing or increasing bus frequencies at particular hour/s in order to minimize the waiting time.

4. **Running Time Survey:** Running time survey of a route considers the regular traffic on road, road condition and the number of stoppages enroute. The running time varies at different hours of the day; as such, it is useful for scheduling the trips on different routes.

5. **Vacant Seat Surveys:** These surveys highlight the unoccupied capacity or the loss of seat-kms, and help in the redistribution of the capacity according to the passenger load.
6. Commuter Opinion Surveys: These surveys can be conducted at various traffic generation nodes by asking specific questions as regards their needs, quality of service and expectations.

7. Traffic Staff Survey: Traffic staff consists of driver, conductor, starter and inspector. They have firsthand knowledge of the route behaviour. Many times, their suggestions help in de-bottlenecking traffic junctions, rerouting and rescheduling of the buses.

The findings generated on analyzing the data collected through these surveys would certainly help in designing a city bus system, responsive to the needs of the commuters. 46

Bus and Crew Scheduling:

In order to operate the various component traffic plans of a city bus system, that in turn, has been designed on the basis of various surveys, bus trips are required to be linked to each other in such a manner to form a bus schedule. Normally, a bus schedule is evolved on the basis of two important criteria: (i) bus utilization per day, and (ii) passenger km per bus (or indirectly, earnings per bus per day). Thus, simultaneous effort should be directed at maximizing the bus utilization as well as attaining a reasonable load factor. In city bus planning, generally, the method of route wise scheduling is adopted, that is a particular number of bus schedules are assigned to operate trips on a particular route. In order to increase vehicle utilization, if required, trip wise scheduling can also be adopted where a bus from one route can be switched over to another route where there is a higher traffic demand.

In the case of crew scheduling, it is necessary to ensure crew utilization within a given span of steering duty and spread over duty according to the provisions of the Motor Transport Workers Act. Providing rest after continuous duty is also a major constraint.
Crew productivity can be measured in terms of bus-km per crew member employed per day. Some undertakings split the crew scheduling into two spans of 4 hours each in the morning and evening for ensuring higher output. In order to motivate the crew to accept the split duty, additional line allowances usually are paid to such crew, while others induce their crew with incentive payment on revenue collection, on km efficiency, on completing scheduled trips, on avoiding absenteeism and on punctuality and behaviour.

4.17 KEY TRANSPORT TERMS

Depot:

The organizational unit of a transport undertaking directly responsible for the operation of bus service.

Route Kilometers:

The actual distance in kilometers between two terminal points of a route.

Trip:

A single journey from one point to another and return journey.

Scheduled Trips:

All trips planned as per the approved bus schedule. Trips to be operated as special schedules for Bazzars, etc., specifically provided in the bus schedule should also be taken into account.

Trips Operated:

Trips operated differ from the trips scheduled. Number of trips to be operated to the extent of (a) cancellation in the scheduled operations, and (b) extra trips operated during the period.
Regularity of operations:

Regularity of operation is the percentage of scheduling trips actually operated to the total of scheduled trips as per time table.

Time Table:

Time table is a programme of bus services published for the information of public, showing departure and arrival at terminals and important points enroute.

Bus Schedule:

A bus schedule is the programme of operation of a bus on one or more routes operating one or more trips within 24 hours.

Running Time:

Total time provided for the operation of a single journey between the terminals.

Standing Time:

Time scheduled at the terminals to ensure regularity of service and allowing alighting and boarding of passengers.

Scheduled Kilometers (for a day):

Effective kilometers planned to be operated on a given day by a depot/division/undertaking as per the bus schedules of the unit are the scheduled kilometers on that day. It is the sum total of kilometers approved for all bus schedules on that day.
Effective Kilometers:
Kilometers actually operated by public service buses for the purpose of earning revenue. The total effective kilometers relate to the revenue earning kilometers actually operated by buses during any specific period for:

1. Operation of trips as per schedule,
2. Operation of extra trips for fairs and special occasions.
3. Operation of causal contracts.

Kilometer Efficiency:
Ratio of effective kilometers (excluding kilometers operated through extra trips) to scheduled kilometers planned for operation.

Dead Kilometers:
Kilometers covered by the bus in the following circumstances:

1. Movement between terminal and depot and vice-versa.
2. Movement from terminal/depot to the fuelling point and back.
3. Movement as relief in case of accidents and breakdowns,
4. Movement for continuing the operation of a broken down or accident bus, up to the breakdown/accident point.

Cancelled Kilometers:
Scheduled kilometers not operated.

Passenger Kilometers:
Volume of passenger traffic in terms of carrying capacity kilometers actually occupied. It is the sum total of length of journey performed by all the passengers carried. Passenger kilometers are usually calculated by dividing the earnings from the passengers by the fare per kilometers, when the fair structure is
of a uniform rate. Thus, passenger kilometers = Traffic revenue / Fare per kilometer.

For calculating passenger per kilometer, only the revenue from the passengers, i.e. sale of tickets should be taken into account.

**Peak, Slack and Normal Period:**

Division of Traffic period (hour, day, week or month) as per explanations below:

(a) Peak Period is a period having high traffic activity indicating maximum traffic demand.
(b) Slack Period is a period having low traffic activity indicating minimum traffic demand;
(c) Normal Period is a period having average traffic demand, which is between peak and slack periods.

**Fare:**

An authorized payment for a ride on a passenger bus, whether cash, token transfer or pass.

**Bus Stop:**

A waiting, boarding and alighting area usually designated by distinctive signs and by curbs or pavement markings.

