TRANSPORTATION IN INDIA
with special reference to
ROAD TRANSPORT
A select annotated bibliography

DISSERTATION
SUBMITTED IN PARTIAL FULFILMENT OF THE REQUIREMENTS
FOR THE AWARD OF THE DEGREE OF

Master of Library & Information Science
2001-2002

BY

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ALIGARH (INDIA)
2002
DEDICATED
TO MY
PARENTS
This is to certify that M.L. & I.Sc. dissertation of Ms. Yasmeen Parveen on "TRANSPORTATION IN INDIA WITH SPECIAL REFERENCE TO ROAD TRANSPORT" was compiled under my supervision and guidance.

(Asif Fareed Siddiqui)
Lecturer
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ACKNOWLEDGEMENT

First and foremost, I would like to thank the Almighty, the most benevolent and merciful God, who provided all the strength and guidance for the completion of this dissertation.

I wish to express my sincere and earnest thank to my respected teacher and supervisor Mr. Asif Fareed Siddiqui, Lecturer, Department of Library & Information Science, A.M.U., for his encouragement, cooperation and guidance which helped in understanding the problems involved.

I would like to express my deep sense of gratitude to my respected teacher Mr. S. Mustafa H. Q. Zaidi, Chairman, Department of Library & Information Science, AMU for his inspiring attitude.

My sincere thanks are due to my respected teacher, Prof. Shababat Husain, Department of Library & Information Science, AMU for his untiring efforts and encouragement during the session.

I am extremely grateful to my respected teachers Mr. Naushad Ali P.M., Mr. Masood Raza, Miss Sudharmma Haridasan and Miss Nishat Fatima, Lecturers, Department of Library & Information Science, AMU for their help and cooperation during the period of project working.
I am thankful to Mr. Riyaz Abbas and Mr. Asrar Ahmad Khan staff of the Seminar Library of the department for their wholehearted cooperation during the period of my study and dissertation work.

My heart felt thanks due to all my friends, classmates and well wishers.

I would be failing my duty if I do not express my sense of gratitude to my parents, loving brother and other family members who rendered all the help and wholehearted cooperation through my study.

In the last but not least I am also thankful to Mr. A. Zadir for typing the dissertation in a very short span of time.

Yasmeen Parveen
AIM, SCOPE AND METHODOLOGY

AIM AND SCOPE

The present work displays in the form of an annotated bibliography and assembles together a selection of the relevant literature dealing with "Transportation in India with special reference to Road Transport. Although the bibliography is selective in nature but an attempt have also been made to cover all-important aspect and in each a few.

I am confident that the bibliography will be useful to all those who have some interest in transport management.

The present work is intended to help a research in finding out an selecting the documents on the topic concerned in order to relief the burden and save the time consumed in document search.

Part one deal with the brief introduction of the subject. Part two consists of annotated list 201 articles.

METHODOLOGY

In order to complete this task secondary sources such as Guide to periodicals literature was consulted to approach primary sources which include periodicals.

I collected most of the material from the following libraries:

1. Maulana Azad Library, A.M.U., Aligarh
2. Department of Commerce, AMU, Aligarh
3. Department of Economics, AMU, Aligarh
STANDARD FOLLOWED

The Indian standard recommended for bibliographical references (I S: 2381. 1963) and Classified Catalogue Code (CCC) of Dr. Ranganathan have been followed. In some cases where, ISI do not given any guidance. I have taken appropriate decision.

ARRANGEMENT

The entries are arranged under subject heading, which are arranged alphabetically following letter-by-letter method. The entry element of the author is in capitals, followed by the secondary element in parenthesis using capital and small letters and then the title of the articles. Subtitle, (if any) then name of the periodical being *italics* followed by volume number, issue number, the year, month and date giving by using inclusive notation of the pages of the articles.

Entries of periodical articles and arranged as follows:

a) Name of the Author/Authors
b) A full stop
c) Title: subtitle, if any
d) A full stop (.)
e) Title of periodical being *italics.*
SPECIMEN ENTRY

ROAD TRANSPORT, BUSES, FARE, POLICY


Fixation of bus fare in transportation is more political than an economic decision. Economic Transport Service from the point of view of common man assumes affordability of fare in relation to the income. Transportation should reduce fare in slack reason to cover operational cost, which will help them to attract passengers to earn more revenue.
objective of transportation system should be such that more and more people shall patronise transport bus services.

ABSTRACT
The entry in the bibliography contains abstracts given the essential information about the article. Attempts have been made to prepare indicative abstract, so that in most of the cases user needs are fulfilled with abstract itself.

SUBJECT HEADING:
Attempt has been made to give co-extensive subject headings such as possible; it will facilitate their readers to find out desired article(s) from this bibliography.

INDEX
The index part contains the author index and title index arranged alphabetically. The index guides to the specific entry or entries in the bibliography. It is hoped that is will be found useful in consultation of the bibliography.
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Part - One

Introduction
INTRODUCTION

The living conditions of men have been influenced by their capacity to move from one place to the other from the earliest times. By harnessing nature directly and indirectly man has been able to explore and exploit the earth's resources. The early man was a wonder of necessity rather than choice. Food was scarcer and hard to get and this necessitated in making invention of the vehicle to carry loads. Techniques were invented for carrying loads through different means of transport. From this developed the Y shaped sledge or travois, the slide car, sledges and skies, animal transport and water transport.

In early stages of civilisation men were nomadic with the development of permanent settlements, nomadic culture gradually faded with the passing of time. The agricultural, hunting, trading and post oral economics of these settlements required regular movements. Technological innovations facilitated developing specialisation in social organisation. Transportation systems in operation are reflections of the decisions and actions of individuals with optional means of movement.

MEANING AND NATURE

The word transport has been derived from the Latin word 'transportare'. Trans means across or the other side and port are means to carry. Transport, their means to carry to the other side or from one place to another. Transport as such, is a service, which helps goods and persons to be carried from one place to another. It is this single powerful factor on which the economic, social and
political activities of a nation depend. Without transport, the functional differentiation of areas into the various specialised types of land uses would be difficult. Transport, by making people and goods available to places where they can be more useful, makes for a concentration of the labour force and of materials. It provides place and time utilities to both man and materials and is, therefore, indispensable to the development of trade and industry. Within the limits of a city, transport constitutes an important element of land use and of functional differentiations in urban areas takes place.

Modern means of transport through their fact, safe and efficient services have broken the distance frontiers and united the whole world into one thread. Raw materials are carried to the factories over long distances for processing; finished goods all distributed for consumption in national and overseas markets, commercials commodities are dumped in scarcity areas within no time; perishable commodities are safely rapidly distributed over far and distant places. Similarly, it carries persons from their homes to marketing centres, offices, work places, educational centres, pilgrimage and to the various places of historical, natural, cultural, national, industrial and commercial importance. Transport, through its wide spread network, keeps goods, persons, ideas, literature culture and researches mobile and infuses life in the society in the same ways as veins and arteries keep the blood circulating in the human body to keep it alive. Without this mobility the society would become stagnant, myopic, secluded and probably dead. The main object behind all movements,
of goods and persons is to augment wealth and welfares of the society and keep it appraised of new developments taking place in the other parts. The introduction of transport system in an area opens new vistas of economic activity, gives a kick to dormant potentials, inspire hope and life among the people in the area.

The importance of transport is increasingly every day with the new developments in the fields of ways, means, motive power engineering techniques, organisation, legal enactments and social, economic and political factors. Hence, the scope of the study of transport is much wider today. Kurt Weidenfield defines transportation system as the sum of technical instruments and organisations designed to enable persons, commodities and news to master space. Thus, the scope is not limited to the study of ways and means of transport but it includes all the aspects and activities, which help in moving goods and persons. Therefore the scope of transport will cover all the means of movement such as railways, waterways, roadways, and airways. Transport management is not an isolated activity of society and a law into itself, but is subject to the same moral code, which governs all other activities of society. The pursuit of an objective for its own sake should not be the dominating factor, for such thinking leads ultimately to conflicts with other social groups. However, the true nature of transport management must be seen as a series of processes, many of which are steeped in traditional technologies, and each one
of which has its own contribution to make to the effective working of the system.

ELEMENTS OF TRANSPORT

Following are the main elements of transport:

1. THE WAY - way is one of the most essential requirements of the transport. Without the way, no transport service is possible. It directs and provides base to the vehicles to move to their destination. The ways might be land ways or roadways, waterways or airways. They can also be classified as natural and artificial ways.

   Natural ways are gift of nature and hence available to men without any cost. No investment has to be made in their construction; of course, some expenditure has to be incurred in improving them and to make them serviceable. We can include pathways, river, lake and seas ways and airways under this category.

   Artificial ways are constructed through deliberate human effort with considerable investment in their construction and maintenance. We can include roadways, railways, canals etc. under this category.

   Only pathways existed in the most primitive societies when man was uncivilised, self-dependent and his movements on foot were strictly limited. The accidental pathways directed him to go for hunting in forests and come back to his living place. Slowly and gradually, plantation, agricultures, handicrafts, animal rearing etc. stated and interdependence grew; barter and
division of labour started in the human societies with the advancement in civilisation.

The use of animals, animals' carts, barter and mobility of the society necessitated wide road. Hence, pathways were widened and new roads were constructed to meet the requirements. In due course the scope of commerce developed and businessmen travelled over long distances in search of new market. They moved in groups (called caravans), as the travel was slow, unsafe and risky due to fear of highway robbers and wild animals. Considerable improvements have taken place in the science of road engineering, materials and techniques, particularly after the Industrial Revolution, to meet the requirements of heavy vehicular traffic. Under land ways another development is that of railways. For the development of railways steel lines were spread and thus completely artificial ways were constructed.

The waterways have been utilised for navigation since the dawn of human civilisation. For water and irrigation facilities, the early civilisations grew alongside the waterways, such as rivers, lakes and seas. In course of time man discovered that he could make use of water. He realised that this gift of nature would prove a cheap and convenient way for carrying goods and persons. Small rafts and canoes were floated in the initial stages. Over thousands of years that followed, development in boat and ship engineering took place and now we see giant ships and steamers propelled by steam or
other powers floating on the bosom of the sea and going to every nook and corner of the world.

Airways are the last but not the least in the list. The use of aeroplanes increased for transport purposes only after the First World War. Airways have overcome all the difficulties of topography of land as the aeroplanes can fly like birds over hills, forest, oceans, rivers and deserts without any difficulty. Airways have reduced the distances and have made travel very fast.

2. THE VEHICLES: - Vehicle is another important element of transport. The way and vehicle are closely interwoven. Like the ways the vehicles can also be classified as land way vehicles, waterway vehicles and airway vehicles. Under land way vehicles we can include human porters, animals and animal carts, bicycle and cycle-rickshaws, motorcars, buses trucks, scooters etc. Railways trains and tramways also covered under it. Waterways are also covered under it. Waterway vehicles include rafts, canoes, boats, steamers and ships. Under airways vehicles we can include all types of aircrafts.

Human porters were only means of carrying goods in the hoary days of the past. Man used to carry weapons for hunting and woman used to carry other luggage on her back even today there are human porters in hilly areas, underdeveloped regions and at railway station who continue to operate in the absence of suitable alternative. The next stage in the history of vehicle development started when luggage was put on the branches of trees and dragged by men and women who found this method easier than to carry the
load on their back. In course of time sledge-type carriers without wheels were developed.

During the agricultural age, the use of animals and animal carts was introduced. Various beasts of burden such as dogs, horses, oxen, camels, yaks, elephants, donkeys etc. were harnessed in different countries depending upon their availability and suitability for carrying goods and persons. In the first stage, animals dragged sledge type of carriers or carried goods on the back; but later on wheel carriers, such as chariots, bullock and camel carts, Tonga, ekka etc. were developed. The importance of animal service at hill stations, in underdeveloped areas and rural regions continues even today. Yaks in Tibet, camels in desert, reindeers and dogs in North Pole still occupy a unique position, although the animals and animal carts are slowly becoming outmoded following the growth and development of the mechanised means of transport.

With the improvement in technology and science, particularly after Industrial Revolution, modern mechanical vehicles were manufactured. Under these vehicles we can include motorbuses, cars, trucks, scooters, bicycles, rickshaws as well as railway trains. Most of these modern vehicles are driven by machines and use some of power such as steam, coal, petrol, diesel or electricity. The speed of these vehicles is very fast and their carrying capacity is large. They are all wheeled vehicles. Wheel, which is one the greatest achievements in the field of transport, has speeded up the mobility of vehicle.
Besides land way vehicles, waterway vehicle were also developed. The ancient people used rafts, canoes and small boats, which were propelled by men with the help of oars. Later on, with the improvement in technology, modern ships and steamers with large carrying capacity and propelled by machines using steam or petrol as motive power started floating. The modern ships are of gigantic size. Some of the ships are replica of a small town having every facility of modern life.

Aeroplanes were manufactured mainly after the First "World War. This latest and fast test invention has fulfilled the most cherished desire of mankind to fly in the open sky like birds and reach distant places. Although the carrying capacity of an aeroplane is limited and travel by air expensive as compared to a ship or a railway train, yet its speed has fascinated the world. Now we astonishingly see spacecrafts flying at fantastic speed being controlled from earth and landing man on the moon.

3. **MOTIVE POWER**: - Motive power means the power or energy, which drags the vehicles. For this purpose power such as human, animal, steam, coal, petroleum, diesel and electricity have been utilised. During hunting age, human energy was the only power. Even to day, human porters and coolies carry goods particularly where no modern alternative device can be developed because of climatic conditions or topography of land. During agriculture age, animals as motive power were utilised. Camel is still called the ship of the desert. Oars and masts were employed to provide motive power
to canoes and boats. James Watt discovered steam power in 1782, which brought revolutionary changes in the field of transport. Steam power has been extensively utilised in ships, steamers, motor, cars, truck and railways. Coal gas power was introduced when Lemair invented coal gas engine in 1860. Then, coal power was replaced by petrol power 1893 by the efforts of Daimler. Another addition to this list of motive power was made by Diesel in 1894 when he discovered a new type of oil, now named after him, i.e. Diesel. Diesel has been utilised in motorcars aeroplanes and railways. Diesel has proved a very cheap power and hence its use is increasing in modern vehicles. Electricity has been utilised only in railways. Atomic energy has been used in spacecrafts. In this rapidly changing world, atomic energy might even be introduced in other means of transport in the years to come.

4. **TERMINALS:** - Terminal is a place where a journey ends or the place of departure and destination of vehicle are called terminals. So terminals are an important element of transport. Terminal facilities are required for loading and unloading of goods, real-shed for passengers, basic amenities for passengers waiting for commencement of journey, repairing facilities for the vehicles, safely and security of vehicles when not in use. Thus, the artificial destination as terminal such as railway station, bus station, aerodromes, ports and harbours are necessary for convenient service

5. **COST AND TIME OF TRANSPORT:** - Time taken for performance of service along with costs involved in transportation are the vital elements of
transport. Speed of transportation is an important factor, which affects both costs and time. The duration, safety, security, regularity is essential factors of cost and time. Reduction of time for transportation leads to saving of transport equipments, optimum utilisation of terminal facilities, savings in inventory cost, less working capital requirement and reduction of labour costs. Fast, quick, prompt and efficient means of transport within adequate safety limits is the goal of modern transportation systems.

6. **TECHNOLOGY**: - The main objective of transport is carriage of men and materials to distant places at maximum speed minimum cost and adequate safety. Technology plays a vital role in guarantying speed, ensuring safety and providing an efficient and in expensive mode of transport. Technological improvements in Roads, Railway tracks, computerisation of terminal facilities, introduction of large, sleek, comfortable vehicles, electrification and dieselisation, maintenance of transport equipments and facilities have brought tremendous change in the fields of transport which has made a positive impact on economic development. Technology has also added to the efficiency of transport management and administration. Therefore, technology plays a useful role in shaping and directing the nature and size of transport. Technology influences the organisational structure of transport systems.

**CLASSIFICATION OF TRANSPORT:**

Transport has been universally classified on the basis of tracks on which the transport vehicles move. They are as follows:
(A) **ROAD TRANSPORT**

Transport by roads includes porters, animal driven carts, bi-cycles and vehicles driven by fuel such as scooters, cars, mopeds, trucks, buses etc. Movements of power driven vehicles require good hard and wide surface roads whereas porters and animal driven carts do not require any such precondition for smooth and convenient travel. Porter's services are still required in inaccessible areas, and in difficult terrain where roads cannot be constructed due to geographical factors. Carriage by porters and animals is the most primitive form of transport. It is cheap, convenient and requires less investment. It is most suitable for short distance but since its advantages outweigh its merits, it is losing its importance. The limitations are its limited carrying capacity, slow speed, costly maintenance and unsuitable to carry bulky goods over large distances. Introduction of high-speed vehicles, with large carrying capacity and ability to travel long distance has virtually eliminated animal and porter transport. Though it is still prevalent in villages and rural India, modern India has been monopolised by fuel-driven vehicles. Mechanised transport requires huge capital outlay initially but the cost of services per unit of traffic is lower as compared to that of animal transport. Hard surfaced roads and ancillary services like repair workshops etc. are essential requirements for mechanised form of road transport.
(B) RAILWAY TRANSPORT

Railways are considered as the circulatory system of a nation, enabling bulk transport of merchandise and men over long distances at a very cheap rate. It is fast, safe and inexpensive to travel long distance. The success of Industrial Revolution and its gradual expansion is primarily due for the steam invention of the locomotive by James Walt. Railways have special tracks called rails. So railway transport necessitates huge capital investment on laying rail tracks, maintenance of rail and provision of other supportive facilities like signalling systems. Though the initial capital cost are very high the operating cost are less when compared to volume of traffic handled and increased utilisation of facilities. It is the railways, which have met the formidable demand for transport in a growing economy in the domestic sector. Sub-urban railway transport facilitates movement of men and women in industrial cities like Bombay and Calcutta.

(C) WATER TRANSPORT

Water transport is movement of water vehicles over water. Waterways are considered the cradles of modern civilisation. It can be classified into Inland water transport and Ocean transport.

Inland water transport comprising of rivers, canals and lakes Inland waterways stem is very ancient. Human civilisation has flourished on the banks of rivers due to movement of goods and men over riverboats and crafts. Internal trade prospered and cultural ideas travelled for a wide because of
inland waterways. Inland waterways are cheap and convenient requiring very less capital investment and is labour intensive. The demerits of inland water transport are its seasonal operation, circuitous routes, and rocky surface of the river bed, slow speed shallow waters, snow etc. Ocean transport can be divided into coastal and international ocean transports. In both cases ocean is used as the way. In coastal ocean transport, goods and passengers are carried from one port to another port of the same country, while in international ocean transport cargo and persons are moved from one country to another. Ships and steamers are used as ocean vehicles. Ocean way is also a gift of nature and therefore no money has to be spent on its construction and maintenance.

(D) AIR TRANSPORT

This is the latest and fastest transport. Air transport, using sky as its way and aeroplane as vehicle, is of recent growth and origin. It developed particularly of the First World War. While it has got the advantages of rapidity, unbroken journey, aerial photography, survey and forest protection defence etc. it suffers from being very expensive for travel, low weight carrying capacity, binding of international laws, high frequency of accidents and frequent obstructions posed by inclement weather conditions. It suits it enjoys unique importance due to its speed. In modern civilised society where time factors has become very important and interventional contacts are rapidly growing, air transport has got a very significant role to play.
(E) PIPELINES

Pipelines are comparatively new in the field of transportation. Besides water, they are now being utilised for transporting petroleum products - liquids and gases from distant places of their production to the centres of their consumption, the initial investment of spreading pipelines is high, but they involve very nominal operating expenses as they require no vehicles, operators or motive power. Their use is expanding day by day, but they can carry only liquids and gases. In India also they are now being spread.

SOCIO-ECONOMIC SIGNIFICANCE OF TRANSPORT MANAGEMENT

(I) Transport System is a catalyst of the Socio-Economic development:
Transportation plays an important role in rapid economic development of a country. Improved and effective transportation is indispensable to economic progress. Transport sector bears a close and complex relationship with all other sectors of the economy. Socio-economic planning is generally influenced by the pattern of movement of people and goods. While the demand for expansion of transport generally derives from the needs of the economy, to some extent, the transport sector also acts as a catalyst of socio-economic development. Transport acts as an accelerator and catalyst for faster, higher and quicker economic growth.
(ii) **Transport promotes Industrialisation:**

Transport increases wealth, promotes industrialisation and transforms the organisation of industry, creates urban conglomerations, raises the standard of living of the people and promotes culture. Centralised production and regional specialisation has led to an increasing role for transportation and communication. The purpose of manufacturing cannot be served unless the product reaches ultimately to the consumer by means of transport. Transport infrastructure services can have significant effects in improving quality life of the people. Access to transport can contribute to earn higher wages and also can expand opportunities for non-firm employment.

(iii) **Transport System provides access to rural area:**

Good network of roads and railways, navigable rivers and canals, coastal waterways and airways turn the liability of for flung regions into asset by uniting them into a single self-contained economy. Transport system is thus, the nerves of an economy, which stimulates its developments and activities. The traditional forms of transport, such as bullock cart, animal and manually handled carts perform a useful role especially in the rural areas. They carry the goods and passengers to the inaccessible areas without any difficulty. Improved design of animal driven carts and provisions of intermediate transport system play a crucial role in rural transport system. Three wheelers, mini buses and
tractors are used extensively to transport goods passengers in these areas.

(iv) Transport is the key factor to link dispersed Areas:

No village or towns is self-sufficient; it must have efficient transport link with its neighbourhood and the world outside to enable it to fulfil its economic needs by exchanging part of its own output of goods and services with food materials from elsewhere. The significance of transport sector lies not only in increasing productivity, widening the market, introducing new stimuli to economic activity, but also in bringing village, town, and the more developed regions closer to one another.

(v) Transport increases the economic efficiency of resources:

The economic efficiency of resources of various countries is increased with the growth of different mode of transportation over the years. Transport reduces the cost of production and distribution by effective, planned, integrated and coordinated network. Introduction of Railways has been historically the most powerful single factor in the process of economic development of industrialized countries of the world. All nations of the world, whether developed or developing, have to depend largely on transport development for better utilisation of their resources.

(vi) Transport provides mobility of labour and boost Tourism Industry:

The transport system removes the in-equilibrium in labour market by
providing means for mobility of labour from surplus area to deficient areas. The tourism industry also can grow with the network to places of tourist importance. Connectivity of transport links helps the people to move from one place to the other not only for commercial purpose but also to keep social link with each other.

(vii) **Transport promotes social welfare:**

The economic characteristics of modern transport infrastructure are the supply of services through a network of delivery systems designed to serve a variety of users. The network in most cases is to achieve social welfare. Transport services are essential to spread education, extends health services, provide faster distribution of mail, and effective public distribution system, which are considered as the basic ingredients for promote social growth.

(viii) **Transport helps to stabilise prices:**

Goods can be transported to places, where there is scarcity for it. By this consumes can get their desired products or commodities at a reasonable price. Similarly, by transporting goods to the market, the producer gets fair price on their products.

(ix) **Transport curbs monopoly of the trader:**

Facilities for quick transport of commodities from one place to another, restricts the traders to charge high price to the consumers. The demand
for product increases because of the non-availability of adequate and continuous transport facilities fulfils the need of the people.

(x) **Discovery of New Market:**

Invention of new sea routes helped in discovering new lands in various parts of the globe. Similarly discovery of new land routes increases the mobility of goods and passenger traffic and decreases the cost of transportation. To achieve highest international economic order, transport plays an important role. Even waste lands, hilly trains, forest-land, icy land isolated island can be put to economic use with the expansion of transport network.

(xi) **Transport provides large employment opportunities:**

Growth of various mode of transport provided employment to millions. People can be employed in road construction activities, port development activities, railway construction and service activities in shipping trade and other related transport activities.