**Passenger Lead:**

An average length of the journeys performed by the passengers and is worked out as: Total passenger kilometers during the period divided by total number of passengers carried during the period.
Occupancy Ratio:

Percentage ratio between passenger kilometers and seat kilometers offered, worked out as: Occupancy Ratio = (Passenger Kilometers/Seat kilometers) * 100.

Load Factor:

Percentage ratio between passenger kilometers and capacity kilometers. It is also the percentage ratio of actual passenger earnings to expected passenger earnings at full load including standees allowed. For estimating the load factor, only the income from passenger tickets should be taken into account as is to be done while estimating passenger kilometers.

Fleet (Buses) held:

Total number of buses held by the unit (depot/division/undertaking) at a particular point of time, under any of the following conditions:

1. Buses on road,
2. Buses held as spares,
3. Buses in workshops,
4. Buses under routine inspection,
5. Buses in off the road conditions,
6. Buses awaiting scrapping and disposal,
7. Buses in transit from suppliers,

Spread Over:

Period between commencement of duty of a driver or conductor on any day and the termination of duty on that day.

Steering Duty Hours:

Time spent on active duty at the wheel plus any terminal layover time (i.e. the halting time at any handing over, not exceeding fixed limit to be prescribed). It
also includes time spent on attendance to the bus and attendance to the work related to the operation of the bus.

**Staff Ratio:**

Ratio of the total staff employed on the last day of the specified period to the number of buses on road on the same day.

**Traffic Revenue:**

Income realized from transportation of passengers and incidental sources related to transportation of passengers. The sources of traffic revenue include:

1. Sale of passenger tickets, including monthly passes, advance bookings etc.
2. Charges for accompanied baggage,
3. Reservation charges,
4. Casual contract service charges,
5. Postal and mail charges,
6. Transport parcels or unaccompanied luggage.

**Miscellaneous Income:**

Income from other sources not directly related to transportation of passengers, such as:

1. Advertisement on buses, shelters, terminals, tickets, etc.
2. Refreshment rooms and canteen contracts,
3. Cloak room,
4. Cycle stand,
5. Royalties,
6. Sale of scrap materials and the difference in the resale value and the net value of the buses sold,
(7) Repair/maintenance carried out to outside buses,
(8) Rents from hire of property,
(9) Interest on investments,
(10) Other miscellaneous sources,

Road Transport Service:

A service of motor vehicles carrying passengers or goods or both by road for hire.

Area of Traffic Operation:

Area in relation to any provision of the Motor Vehicle Act means such area as the State Government may, having regard to the requirements of that provisions, specify by notification in the official Gazette.

Passenger:

A passenger means any person traveling in a public service bus other than the driver or the conductor or an employee of the permit holder while on duty.

The total number of passengers should include all passengers carried either at full fare or at concessional fares. A child passenger should be treated as one passenger for working out the total number of passengers carried.

The average number of the passengers carried per day is calculated by dividing the total number of passengers carried during the period by the number of days in that period.

Total Cost:

The total working cost incurred in connection with the operating of city bus transport services is termed as ‘Operating Cost’. NMMT has subdivided Operating Cost into the following major heads.
Personnel Cost (includes the salaries and wages, allowances and bonus paid to the employees as well as the contributions made to their Provident Fund and the expenditure incurred on the welfare facilities)

Material cost (includes the expenditure incurred on diesel fuel, lubricants, tyres and tubes, batteries and other automotive spares and consumables, drivers and conductors uniforms, leather bags and ticket trays, etc);

Taxes and Duties (include motor vehicle tax, passenger tax and octroi duty and sales tax paid on the purchased items, as also insurance)

Interest on Borrowings (includes the interest paid on the term borrowings for purchase of buses and cash credits for meeting working capital needs);

Depreciation (which is charged on the buses, workshop machinery, furniture and other assets)

Miscellaneous (these include the expenditure on all other items).

**Total Revenue:**

The income derived from the operation of city bus transport services and incidental services is termed as ‘Revenue’. NMMT has sub divided its Revenue into the following two heads.

- Traffic Revenue (includes revenue earned from sale of tickets, monthly passes and casual contracts)
- Non traffic Revenue (includes revenue earned from the advertisements carried on bus, bus stops and sale of scrape material)

**Fleet Utilization:**

It is the ratio of the number of buses on road to the buses (fleet) held by the NMMT on yearly basis and expressed as a percentage derived from:

\[
\text{Fleet Utilization} \% = \frac{\text{Number of buses on road}}{\text{number of buses held}} \times 100
\]
Bus Schedule:

A bus schedule is the programme of operation of a bus on one or more routes operating one or more trips within 24 hours.

Bus Utilizations:

It is the distance in kilometers covered by a bus per day and is expressed in relation to effective kilometers.

Total Effective Kilometers covered in a Day
Total Number of Buses on Road on that Day

Route Kilometers:

The actual distance in kilometers between two terminal points of a route.

Scheduled Kilometers per day or per year:

Kilometers planned to be operated on a given day as per the schedules on a day. It is the sum total of kilometers approved for all bus schedules on that day.

NMMT works out the Scheduled kilometers per year by multiplying the scheduled Kms by 365 (number of days in a year).

Seating Capacity:

It means the number of seats offered to the paying passengers in a bus, excluding the seats allotted to the operating crew.

Seat Kilometers:

It is the average seating capacity (of the buses on road) multiplied by the effective kilometers during the year.
Carrying capacity:
It means the number of seats offered in a bus plus the standees authorized as a part of carrying capacity.

Standees:
It means the number of paying passengers permitted to be carried in a standing position in a bus by the Regional Transport Authority.

Capacity Kilometers:
It is the product of carrying capacity multiplied by the effective kilometers.48
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