(xii) **Adequate transport facilities in a country help to combat the natural calamities:**

Quick relief work can be initiated after the occurrence of natural calamities such as food, drought, famine, and earthquake in a better way with the existence of fast transportation network.

(xiii) **Transport is helpful in funding revenue to the Government:**

Transport operator pay tax for plying their vehicles. Increase in transportation system facilitates movements of goods and thereby the
revenue of the Government increases by way of sales tax, octori, customs duty, etc.

ROAD TRANSPORT MANAGEMENT IN INDIA

Road transport in India is known from the very early times. The great emperors of Maurya and Gupta periods had regular contacts with their dominions and the neighbouring state. It was considered by them as their primary duty to provide transport service to the general public. The new form of transport by motor vehicles became more and more popular and useful only in the second decade of the present country. With this, the surface transportation entered a new phase. As a result, the range of operation of bullock carts-horse-dawn carriages, palanquins etc. has significantly reduced with regard to the area covered, number of persons carried and the volume of goods transported prior to 1941 the operation of motor vehicles was regulated by their respective provincial Acts in the provinces of Bengal, Bombay, Madras, Punjab, and the united provinces. In 1914, Indian motor vehicles Act, 1914 were passed to regular the operation of motor vehicles in India.

NATURE OF ROAD TRANSPORT

The road transport is the most primitive mode of transport during ancient times road transport was the only available means of transport. The new popular encyclopaedia states, "The road is one of the great fundamental institutions of mankind. It's history dates back to the dawn of recorded history and beyond. It develops with man's advance; it retrogrades with the break
down of social order. A people without roads would be a people without inter
course with the outside world, without the attributes of civilisation. Man-the
road builder of civilisation". Today road transport is the most common and
principal mode of transport all over the world. Economic and industrial
development necessitate good, wide and excellent road to enable smooth flow
of economic services. This advancement of human civilisation is dependent on
good roads.

India is a vast sub-continent with numerous towns and cities, which
needs to be inter-connected to achieve social, political and economic
integration and maintain coordination with other sectors of the economy. Road
is the principal link our houses and work places, houses and markets, houses
and recreation centres.

ELEMENTS OF ROAD TRANSPORT:

The various elements of road transport are as follows:

(1) **Roads** - There are different types of road in different regions and
indifferent places differing in construction, use design and structure. So
road can again grouped under the following heads:

(a) **Suitability to Weather:** Roads, which are usable all round the
year irrespective of climate, seasons and bad weather are called
all weather roads. Roads, which are serviceable only for a
limited period in a year due to adverse weather and climate, are
called fair weather roads. Fair-weather road by definition implies
it can be usually only when the weather and climatic condition are favourable.

(b) **Suitability for unit of conveyance:** -- The unit of conveyance in road transport comprises of human beings, animals, carts, and fuel driven vehicles. Roads, which are fit to bear the burden of all units of conveyance, are called motorable roads. Metalled roads, which are heavy, wide are capable of withstanding heavy loads. But non-metalled roads also called non-motorable whose ability to convey transport vehicles is limited to man himself and animals. Non-motorable and non-metalled roads are earthen roads whose construction cost is low and less durable. Metalled road require large investment of capital but maintenance cost is less and the roads are durable over long periods of time.

(c) **According to construction:** - The type of construction, the variety of materials used, the methodology and technology used in construction results in various types of roads. Earthen, non-metalled roads are narrow and inferior in quality and incapable of handling heavy traffic. Metalled roads are strong and capable of taking the burden of big traffic. Movement of vehicles is fast and quick on metalled roads and consequently wear and tear of vehicles is less than in earthen roads.
(d) **Regional basis of classification:** Roads can be termed as National Highways, state highways, Border roads, rural roads, etc. National highways are roads that link several cities and towns of different states. It connects ports, airports, state capitals with important industrial centres located within a state. Border roads serve the purpose of defending the country's sovereignty and integrity. Village roads link the rural areas with the nearby important towns and cities.

(e) **Competition:** Road as a mode for conveyance offers stiff competition to railways and inland waterways. Therefore, roads, which run parallel to railway lines and canals, are competitive in nature. Feeder roads are those which complements the services provided by other means of transport.

Roads are publicly owned, therefore every citizen has the right to travel and use the roads according to his needs and convenience except during maintenance of law and order and in safeguarding national interest, so all the roads now are owned, constructed and maintained by the Government.

2. **Vehicles** - Several means are used in road transport. We can group them into five.

(i) Human porters

(ii) Animals and Animal driven carts
(iii) Cycle Vehicles

(iv) Fuel operated Vehicles

(i) **Human porters-**

It is the most primitive mode of transport. Historical records tell us that men used to carry weapons for hunting and animal women were carrying luggage's on their backs. Though the world has progressed very much, human porter are still seen all other the world. The most common place where their visibility is high are in railway station, docks, airports etc. Porter are very useful in hill and mountainous regions where in addition to the duty of carrying load, they acts as a guide and interpreter for the tourist. It is cheap convenient where the population is large as in our country.

(ii) **Animals and Animal driven carts-**

Several animals like dogs, reindeer, camel, elephants, oxen, bullocks; horses are used for transporting men and materials. Geographical condition makes it compulsory to use animal for e.g. camel in deserts, elephants in thick jungles, reindeer in Siberian climate. Man has not been able to conquer nature and introduce vehicles suitable under adverse geographical conditions. Camel is called the ship of the desert and a good camel can cover 250 kms., in a day. Though modern civilisation
has introduced highly sophisticated automobiles, animals continue to supplement the requirements of a road transport, as an unit of animals for conveyance is not feasible. Animal transport is the only mode of transport in rough terrain and in hospitable and inaccessible areas of the world.

(iii) **Cycle Vehicles**

The first bicycle was introduced in the year 1867. Cycle is a very common means of transport universally. It is prevalent in developed countries, developing and under developed countries also. Transport by cycle and cycle rickshaw is very popular. The capital cost and operating cost is nominal. Maintenance is easy and convenient. It does not consume any fodder or fuel. Since operation is manual repair bill is very low. It does not require any expensive spare or components.

(iv) **Fuel Operated Vehicles**

Motorcar, trucks, buses, scooter, motorcycles, mopeds vans, matadors, etc. All come under the purview of fuel driven vehicles. All these are now the most common and popular mode of transport. Science and Technology has made a tremendous impact on these vehicles. Several modifications, renovation are being carried on these. Renovation are done to remove any deficient characteristics or rectify any engine design, defects and
at the same time make it fuel-efficient and to keep noise levels at a low level. Fuel-driven vehicles are now a very common sight in highway's and roads. As an unit of conveyance it dominates the roads. Depending on its engine capacity, size and fuel consumption, it can travel long distance, carry huge loads, and move at great speed motor vehicles can be classified according to their physical characteristics such as engine size, chassis or according to their use or ownership.

1. **Physical characteristics:** The motor vehicle can be classified into different groups like trucks, buses, trawlers, tractor, cranes, jeeps, cars, motor cycles, scooters and mopeds. Each one of them has a specific engine size, chassis, carrying capacity and speed range within which it can move conveniently.

2. **Use/Ownership:** On the basis of use and ownership all the above stated units of conveyance can be further classified as private carriers, public carriers, common carrier and individual carrier.

The motor vehicles are subject to regulatory control exercised by the Government.

**SIGNIFICANCE OF ROAD TRANSPORT**

The road is one of the greatest fundamental institutions of mankind. The birth of road is the birth of human civilisation. It has played a crucial role in
shaping the political and economic condition of a country. The prosperity and the economic development of a country depend on the strength of its roads. Man is the road builder and without roads man cannot maintain its link with the outside world. It is though roads that humanity and humanism proposed. Roads provide velocity to the society. It is the symbol of movement of our society. A good road transport system is paramount importance.

**ECONOMIC SIGNIFICANCE**

(i) **Roads and Industrial development:** - Roads play a major role in changing the industrial character of our society. It is the roads, which provides door-to-door service in collection of raw materials and delivery of raw materials to the factory and again collection of finished goods from the factory to the consumption centres. Therefore roads play a very vital role in the distribution function of economic goods. Roads again play a vital role in regional development The objective of our five year plan is to reduce regional imbalance which is possible only with the development of extensive road in regional backward areas. Industrialisation of backward areas is possible only when it has got an extensive system of roadways.

(ii) **Roads and Agriculture:** - Road transport is an ideal mode of transport in rural area. Without Road, Agricultural products and perishable products cannot arrive in the urban market. It is the routes, which
provides great benefits to the agricultural section of our society. The strength of our agriculture line in the strength of the roads.

(iii) **Roads and Employment:** Roads and Road transport is a source of employment to the millions of unemployed Indians, construction and maintenance of roads is labour intensive. It requires high closes of labour and manpower. Roads also enable good utilisation of local raw materials which again employees local manpower. Therefore, road and road transport is a major avenue of promoting employment opportunities.

**POLITICAL SIGNIFICANCE**

The importance of road from political view need not be over emphasised. History has shown that it is road, which brings stability and integrity to the nation. Road as mentioned earlier is the arteries and veins of a country. Therefore, road is an essential factor in promoting national integrity and unity. Roads also play a prominent role in maintaining the severity of the country. It is play a vital role in maintaining and preserving the boarders from foreign invasion. A good road enables swift movement of war materials and soldiers to the boarder regions to protect the severity and territorial integrity of the country. Roads also provide immense help in maintenance of law and order, administration and justice. It preserves internal security prevents antisocial element for taking law into their hands and eliminates sabotage and
violent activity inside the country. Good roads enable the police and fire-fighting personnel to rush to trouble prone areas of the country.

**SOCIAL SIGNIFICANCE**

Road is basic necessity of human society. It is impossible to survive without roads. Civilisation will collapse if road would have been absent. Road provide the benefits in the social sphere.

1) **Elimination narrow minded needs:**

The free and unrestricted movement of human beings from difficult parts of the country allows free mixing of persons from difficult carts, communities and different regions and races. This promotes mutual understanding among different communities. Therefore roads helps in eradication of unsocial values, community feelings and reduces hosted among different communities. It erases distinction based on castes, creeds, religion etc. It makes different communities interdependent thereby reducing misunderstanding among them.

2) **Dispersal of population:**

Good road helps in preventing conjunction in urban areas and prevent concentration of population in a particular area. Since the development of road leads to all around development population will be dispersed all among the line where roads have been constructed. This reduces the burden of urban life and reduces urban congestion. Good roads will
allow mutual flow of population from urban to rural areas, and vice-versa.

3) Education and culture:

It is through the roads that the students attend schools and colleges and acquire academic knowledge and wisdom. Road is the medium for movement from home to libraries, universities, educational institutes and other cultural institution. Therefore, roads promote education and enable the spread of culture in a country. The transport facilities provided by the roads enables free movement of intellectual thought and culture.

4) Quality of living:

Road is the link between urban areas and several areas and vice-versa. Roads promote frequent interaction between urban and rural life. This helps in raising the quality of life among all human beings. Rural people acquire urban culture and promote their standard of living. The standard of living rises among the villages by seeing benefits of urbanisation in the field of sanitation, health and education.

RATES AND FARES

Although different kind of vehicles operates on roads, yet the problem of fixing rates and fares in road transport is not so difficult and complicated. The principal applied in fixation of rates and fares for road transport is that of the cost of services. The principle of what the traffic will bear, or differential
charging, is neither possible nor desirable. Before analysing what factor
governs the rates and fares in road transport, it is imperative to understand the
nature of road transport expenditures.

**Road transport expenses** - The road transport expenses can be divided into-

(i) capital expenditure, and

(ii) Revenue expenditure.

The revenue expenditure can further be divided into -

(a) standing or fixed expenses and

(b) running expenses.

**Capital Expenditure** - The capital expenses of a road transport undertaking
can be grouped under three heads: (a) cost of purchasing road vehicles, (b)
capital cost of building required for garage, office or repair shops etc.; and (c)
miscellaneous property.

Capital expenditure has the following characteristic:

1. The road transports haulers have not spend on preparing the
permanent way. This is a net saving of capital expenditure in
road transport.

2. The capital expenditure of road transport is not fixed to a
particular route but is mobile of the route is found un-
remunerative, the vehicles can be moved to other route which are
profitable.
3. The vehicles bear a positive relation with the volume of traffic. If the volume of traffic increases, the number of vehicles, drivers and organisations can be increased in proportion and vice-versa. It is possible to adjust capital expenditure of road transport to the volume of traffic, though not in the exact proportion, yet to a fair degree of percentage as least in the long run.

4. The capital is small. In case of cycle rickshaw it is very nominal, and even in case of motorbuses and trucks it is not as high. Therefore, many competitors can enter the arena of road transport.

**Revenue Expenditure** - Revenue expenditure in road transport is incurred for efficient running of the vehicles, for keeping them in good and serviceable condition, for payment of interest on capital for providing depreciation, repairs and renewals and for payment of taxes. They are annual or operating expenses. These expenses can be divided into -

a) Standing or fixed annual expenses,

b) Running expenses

The standing charges, like capital charges, are fixed and do not vary with the variation in the volume of traffic. They may include charges like taxes paid to government or local authorities; interest paid on capital invested in transport undertaking; rent for garage, stable and office buildings; insurance of the vehicle, third party, fire or operator's liability; depreciation;
insurance of the vehicle, third party, fire or operator's liability; depreciation; office and other administrative expenses; licence for vehicles etc. these expenses are incurred every year and all constant or invariable.

Running expenses are variable and increase or decrease in accordance with the mileage done or traffic carried. The principal items under this head are fuel (diesel or petrol in motor vehicles), oil, grease, tyres, tubes, overhauling and periodical servicing, repairs and renewals of vehicles parts. The wages are running expense if the drivers are kept on piece rate wage system, and standing expense if they are permanent and are paid salaries every month irrespective of work done by them.

The following characteristics of revenue expenses may be noted:

(1) The revenue expenses, both standing and running expenses taken constitute a fair percentage of total cost.

(ii) The variable expenses in road transport are fairly greater in percentage to fixed or standing expenses. this is also because the supply of transport service and expenses incurred in road transport are not joint.

Theoretical basis of rates and fares - In road transport rates and fares are usually determined on the principle of cost service. In road haulage, cost of service is in general the determining factor. Competition tends fix rates and fares for road transport at such a level that the receipts, after all working
expenses have been paid and an allowance made for depreciation, etc. afford ordinary profits and a normal return on the capital invested.

The cost of service or cost of production principle is a sound principle for fixation of prices in any commercial undertaking, provided it is possible to do so. The cost of service furnishes a standard much more definite and exact, much less influenced by individual judgement, for less prove to use as a vehicle for favouritism than any other basis of rate fixation. This principle also eliminates personal and commodity discrimination. It gives a solid and permanent base to the rate structure.

Factors determining Freight rates - The freight rates are determined mainly on the basis of cost of service principle. Therefore, all the factor which materially influence the cost service should be considered. The freight rates are also influence by some other factors due to competitive nature or small scale of operation or due to state regulations in road transport. These factors can be analysed under four heads.

Cost of service- The cost factors as aforesaid, are capital expenses, standing charges and running expenses. For calculating the annual revenues or annual expenditure, the capital expenses are not taken into account, but a seasonable share which should be charged in a particular yearly is included in the annual expenses, for example, depreciation at a fixed rate on all vehicles, and interest on capital. Thus for annual of cost, only two categories of cost remain. First, the standing or overhead charges, like depreciation, interest on capital, taxes
paid to Government (like licence fee, road taxes, registration fee) or to the municipal authorities, insurance of the vehicles against third party or against theft or fire etc. insurance of buildings and other properties, managerial and supervisory expenses and the like which are spent for running the transport undertaking as a whole, and therefore are indirect or overhead expenses. These expenses remain constant and do not vary, at least in short period, due to variation in the volume of traffic. They have to be allocated for finding out the cost of service per unit of traffic on some reasonable basis. And secondly, the running expenses like wages and salaries to drivers, cleaners and conductors; fuel expenses on petrol; rents of the building or other equipments solicitation expenses, advertising expenses, printing of tickets etc. are highly variable in direction and in proportion to the volume of traffic.

In the short period, the road hauler must charge at least so much as to cover running or special expenses and earn forgo standing charges by postponing the realisation in future years. In short period, due to severe competition or due to non-availability of traffic, the road haulers may be motivated to keep their sales so low as to realise only running expenses in the enlightened future interest of getting more traffic, and therefore may postpone the realisation of the standing charges. But this policy of postponing cannot be carried for a very long period and depreciation will have to be provided or interest on capital will have to be paid. So in the long run the sales must cover there standing charges also along with a reasonable profit for road haulers.
**Characteristics of the commodities:** The rates are also influenced by the commodities we may divide such characteristics in physical and commercial characteristics.

The physical characteristics of the commodities mainly affect the cost of service, and hence the rates have to be adjusted accordingly. They may include susceptibility of goods to damage, pilferage or sacrilege, risk of damage of carries property or equipment or the property of the other consignees, space needed per unit of weight, special services required for hounding or transportation etc. Naturally, articles which involve more risk or inflict more liability or demand more expenditure are charged at a higher rate as compared to those which involve no risk, liability or no extra expenditure.

The commercial characteristics of the commodities mainly take in to consideration the ability to pay of the consignments. They do not affect cost or liability much but they determine the ability to pay freight. They may include intrinsic value of the commodities; commercial competition among the places of production; distribution and consumption; competition among the road carriers themselves.

Naturally, high valued commodities having greater place utility and lower competition among the producers or carriers can permit higher rates as against those which are low valued, having narrow margin of price difference between two places with severe competition among producers and carriers.
**State Regulation** - State Regulation may be about the rates themselves or about the services conditions to be compiled with legally. These regulations affect the cost service or the rate structure as such. Due to great flexibility and rate cutting policy adopted by the road haulers, especially by motor trucks during the depression period. State Regulation has become a regular feature almost in every country. In India also the motor vehicles -Act, 1939 and Motor Vehicles Act, 1988 govern the operation of motor vehicles.

**Factor influencing passenger fares** - like freight rates, passenger fares in road transport are affected by several factors:

(a) **Cost of service** - The cost of carrying passenger is taken into account for determining the fares. Generally, these are two classes, upper and lower, and sometimes these is only one class even in buses. But this does not affect the cost of service, as there is no special arrangement for supper class passengers.

(b) **Value of service** - The fares vary according to the demand of the service. During the day of marriages, exhibition and fares, the fares charged are more than those during slack reason like rainy season.

(c) **Fares under monopolistic condition** - The fares on the routes on which Nationalised buses ply are fixed by the government and they do not vary. Sometimes, the motor owners also from associations by entering into agreements in which case a fixed schedule of fares is adopted according to the agreement and the defaulters are penalised. In case of private vehicles which are not under any agreement, or where there is no
regulation, the contractual basis determines the fares, which may vary from time to time and from person to person according to the supply and demand factor. The fares fixed on the basis of contract between the operator of the vehicle and passenger. Although some regulations are imposed by municipalities and rates are fixed by them for local carriers, but in practice it is difficult to impose them and hence the contractual basis continues and rates differ from time to time and person to person. The city buses have fixed rates. The rates charged by local carrier, which are mainly for short distances, are higher as compared to those of long distance carriers.

**Rate System** - The system of charging at flat rate for all distances is adopted in road transport. The main reason for charging flat rate is that the passenger journeys by buses are generally of short distances and tapering system cannot be conveniently followed.

According the Zonal System the whole distance to be covered by a bus is divided into certain zones and the charges are fixed for each zone. If the passenger travels in a particular zone, only he is charged for one zone, if he crosses one zone and travels in other zones, he is charged as many time as the number of zones he has travelled. This system is not popular among long distance routes buses. But is being progressively adopted by city buses, tramways and other local means of transport.
An efficient road transport system depends on adequate funding for construction and maintenance of roads in the country. Responsibilities and accountability has to be fixed in construction and maintenance of roads. It requires proper planning and organisation of road construction activities along with this is required proper financing procedures, accounting procedures for construction and maintenance. In India according to the Nagpur plan, Roads had been classified into central, state, and village roads and the responsibilities had been fixed on the particular provincial Government. The present sources of financing in India are as follows:

1. **Central Road Development Fund** -

   The Indian road development committee set up under the chairmanship of M.R. Jayakur examined into the financing and administration of roads and recommended the creation of a central road fund. A separate road fund was created in March 29 and is divided into three parts.

   a) **Central Road Fund**: 80% of the total deposits in the road development fund is transferred and kept in this road fund. This fund is available for distribution among various states on the basis of consumption of petrol. The fund is utilised for construction, expansion and renovation of roads and for payment of interest and repayment of loans incurred by the state Govt. for construction of roads.
b) **Central Road Reserve Fund**: - 20% of the central road development fund is transferred to a central road reserve fund, which is utilised for administration and research activities on roads. At present, about every year 5 crores in transferred to this fund.

c) **Central Road Special Reserve Fund**: - A special reserve fund is created from the grants received from the Ministry of Defence and other Ministries and is utilised for the development of roads.

2. **General Revenue of the Central Government**-

   The Government of India has financial responsibility for construction and maintenance of national highways and strategic highways, which have special importance. From the general revenue, the Central Government allocates every year a sum for road development. This amount is transferred from the general revenue of the Central Government for road development purposes. The Central Government also augments its revenue for road development by imposing, duty on petrol, diesel oil, motor vehicles and their accessories. Additional excise duty is also imposed in the automobile sector for generating revenue for development of roads.

3. **State General Revenue**-

   Provincial highways are constructed and maintained by state Government. Therefore, state Government finances this programme for its general revenue from its annual budget. The sources of revenue of a state Govt. are through imposition of tax on motor vehicles, sales tax on petroleum
products, motor vehicles and on their accessories. Passenger tax and goods tax is also levied in different states to augment the revenue.

4. Revenue of the local self Government -

Local bodies like Municipal Corporation, N.A.C. District Boards and village panchayat impose octroi duty and other local duties to collect revenue for maintenance of local roads, feeder roads etc. The amount collected by the local bodies is insignificant. It is only the big town and cities, which can raise substantial amount by levying local taxes on petroleum products and motor vehicles.

5. External Sources -

World Bank and other United Nations organisation also provide fund for construction of roads in India. International organisation generally gives long-term loan for a period of 50 years free of interest for development and construction of national highways.

COMMITTEES FOR ADMINISTRATION OF ROADS

1. Indian Road Development Committee, 1927 -

This committee suggested imposition of the additional tax to establish a central road fund. This was accepted by the then Government and the central road development fund till now is an important source of road financing.

2. Motor Vehicles Taxation Enquiry Committee 1950 -

This committee was set up in 1950. Which recommended various schemes for financing construction activities in road transport. It made
separate recommendation for rural and urban roads. For the rural roads, the committee has recommended laving of tax on the basis of land revenue collected and that the fund thus accumulated should be distributed among the local bodies. The basis of collection was the amount of land revenue collected.

For financing urban roads, the following recommendation were made:

a) A substantial part of the import duties levied on motor vehicles and on their accessories should be reserved for road development.

b) State road fund must be established in all states, which will contribute money to this fund based on the taxes levied on petroleum product and motor vehicles.

c) The central government must also contribute to this fund and the contribution made by the central government to this fund must be made available to the state government for construction activities.

3. Taxation Enquiry Committee, 1953-

Dr. John Mathai was appointed as the Chairman of the Taxation Enquiry Committee in 1953, which made the following recommendation for financing activities in road transport.

a) The Central Government must continue its contribution to the Central Road Development fund based on tax imposed on petroleum products.

b) The Central Government must also continue to sanction grants from the Central Road fund to the various states.
c) The state should contribute not less than 25% of their realisation from petroleum products and in addition not less than 25% of the balance of the realisation on motor vehicles tax to the state road fund.

d) The committee recommended setting up of an All India Rural Communication fund for pursuing development activities in rural roads. The fund will be constituted with an annual contribution given by the Central Government and the State Government must provide a matching grant of at least 25% of the grant given by the Central Government.

4. Road Transport Taxation Enquiry Committee, 1967-

Government of India constituted a committee under the chairmanship of Dr. U.V. Keskar to enquire into the question of road transport taxation road transport taxation in India Committees submitted two reports, one in 1966 and other in 1967. The committee made valuable suggestion regarding realisation of road tax. The terms of reference of this committee was as follows:

a) To examine the present cost of operation including the taxation cost.

b) To examine the need for coordinating the rates of motor vehicles tax with petroleum products.

c) To survey the existing administrative machinery and the imposition of collection of tax.
d) To recommend the principles on which tax is to be imposed on motor vehicles and level of tax.

e) To suggest any changes in law and procedure that may be required to give effect to any recommendation that may be made by this committee.

f) To make any other recommendation incidental and collateral to the subject matter of the enquiry.

The committee made the following recommendation on octroi:

a) Octroi should be abolished

b) Check post should be recognised and minimised to the minimum required to ensure continuous checking. Flying squared with an Inspector must be adopted.

c) The traffic police must co-operate with the motor vehicles departments.

d) Mobile courts must be set up to deal with the motor vehicles departments.

Administration of Roads-

The administration of roads in India is in the hands of government, state government and the local self-government.

Road Administration at the Centre

Since the central government has taken over the responsibility for the national high ways with effect from 1st April 1947 it has established a Central
Road Organisation under the Ministry of Shipping and Transport. There are two wings of the Transport Ministry: Road wing and Transport Wing. The road wing deals with matters concerning construction and maintenance of national highways and other roads in the charge of Central Government. The transport wing looks after all matter connected with transport.

The main purpose of establishing the above organisation is to achieve coordination between the road development activities of various states. Financed from the Central Road Development Reserve Fund, the organisation maintain contacts between the different states and their public work department so that it may advise the states on detailed road programmes and technical matters like grants, research, training, statistics etc. The organisation is under the charge of the consulting Engineer (Roads) of the Central Government; under him are a large number of expert engineers, consultants, bridge experts, planning officers etc. The organisation look after the annual programmes of the development of the national highways. It also reviews and revises the national highways work periodically in respect of each state. It also collects roads statistics.

Road Administration in the States-

Before 1947 only the state government were responsible for construction and maintenance of all types of roads. But since April 1, 1947, the national highways are the responsibility of the Central Government. The state highways are constructed and maintained by the public works Department of the states.
The head of the public works Department is called Chief Engineers. The Department is divided into a number of circles. Each circle works under a Superintending Engineer. The circle is divided into a number of divisions, each of which is under the Executive Engineer. Under him these are a number of engineers.

**Local Road Administration**

For looking after the district and village roads, engineers are separately appointed in the local bodies. The roads falling under the Forest and Irrigation Departments are being managed separately by it.

The present road administration is not sufficient for the development and coordination of roads in the states. The Road Transport Reorganisation Committee, 1959 (Masani committee) recommended that in every state there should be a Transport Department, having Road wing and Transport Wing on the pattern of the centre. The Secretary of Transport Ministry should coordinate the activities of these two wings.

**Institutions Established by Central Government**

Besides the main administrative machinery the Central Government has established some other institutions for road research, advice planning and development.

(i) **Indian Roads Congress:**

It was established in 1934 as a semi official organisation and has been doing remarkable work. It provides Indian engineers and other persons
a forum for the exchange of ideas and pooling of experience in road construction and maintenance.

The annual meeting of the congress are held and valuable suggestions are made for the development of roads. The Nagpur plan and the New 20 year Road Development plan have been prepared in consultation with it. The congress has drawn a Bridge code, which has been accepted generally. It has made many suggestions regarding the surface of the roads suitable for India, specific standards for roads, transport regulation and financing.

The Indian Road Congress has many committee and sub-committees are: Bituminous Committee, Bridge Committee, Road Transport Development Committee, Research Organisation Committee, Road Transport Operation Cost Committee, Specification and standard Committee, Track Committee etc. There are other committees which deal with cement/concrete/road surfacing, dimension and weights road design vehicles, education of road engineers, manufacture of road making machinery, prevention of ribbon development, soil research, stabilised soil roads, traffic engineering etc.

The congress works in close collaboration with Road wing of the Ministry of shipping and Transport. In so far as the income of the congress is concerned, about 60 percent comes from the central and the
state governments. Other sources of income are membership fee, sale of its publication and advertisement in its journals.

(ii) **Central Road Research Institute:**

Although the Indian Road congress undertakes the research work, yet its resources being limited and meeting being held annually, much cannot be expected from it in this field. Moreover, there is a growing need of research in the field of road engineering in India, which has different climates and soils in different parts. Therefore, on the recommendations of the Nagpur plan the Central Road Research Institute had been set-up in Delhi in September 1950. There are five division of this Institute, namely, soil, road, rigid pavements, traffic engineering and economic research and flexible pavements divisions.

The main functions of the Institute are fundamental and applied research on road materials and road construction; testing and standardisation of specification; devising suitable instruments for various test such as the measurement of irregularities of road surfaces, impact factors, automatic recording of traffic, test on soil and study of soil mechanise for constructing low cost roads and development of all-weather village roads, and development of all-weather village roads, studies on the behaviour of road under different traffic conditions; incidents of accidents, road safety devices, road statistics; dissemination of information; training of technologies etc.
The Institute aims at economy and durability of roads. It also coordinates the activities of road laboratories and testing centres located at Madras, Calcutta, Lucknow, and Patna. The Institute is financed by the Ministry of Shipping and Transport and has liaison with other research and experiment stations and engineering colleges of the country.

(iii) Border Roads Organisation -

The Border Road Organisation was established in March 1960 for accelerating the pace of economic development in the North and North-Eastern borders by making these areas accessible through the development of arterial routes.

URBAN ROAD TRANSPORT IN INDIA

Nature and scope of city Transport -

The nature and intensity of transport problems in the city depends upon various factors like the distances to be covered, nature and volume of trade, nature of industries centres, size and nature of population, administrative offices, pilgrimage centres, colleges and universities, courts, nature of feeder transport etc. In cities like Bombay Calcutta and Delhi where long distances are to be covered fast and cheap transport services is required. Similarly, high populated, industrialised, commercialised cities or places of tourist interest or cities which are big centres for sending goods and passengers outside on
regular basis require much more speedy, cheap regular punctual means of transport having large capacity.

The movement of labour to factories, businessmen to the shops, employees to offices, students to the colleges and various such groups who have go every morning and come back every evening is a stupendous task. Everyday thousands of persons visit big cities for marketing, attending colleges, going to hospitals attending courts or other offices, tourists, salesmen and distributors, and like wise move out through the railways and motor buses. These cities need passenger transport services for this purpose, i.e. city transport service for feeding motorbuses. In cities, therefore, the nature of passengers transport requirement is much more complex and, hence, speedy, frequent, flexible, cheap, convenient and punctual passenger service is necessary.

Similarly, the nature of goods transport requirements of a city is also very complex. Transportation is required for various purposes. If the city is a big industrial centre, the transport is needed for collecting raw material and sending finished goods, and for providing feeder services to, motor trucks, and for providing feeder services to, motor trucks, for distributing the products throughout the marketing centres, and for various other purposes like transferring goods and household properties from one place to another, and for residents of the city to bring items of daily use etc.
The requirements of city transport are varied. Throughout the day and night transport means must be available at all the centres of the city for carrying persons and goods to different places. The volume of passenger and good traffic is very large, particularly in big cities where electric trains, tramways, double-decker busses, taxis, scooter, rickshaws, togas and various other means of public transport services taken together sometimes fail to provide adequate transport service. Besides, a number of private buses, private car, scooters motor cycles, cycles etc. also supplement the public means of transport.

SIGNIFICANCE OF URBAN TRANSPORT

Transport is a basic necessity. This is more true in case of big city. We examines its significance as follows:

(i) The city is spread over a wide area. The housing problem is very acute and it is not possible to get residential accommodation in the crowded area. Even if to some extent it is possible it will create over crowding, congestion etc. and create other socio-economic problems. Efficient transportation system enables people to live at distance places.

(ii) The city requires cheap transportation services for carriage of goods and passengers otherwise a large amount has to be expended on transport cost.
(iii) City transport must also be adequate, particularly at peak hours in the morning and evening to avoid over crowding and rush.

(iv) Since the people have to travel long distances, fast service is essential in the city. Motor transport and tramways can provide it.

(v) For maintaining law and order, extinguishing fires, avoiding accidents, traffic control in busy and crowded streets, efficient system of transportation throughout the city is needed.

(vi) City transport services are feeders to motor, trucks, Buses etc. If the efficient transport services are not available, the railways will not get traffic and the passengers and shippers will be put to hardship.

(vii) For feeding the factories with raw materials and distributing products, for Mandis, for market, regular and cheap city transport is essential, otherwise the whole structure of commerce and industry will collapse. In brief, the significance of city transport is great in all walks of life economic, social or political. The city life will become miserable if efficient and cheap system of city transport is not available.
Means of Passenger Transport by Roads-

The various means of passenger transport are as follows:

1) **City bus services**: In all the big cities of India, municipalities have provided city bus services for passenger transport. The city bus services are either managed or controlled by Independent Corporation like DTU of Delhi or BEST of Bombay, or are directly governed by the municipalities. The main object of urban transport is to provide door-to-door services regular and high volume of traffic and good system of roads. The efficient and cheap city Bus service is really a necessity for poor and middle class people.

2) **Motor Taxis and Scooter Rickshaws**: The use of motor taxis is limited only to the big cities and for visiting some places of tourist interest. They are visiting some places of tourist interest. They are mainly used for local transport in big cities. Since their charges are very high, they are lived either by very rich people or by other persons in case of emergencies. They have carrying capacity of four to five persons only.

3) **Motor Car**: The use of motor car is also increasing in Indian cities. But this is only a private means of transport and can be afforded by the wealthy persons, as its running and capital costs are high.
4) **Scooter and Motor Cycle:** - The use of scooter and motorcycle in the cities is rapidly increasing. They are handy, convenient, fast and cheap means of transport.

**ROAD PASSENGER TRANSPORT POLICY**

The making of public policy has two aspects. The first is to evolve policy objectives within a given social, economic and political environment. The second is to identify the appropriate instrument to achieve the policy objective. In addition, public policy in a particular sector should supplement and integrate with the general policy framework. Among the infrastructures needed for social and economic development, transportation occupies an important place. It brings people together, enables distribution of commodity and services evenly among all places and acts as a catalyst for improving the overall quality of life. The main thrust of the Road Passenger Transportation policy is to improve the law mobility index in the country.

Nationalisation of passenger road transport is normally undertaken in terms of specified areas or routes. Typically, in selected area with in the state (usually districts) the franchise for passenger road transport operation is given exclusively to the public sector road transport organisation.

**Area wise Nationalisation—**

Under the area wise scheme of nationalisation only the state transport undertakings are issued with temporary or permanent permits to operate in the following types routes inside the selected districts.
(a) Routes that start and end at two points in the selected districts.

(b) Routes that start/end at some point in the selected district but end/start at another point in another district of the state or outside the state.

(c) Routes that start and end at a point in any other district and end/start any other point in some other district but with a portion of the connecting route falling within the specified district.

If any private operator is already in possession of permits to operate in one or the other of the above categories of routes, such permits are cancelled at the time of nationalisation of such routes.

**ROUTES-WISE NATIONALISATION**

The route-wise nationalisation means that all permits, whether temporary or permanent is issued only to the state transport undertakings. If any private operator is in possession of a permit on such route, the same is cancelled. However, provisions are sometimes made in the scheme of nationalisation to allow private operators to overlap on a segment of the nationalized routes. This mainly done where the state Transport Undertaking are unable to satisfy the entire traffic demand.

The philosophy behind the nationalisation of passenger road transport, whether in an area or on a route, is to make a state Transport undertaking assume the full responsibility for satisfying the total traffic demand in a given area/route and thereby avoid wasteful competition among a number of operators.
Part - Two

BIBLIOGRAPHY
ROAD TRANSPORT, ACCIDENTS

1. SARKAR (A K) and DOMUN (V). Analysis of accidents on an accident-prone road stretch and suggestion of remedial measures for a few selected location. *Indian Highways*. 23,2; 1995, February; 39-49.

The fast growth a road transport has been associated with a steep rise in the number of accidents. The accident analysis for the period between 1991 and 1994, shows that about 66 per cent of the accidents occurred on intersections. Detailed examinations showed that a number of intersection were deficient in terms of sight distance. In most of the cases the steep stretch just preceding the intersection resulting in high speed of the approaching vehicles were responsible for the accidents on the intersections. Based on the analysis a few low-cost remedial measures have been suggested to reduce the number and severity of accidents.

----- -----, ------, KERALA


In India, the cost of all types of accidents is estimated at 0.29 percent of the national income. Whereas in developed countries it was up to 0.70 percent accident cost estimates for other developing countries varied between 0.3 and 15 percent of the gross domestic product of the nation. In Kerala the total cost of accident is estimated at Rs.136.07 crore per annum and the average cost per accident came out to Rs.50,055 at 1992 prices. It is felt necessary to carry out detailed accident cost studies for different parts of the country. Accident cost need to be estimated for urban and rural areas separately.

Geographic Information system (GIS) is increasingly being recognised by professionals dealing with geographically referenced information as the most promising technology for spatial analysis. Transport planners and road safety engineers can use this technology effectively to analyse accident trends and profiles with greater ease and accuracy. Correlation of accidents with ambient conditions can be studied and modelled with details and therefore greater certainty. It describes an experimental project, which used GIS technology to manage an accident database and the development of various application modules for interactive analysis of accidents.


The conventional approach towards agricultural transport focuses mostly on motorised transport. This approach is too narrow because it does not reflect the transport requirements and purchasing power of small-scale farmers. It includes not only roads, but also paths and tracks; not only tracks but also intermediate means of transport such as donkeys, bicycles and animal carts can considerably improve agricultural transport. Even though the effects of an appropriate approach on agricultural production, marketing and income can be significant, it is more often rejected by decision makers as primitive and backward.

Fixation of bus fare in transportation is more political than an economic decision. Economic Transport Service from the point of view of common man assumes affordability of fare in relation to the income. Transportation should reduce fare in slack reason to cover operational cost which will help them to attract passengers to earn more revenue. Objective of transportation system should be such that more and more people shall patronise transport bus services.


Bus Transport pricing is regulated under section 67(1) of the Motor Vehicles Act 1988 under which the state Government can issue directives to the State Transport Authority regarding fixing of fares including the minimum and maximum for stage carriers and contract carriers. There is an imperative need to bring about uniformity in fare structure for bus operation in our country. This can be done only if there is a central organisation to regulate the pricing policy of bus operation. Appropriate methodology for determining cost of inputs has not been laid down in most of the states. There is no inbuilt system so far to provide for an increase in fares commensurate with the increase in the cost of inputs. Hence to evolve a common base for fare fixation and an automatic mechanism to facilitate State Transport undertaking/bus operator for fare hike as and when there is price-hike in input cost of bus operation, is inevitable.

Buses are the major mode of transport in big cities and the dependence on this mass transit system may as high as 60 to 70 percent in terms of passengers served. The dependence on busses is increasing and any improvement in bus transport system would increase the urban mobility and the travel comfort greatly. In this way the introduction of automatic transmission to Indian Industry will be a great boom to our transport corporation and bus manufacturers. An automatic transmission is a constant mesh type transmission capable of changing ranges by itself depending upon the load and speed the vehicle. By using automatic transmission frequent failure occurring in some of the major component of the manual transmission can be prevented and better usage of the vehicle can be achieved.


Bus has played a major role in transporting people in the 20th century; it can play an even greater role in the 21st century. Public policy should aim at strengthen existing institution rather than running them down in the name of privatisation. While competition is necessary it cannot serve the society unless there is level playing field supervised by a strong and independent regulatory mechanism. There should be greater transparency in the cost incurred and whatever costs are attributable to social obligation must be reimbursed. If these are ensured, India and countries similarly placed cannot only travel hopefully into the 21st century but will also arrive safely.

In this articles, describe the development of an overall performance index for Inter-state Transport undertakings (STU) comparison. While few identified and important indicators have been taken for comparison a factors analysis has been carried out to identify the important indicators from the extracted factors, which could account for most of the variances. This methodology helps to identify the areas of strength and weakness of an organisation and to initiate the necessary corrective action by the management. This methodology has been applied for inter STU comparison of all STUs, in Tamilnadu.


Electromagnetic retarder is an auxiliary breaking system operating on transmission line. This is latest technology used in developed countries. The Pallavan Transport Corporation (PTC) Madras used this equipment on a trial basis in some of their buses and the results of the trial were encouraging. The experiment shows that with the use of retarder there was considerable improvement in the service break performance as well as the life of break linings and tyres.


Allocation of buses according to the hourly scheduling based on the journey purpose has been suggested with the use this integrated goal-
programming model, during from the model of bus scheduling and allocation of buses in Manipur. The major problem of mass transportation during peak periods can be solved with the allocation of 41 and 30 buses in the morning and evening peak periods. It is suggested to introduce the concept of cumulative number of buses i.e. running more hours per day with change of crew duties.


The mini bus is a costlier mode of transport. Introduction of mini bus needs some additional justifications like consumer's preference or the small size of the commuters at any particular time interval. This factor should be taken into account before introducing mini buses in a crowded city. Indiscriminate use of mini buses will increase the cost of transport and entail in efficient use of resources. The transport policy should be carefully framed with an optimum mix of standard buses and mini buses avoid cost inefficiency and ensure at the same time, transport amenities to the passengers.

13. PONNURAJ (S) and RAJKUMAR (C). Passenger perception of omnibus services. Journal of Transport Economics and Policy. 34, 3; 1992, September; 261-79.

An efficient transport system is essential for the movement of both goods and passenger. It helps in the spread of education, new ideas and technology into areas including rural locations. Apart from the movement of passengers and goods, transport is also responsible for carrying news and messages, there by becoming an indispensable means
of communication. The reasons for the poor quality are the poor maintenance of buses, narrow leg space. The buses are often dirty creating health hazards and no clean drinking water is provided in the buses. The omnibuses are however a refreshing contrast to the government owned buses. The omnibus operators constantly endeavour to improve the quality of their services. They aim at passenger comforts and keep their buses clean. Since, these buses are well maintained, breakdowns rarely occur. They are time-conscious though they charge higher fare, the public patronise them, as their service is good.

----- -----, OPERATIONS, DEREGULATION


The Transport Act 1985 allowed on the road - competition between bus services after 50 years of protection through road service licensing. It examines the status of regulation in control bus industry and also reviews the impact of deregulation during the period of 1985 to 1990 on fares, costs and subsidies, operations, patronage on the bus industry.

----- -----, PRIVATISATION, CHALLENGE


Privatisation in passenger road transport is not in the offing. It is very much there unofficially. State transport should identify their role and tune the supply of bus services according to the needs of the travelling public. The two cases discussed here, highlight the point and such service will be responded whole-heartedly by the people. Their overwhelming response will not only reduce the deficit faced by the
transportation but will also generate surplus. This is an opportunity for State Transport if they accept the challenge of privatisation.

----- -----, -----, DELHI


Nationalisation of road transport was aimed at providing citizens a reliable, affordable and comfortable public transport system. In spite of subsidies, monopoly over the routes and frequent writings. If a loans and dues, state road transport corporations in most of the states are financial wreaks. The increasing population in a mega polis like Delhi has put pressure on the city bus service, which is already in slambles. The study evaluates the impact of privatisation on the commuters, road users, city traffic and the DTC itself.

----- -----, -----, ROUTES, OPERATION


The total cost, average cost and marginal cost data in respect of sixteen routes operated under Kerala Road Transport corporation in the Thiruvannthapuram city bus depot have been collected, analysed and in corporate in the cost metric to estimate the operational cost. The optimal bus utilisation for the minimisation of the total cost comes out to be 382 kilometres per bus per day, where the average total cost and marginal cost are equal. Also the average total cost at this optimal situation is the lowest at Rs.5.15 km. while operating the services on the basis of minimisation of the total cost, the losses incurred must be compensated
by providing adequate subsidy because when fares are deliberately kept low and social obligations are more pronounced even a very efficient organisation will be a loss maker.

--- RESEARCH ---


It highlight the role of Operation Research (O R) in routing of urban public bus transport and also theoretical concepts involved in routing. An effort has been made to show how the urban form and structure can be used as an approach for designing efficient route structure for operation of public bus transport system. It define the problems in which the transportation planner may have to face while attempting to use operation Research techniques in rationalisation of routing of public bus transport network.

--- PERFORMANCE ---


Bus transport system plays a vital role in the movement of passengers today. In the present study three methods have been developed to measures and evaluate the route wise performance of some of the inter-city routes operated by the corporation. The three methods developed and used are the performance rating method; the cost income comparison; and the earning potential realised. A comparative analysis of the three methods has indicated consistency in performance rating. It
is suggested that route-wise performance monitoring is essential in order to improve the overall performance of the corporation.

----- -----, -----, SCHEDULE


Managers of transport organisations generally face several challenges in planning and operation of the fleet. They invariably require fleet augmentation from time to time to cater to the increasing demand. However, the crucial decision-making lies in the allocation of the augmented fleet to various routes, and the augmented fleet in many cases cannot be distributed equally on all the routes. It has to be, on the assessment of need and utility and additional bus offers many particular routes. Thus, it becomes obligatory on the part of the management to optimise the utility of the fleet giving the much needed consumer satisfaction. In this context, the concept of marginal ridership is introduced and its utility is explained. With this the overall requirements of the fleet size can also be assessed at macro level.

----- -----, -----, SERVICES, QUALITY, ASSESSMENT


The assessment of quality of services provided by the nationalised and privately owned bus system in Tamilnadu. The assessment has been the outcome of a sample survey of 13,300 bus users conducted by the Institute of Road Transport numbering at 27 selected location geographically spread has over the state of Tamilnadu. Public transport
system has been rated better on aspects like safety, schedules adherence and punctuality while the private sector scores over the public sector on crew behaviour, vehicle cleanliness and comfort.

--- -----, -----, ----, DELHI


It presents a comparative study of assessment of the quality of service provided by private and public bus transport in Delhi. The assessment has been the outcome of the response of bus commuters of Delhi to a few sample surveys in which samples were collected randomly at different locations. For comparison purposes, weighted Attributional Rating has been computed for various travel attributes of the public as well as the private buses. The findings are useful for future planning of the transport services.

--- -----, -----, STATE ROAD TRANSPORT CORPORATION, ANDHRA PRADESH, HYDERABAD, METRO SERVICES


To cater to the needs of different sections of travelling public in metros, APSRTC has introduced two classes of Luxury buses viz. metro liner and metro express. The physical and financial performance of these two services in the Hyderabad region. Physical performance is assessed by analysing vehicular utilisation, vehicle utilisation, occupancy ratio, fuel consumption and quality of services. Financial performance is evaluated in terms of revenues and costs incurred, and comparing the actual
earning per Km with break even earning per Km. The analysis show that the services have not only achieved the targets but exceeded them. These metro services have greatly contributed to the net revenues of the Hyderabad city region of APSTRC.

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Kerala State Road Transport Corporation (KSRTC) is one of the oldest undertakings operating bus services throughout the state. Its growth, however, slowed down since 1985, and from 1990 the level of nationalisation in the state has come down to 20 percent. The performance has been measured by using a set of indicators relating to physical performance financial performance and quality of service. Indicator values have been normalised by computing an index to make the comparison across the undertakings and units of KSRTC. The overall performance of KSRTC is found to be below average and concerted efforts are required to be made to improve its labour and capital productivity ratios. Decentralisation of operation has been suggested as one of the measures to improve the performance.

----- -----, ----- ----- -----, MAHARASHTRA, PUNE


In the liberalised competitive environment, Maharashtra State Road Transport Corporation (MSRTC) is continuously in the process of becoming a dynamic business organisation. The views of the passengers
are crucial in this regard while finalising any strategy. This study was conducted during August-December 1997 to find out as to whether the passengers in and around Pune perceive the quality of the services rendered by MSRTC by Zeithmlet al was used for the study. This tool focussed on five general dimensions of service quality viz. Tangibles, Reliability, Responsiveness, Assurance and Empathy. The study showed that in a scale of 7 there is a gap of -1.45 between the perception score of 4.00 and passengers expectation of 5.45. The highest gap of 2.32 was found in responsiveness, while the lowest gaps was in Tangibles. Passengers gave first importance to the Reliability dimension, followed by Responsiveness while Assurance was given least importance.

----- ----- , -----, STOP, SPACE


Bus transport system has become a major mode of transport in big cities. The dependence on buses is increasing and any improvement in bus transport system would increase the urban mobility and the travel comfort greatly. The optimum spacing and location of bus stops are studied and their impact on passenger travel time is examined. A model was developed to estimate the optimum number of bus stops on a given route. Boarding and alighting time of passengers was also studied. The regression analysis showed that each route has specific characteristics and any generalisation for the city, as a whole must be taken carefully. The average boarding and alighting time per passenger was found to be 6.5 second. Vehicle dwell time was also analysed and a model was developed to estimate the capacity of bus stop.
Bus systems in small cities are widely believed to produce air quality, energy conservation and traffic congestion benefits by inducing car-to-transport mode shifts. It concludes that question raised by the unexpected effects of transport and the lack of adequate data to evaluate similar systems in other cities should be addressed by collecting and analysing additional data. Otherwise transportation planners and public officials may be misled by inadequate or invalid information when formulating transportation policy or committing public resources to conventional bus system.
The State Transport Corporation (STCs) in Tamilnadu are meeting the bulk of the ever increasing traffic demand the requirement of the future also will have to be met largely by these Road Transport Corporation (RTCs.). The Government should therefore realise that without an efficient public transport system state cannot progress. A pollution free environment cannot be maintained and petroleum products cannot be saved unless the STCs are supported and improved. The challenge before the STCs is to improve the quality of service to the passengers. Image management cells should be created in every corporation to improve the operational aspects in the eyes of the commuters.

What matters most for the bus passengers is the proper and punctual running of buses. Enroute monitoring of buses has been ineffective primarily because of the magnitude of the effort and the cost required in attempting such a move. However GPS based Intelligent Transport Systems provide the possibility of monitoring the movement of vehicles at an affordable cost. It has been brought out that an efficient vehicle system would require the integration of two modern technologies viz. the Global Positioning System (GPS) and the Geographical Information System (GIS).
URBAN, JUSTIFICATION


Urban public transport, particularly the bus systems have historical link to kind of social obligation and therefore, strict economic principles of commercial operations cannot be applied. The vast economic disparity and affordability of urban dwellers supports the argument for subsidised transport, but not all urbanities deserve this subsidy. Subsidy can be linked to its legitimacy through efficiency and effectiveness of the operation.

PRICING POLICY


The fare structure set for urban bus transport system is complex and it does not follow the economic principles due to many social, political and economic considerations. However, the transport undertaking should study scientifically the economic situation faced by them. They should follow the first basic principle for pricing that it must be cost based and the user should pay at least the full marginal resource cost of transport. It is also suggested that there should be a unified Transport Authority, which can play the vital role of a facilitator, coordinator and negotiator for urban bus system and besides other issues. This authority should look into the fare structures in the light of the proposed guidelines, which will definitely lead to an acceptable fare structure.

CHALLENGES

More than a decade of fundamental change in public transport in India has resulted in many achievements, many disappointments, and many continuing problems. Short term demands, for high returns have led to the slashing of costs and to great productivity improvements. At the same time as there are high levels of investment in new vehicles and upgraded rolling stock. Marketing and human relations issues have been increasingly marginalized in many places. The development of a longer term, market driven, customer-focused strategy is therefore an urgent priority.

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The various optimisation techniques used for a transportation system are based on a single objective criterion: cost minimization. In formulating any transportation model for a city transport system, some peculiar characteristics of the system must be taken into account each route separately and the allocation of buses on each of them. Also different models can be formulated for routing and scheduling of buses based on different objective criteria. Here, goal programming is used for the optimum allocation of buses on various sectors based on route lengths, traffic volume and population density. The technique can also be applied for scheduling of buses based on journey time and journey purpose so as to enhance the efficiency of the transport systems.
COMMUNITY, NEEDS

35. DAY (A). Meeting the needs of the community: Social issues in road and transport planning. *Indian Journal of Commerce*. 51, 1; 1998, March; 73-82.

Social issue in road and transport planning to assist transport authorities to be better prepared for an able to respond to, the community of the future. Social issues are defined widely to include those matters, which are features of community as well as impacts on community. The importance of social and ecological responsibility in transport decision-making is underlined present social trends are described as a basis for establishing a picture of the society of the future, acknowledging unforeseeable phenomena. Key among issues needing more attention is community values and the causes and influence of stress attributable to the transport system. Transport authorities can prepare themselves to respond better to the needs of the future community.

COST, SOCIAL


It contains a welfare economic analysis of road transport's external effects. The road transport activities give rise to a wide range of external costs. However, there are no external benefits associated with individual road transport activities, which might compensate for such effects. Therefore, road transport volume will in general be beyond the optimal levels. It describes a conceptual framework for the analysis of environmental external costs. This framework is used for the evaluation of the existing empirical work on road transport's environmental external costs. It is concluded that most of the studies carried out in that field will provide an underestimation of road transport's external costs.
Finally, some attention is paid to empirical estimates of road transport's accident costs.

----- -----, CNG

37. NAIDU (J M) and MAJUMDER (P P). CNG: A viable alternative? Indian Highways. 27, 9; 1999, September; 79-98.

The key energy challenge facing India today is preventing bottlenecks in energy supply from constraining economic growth the transport sector in India is a major energy - consuming sector, particularly of oil. The dependence on liquid fuels in road transport sector is so deep - routed and is increasing exponentially as the number of vehicles on road is shooting up. This dependence on oil, in the coming years would be still more to satisfy the needs of transportation. Beside dependence on oil, another problem is environmental pollution that our modern society is facing today. The exhaust from liquid fuel is diminishing the air quality day by day. The increasing respiratory diseases, increasing hospitalisation, decreasing visibility during peak hours in Indian metros and other cities, makes sense to find alternatives to improve the urban quality of life. Hence it is the time to reduce dependence on liquid fuels by switching over to alternative fuelled vehicles. It describes the need for switching over to CNG operated vehicles, the safety aspects, techno-feasibility of CNG conversion, performance of CNG vehicles and economics of CNG vehicles.

----- ----, DEVELOPMENT, FINANCE

38. ARAVINDA. Financing road development Indian Highways. 23, 5; 1995, May; 96-109.

Growth of our road length and capacity have not kept pace with the growth of the general economy of the National or the growth vehicular
traffic which has pushed up the cost of road transport operation in India. The problem of inadequacy of funds has to be mainly solved by increasing the level of public investment in this sector through the allocation of a higher proportion of the revenue resources contributed by the road transport sector by way of existing and new taxes, duties cases etc. private sector investment should also be encouraged. Given the crucial role of road transport for our economy, the road infrastructure development can not be allowed to lag and the Government itself will, have to fund adequately for the development of road/Highway sector until the private sector can organise itself to take on an increasing share of this responsibility in course of time.

--- ----, ----, INDIA


The enormous growth in total traffic volumes and the shift in the market share of traffic in favour of road transport have important implications for policies related to the road transport sector. While the importance of an adequate road network hardly needs to be reiterated, the essential thrust of policies would have to be on creating a more competitive regime in order to improve the productivity of the road transport systems. The State Road Transport undertaking will have to compete with the private sector even though the former may continue to play a dominant role. Ultimately, it is only an efficient public sector that can help the Government meets its social obligations.
Transport infrastructure in India largely consists of road and railways, other modes, like air and inland water transport having minimal and supportive roles. Between roads and railways, road transport has evolved as the preferred mode both for people and goods. Road transport is carried by a vast network of about 3.3 million Km of roads in the country. The whole road network is seriously capacity-constrained and deficient, which has adversely affected traffic movement, especially that of goods. Development of roads is, therefore, necessary for efficient transportation, thereby supporting desired economic growth.

Rural transport provides mobility on which a number of developmental programmes depend. These can practically be no revolution in other sector without a revolution in road transport. To improve the provision of mechanised transport, the basic need is in terms of good infrastructure in the shape of proper roads. The Government of India had formulated road development plans from time to time with a view to connect rural areas with the main stream. The rural transport has to be linked to rural development. State Transport Undertaking has to prepare business proposals and feasibility project, which should receive proper attention for allocation of funds under rural development schemes. It will be the proof of our business acumen, if we can link rural transport to the rural development efforts of the nation.
42. SINGAL (B I) and SACHDEVE (Y P). Sustainable development and mass transport. *Indian Journal of Transport Management*. 21, 2; 1997, February; 83-8.

The issue of sustainable development mainly arises from inadequate supply of mass transport services and rising use of personalised motor vehicles. The existing urban travel patterns are not sustainable in the long run. Although it would be possible to reduce vehicles emissions by technologically improved vehicles, the problems of road congestion, excessive energy consumption, equity and road safety would still remain. The provision of adequate and efficient mass transport system in our cities accompanied by various measures to curb the use of personalised motor vehicles can only solve all these problems.


Urban Transport is a serious concern in developing countries like India, where public transport remains the most important mode of travel in urban areas. Vehicle scheduling plays a vital role in public transport system management. Bus fleet assignment on a route to meet a required timetable pattern on a route. The condition under which a saving of a few buses in the fleet is possible by inserting express and partial services in the scheduling with alternative fleet assignment strategies.


In India Transport is undeniably a crucial component of the infrastructure needed for the developmental process. Such a situation
resulted in deterioration of the health of their fleet, which forced many of the transportation to defer their replacement plans and the rise in the average of their buses. Inability to augment, the fleet of transport in its turn, has resulted in both legal and illegal competition, which lead to a general decline in the service quality and dissatisfaction among passengers. To improve the quality and reliability of there services, transportation need to augment their fleet and match their services to the needs of the passengers. Hiring of buses is a strategic alternative at the prevailing situation by which Transportation can augment their existing services without investment.

MAINTENANCE


In this article the author highlight the importance of a number small parts found in each system of a bus which contribute in a big way to increased life of the assembly or spare part and there by contribute significantly to reduce maintenance costs, greater availability, reliability and safety of that but which in turn have a direct bearing on passenger satisfaction and financial viability of the undertaking.

UTILISATION


Vehicle is most important asset for a State Road Transport. The major portion of the total assets of a road transport is in the form of fleet, constituting the operating capital. Increase in the fleet utilisation is the prime condition for improving the operational and financial performance of a road transport. Fleet utilisation, also termed as
vehicular utilisation, is the ratio of the number of vehicles on road to the
fleet held by the under takings. It is always expressed in percentage and
indicates the total vehicles actually utilised for operation.

----- -----, FRAMEWORK, POLICY

47. APPARAO (V). Need for a suitable policy framework for transportation:
125-34.

Road Transport is a great importance both for movement of passengers
and goods. Transport provides one of the basic infrastructure facilities
for economic development of backward areas. Though importance of
road transport is well known, the ownership policy issues, which play a
crucial role, are not so far fully researched. These policy issues of
ownership decide the service levels especially in situations where bus
transport operations are justified for social reasons but un remunerative
financially from the operator point of view. The ownership issues of
public utility services have profound effect where there are uncovered
costs to the operators from the fare box collection, while there are
external gains to the society as a whole.

----- -----, FREIGHT

48. DHAWAN (G). Road freight transport. Yojana. 32, 10; 1988, June; 19-23.

The Road transport which can be exploited in the cheapest and best
possible way to transport various goods to different destination in the
country. Perhaps this may be the reason why more then eighty five
percent of the total goods are being transported through heavy vehicles
playing on roads. The road freight transport, which is the backbone of
goods transport in the country, is facing numerous problems today.

It deals with the effects of lean production for the inter firm supply traffic. Generally predicted large increase of freight transport especially of road freight traffic is not the result of the new production methods, but is caused by other factor, i.e. the liberalisation of the transport sector or the extremely low transport costs. Lean production in the sense of a total rationalisation of entire value chain could actually lead to decrease of inter firm freight transport, because there is a general tendency to reduce the number of direct suppliers. But there must also be a clear diminishing of the average transport distance through regional concentration of production and supply relations. However, an essential precondition for this would be the drastic increase of transport costs.


Road goods transport is a vibrant, yet neglected, part of India's transport section. The recent strikes of goods transport operators have amply demonstrated the stranglehold this seemingly unorganised section of the industry has over the entire economy. There is multiplicity of agencies, which seek to control road goods transport. If road goods transport had been properly natured and actively supported by appropriate technological innovations in vehicle manufacture and by a growing road network of high quality, it would have served the country in a much more powerful and efficient manner. The scale of investments being relatively low and the unit size being small, road goods transport
required outside assistance for the improvement of skills of driving and maintenance.

----- -----, HUMAN RESOURCES DEVELOPMENT.


The changing economic environment will pose new challenges for Human Resources Development (HRD). In the case of public utilities as transport, there should be a cautious blend of what is relevant in the existing set up and the new equation for the future. The road passenger transport industry is divided into organised and unorganised sectors. The unorganised sector consists of small and unviable units of operations and is not amendable to corporate HRD intervention. In the organised sector, solely consisting of large public sector organisation HRD in adequate and requires total revamping. There should be a 3-tier approach to suit the supervisors, workers and managers. At the same time, trade unions must be involved in evolving strategies, which will help human development as a means for improving productivity and performance.

----- -----, -----, INTELLIGENT, TRANSPORT SYSTEM

52. SATISH CHANDRA and PARIDA (M). Intelligent transport system comes to India in the new millennium. Indian Journal of Transport Management. 24, 2; 2000, February; 107-110.

The Intelligent Transport System (ITS) as the solution to all major transportation problems like traffic congestion, accidents, speed bottlenecks etc. The possibility of ITS being used on Indian highways in the next millennium. It is felt that if the policy makes and road
development agencies in India decide, the economic feasibility may not come in the way of introducing Intelligent Transport System on India's selected corridors. A beginning can certainly be made by the privatisation of certain routes.

--- ---, ---, PROBLEMS, ECONOMIC.


The problem of roadways is not an isolated one. It is rather a symptom of gross imbalance in our transport economy, which makes the transport system inefficient with no more cost. The approach of the roadways authorities is generally ad-hoc and at variance with their corporate mission of building up a modern roadways system with sufficient capacity, based on an optimum intermodal mire providing transportation at the least cost to the society.

--- ---, ---, RURAL


The passenger road transport is left to the private operator, there is very possibility that they will concentrate only in the area where there is a heavy demand and only on the profitable routes. They will not think in term of extending the service to the remote areas. No doubt, the Government can exercise its power of issuing licence to direct these operators to provide transport service in backward and underdeveloped areas also. It is therefore that the Government should take up the responsibility of developing and providing passenger road transport. It
should evolve a time-bound programme for building roads and for the nationalisation of road transport.

----- -----, -----, **SCENARIO 2021**


India is experiencing rapid and massive urbanisation. Metropolitanisation is its feature; urban transport is an important sector in the sustainable development of urban areas. Inadequate urban transport leads to a number of problems like congestion and delays, accidents and pollution. Urban transport is a major resource consumer in terms of land, capital, energy etc. Urban transport demand is large in size and increasing at geometric rates. A number of national sectoral policies affect urban transport. The vehicles on urban roads are increasing. Urban traffic and travel characteristic indicate trends towards increased motorisation. For rational planning development, operation and management of urban transport there is a need for a National Urban Transport Policy. There is a need to have a vision of urban transport in the 2121 century, formulate objectives and implement programmes. An agenda of action both at the national/regional and local level is called for.

----- -----, -----, **URBAN**


The urban transport scene in the country, in particular has been the worst sufferer, since water and shelter had to receive priority and were the major recipients of the State investments. As a result there has been
uncontrolled growth of the Intermediate Public Transport with the attendant problems of road congestion, fuel wastage and air pollution. The available urban mass transport services are overcrowded, unreliable and involve long waiting periods. As a result, there is a massive shift to personalised transport especially 2 wheelers and also proliferation of Intermediate Public Transport i.e. three wheelers and mini buses. The urban transport infrastructure thus needs to be approximately doubled in the next 5 to 6 years time, if the gap in the demand and supply has to be eliminated.

----- -----, -----, COST AND PRODUCTIVITY


It tries to evaluate the productive performance of transport systems in India. It makes intermodal and intercity comparisons, and identifies economics of density; vehicle capacity and higher vehicles speed as essential factors in performance. It finds that costs and subsidies have an effect on performance. The results of intermodal do not fill a significant gap between buses and underground rail. Some transport systems are offered as good models.

----- -----, -----, NATIONAL POLICY


All developing countries are facing rapid urbanisation and India is no exception. Unfortunately, such urbanisation has been accompanied by an even faster growth in the number of motor vehicles on Indian roads, manifesting itself in the form of severe congestion and air pollution. These have seriously affected the health of the people their quality of
life and the productivity of the economy. Yet, a coherent and comprehensive policy to deal with these problems is conspicuous by its absence with the result, government initiatives have only been piecemeal efforts can only have a very limited impacts. It suggests a comprehensive framework of mitigation. Strategies that should form a part of an urban Transport policy for India.

----- -----, MANAGEMENT

59. KAUJALGI (V B). Emerging areas for operation research application in road transport. Yojana. 33, 8; 1989, May; 38-45.

Numerous issue in planning, operation and management of road transport have been subjected to or techniques in the past. The advancements in the information technology, which are expected to bring about revolutionary changes in the road transport scene, offer new challenges. The new techniques offer variety to tackle the problems characterised buy conflicts, ambiguities and emotion such as that of road transport management. The advances in neural networking, expert systems and computer controlled traffic operations indicate exciting possibilities for developing new generation of OR models and applications. The road transport problems like fusil fuel shortage, air and noise pollution control and maintaining urban bus services are some of those to be analysed through or method urgently.


Government have at their disposal two main types of instruments to contain the external effects of transport: Standards, and taxes. While taxes are to be preferred from an efficiency viewpoint, it is nevertheless
striking that standards are used more frequently. This also holds true for policies with respect to travel speeds: as far as speed is concerned, standards (speed limits) are in use almost universally in road transport.

61. TILLOTSON (H T), KARALI (R) and ODKI (J B). Road maintenance management. *Current Science*. 80, 1; 2001, January; 18-25.

Today, there is a need for greater cooperation between the specialised areas involved in the provision of roads and road transport. It is not concerned with the even wider view implicit in any concept of an integrated transport policy. It argued that well-established definition of Pavement Management System (PMS) neglect the planning and design that precede the construction of new roads and the whole life approach to optimisation.

----- ----- ----- ----, ECONOMICS


Most of the city bus organisations are running in loss today, with continuous pressure on them to increase the service level. Transport corporations are forced to increase their operation, which ultimately add to their losses. Since the fare hikes, which are required for bus operation do not cover the cost hikes. The prices of the inputs are beyond the control of this management. In such a situation, one of the measures open to the management is to minimise losses by controlling the personnel cost, which can be achieved either by increasing the manpower productivity or by salary level. The utility of computers in manpower planning, recruitment policy, retraining and its effect on the total profitability of the organisation.
A conceptual model is described for the application of quality management to the realm of heavy vehicle transport operations. The model is based on there being a second order customer supplier relationship between the road transport authorities and those who operate heavy road vehicles. Quality Assurance for the 'product' of safe and productive road use is determined to be the responsibility of the heavy road vehicle operator and to require a Quality Management System (QMS). Though the use of quality Management system the emphasis in heavy road transport vehicle operations becomes one of preventing rather than detecting non-compliance to road use regulations. This approach provides benefit to both operators and road transport authorities.

It is estimated that automobile related emissions account for over 70% air pollution in India. The demand structure of automobile market is experiencing a fast shift. The new regulations coupled with a strong growth in demand pose a major challenge in India in the fuel industry with the Supreme Court order to abide by Euro-I and II (Bharat-I and Bharat-II) for vehicle emissions. There are different types of pollution in the transport sector and exhaust from vehicles is major source of pollution. Vehicle emission causes severe health problems. The environmental degradation due to emission from the vehicles has become a grave concern. The adulteration menace highlights some of
the possible alternatives for petroleum products in India to overcome the existing situation.

----- -----, MONITORING, PUNCTUALITY, METHOD


The extent of patronization of a public transport system is directly dependent on its level of punctuality. Ensuring punctuality puts a heavy demand on the entire operations system. As it requires correct crew performance, correct vehicle performance and correct traffic performance. Monitoring punctuality throws up a big challenge especially in an urban transport environment because of the magnitude of the problem involved. Technology can provide an effective and a cost efficient solution. It is brought out the radio frequency method the punctuality of buses can be monitored at busy bus-stands.

----- -----, OPERATIONAL, EFFICIENCY


Public road transport system is one of the major parts in the entire transport system, which at all times is concerned with operational efficiency. But what is operational efficiency and how it can be measured in order to throw some light on the existing set up becomes a subject with a difference. All these can be measured and the efficiency can be assessed through the proven and time-tested methods.
When public transport is the only motorised transport available, user will spend time and effort to find the information they need in order to use it. Information is becoming increasingly important in the added value of public transport operation. Many public transport passengers are commuters. The masses of commuters their hide the lack of user-friendly information that would allow moving freely on the entire public transport networks. Passenger information includes all items of practical information relation to trip planning and travelling. In addition to the quality of each of these information items, the quality of the passenger information also depends on coherence of the entire passenger information strategy. Technology can help to enhance the quality of many elements of the information system in regard to the generation and/or communication of information. Information technology has entered most sectors of public transport operation. Finally there are techniques, which allow operations to provide dynamic information to the passenger with out installing a centralised vehicle control system.

While India is entering the new millennium it is time to take a critical look on the development of road passenger transport industry in the country. This retrospect has covered a brief history of development of road and road transport in India, mainly, related to auto vehicles. It has also reviewed various statutory provisions right from 1914 to 1988.
Unfortunately road transport in India gets very low priority in the overall planning in the country. The rise and fall of transportation are analysed along with the price hike on the resources required for bus operation. Road safety is a crucial issue today, which is reviewed here from 1980 onwards. The problems faced by this service industry are to be converted into opportunities and should be faced as the challenges before 21st century.

----- -----, PERFORMANCE, SOCIAL ACCOUNTING


Infra structure facilities, viz. Power, transport and communication network, etc. are essential inputs for any country's economic development. Out of these, transport facility is one of the key indicators required for economic development because there is hardly any activity, which is not influenced by transport services. It also determines the fact that socio-economic activity and transportation systems are closely inter-related. Road transportation system assumes a significant position in regional development of any state. Road and road transport are important constituents of any transportation system. A well-developed, cheap and efficient network of transportation system leads to speedy movement of human beings material, and also connects rural population living in remote areas with the mainstream of socio-economic activities. Road transport is all the more important in any hilly state especially in the near absence of other mechanised modes of transport. Hence the functioning of any state largely depends upon road transport.

A time has therefore come when the need for a fresh look at the nations transport policy cannot any further be delayed. The problems of road transport since it is this sub-sector, which moves the country its people and its goods more than any other. It may not have the glamour of other modes but as a beast of burden, it served its purpose more than adequately. Further in no other country, not excepting the advanced ones, could any other mode compete with the road. The sooner road transport is accepted as the most powerful mode of transport is accepted as the most powerful mode of transport, the better it for the entire economy. It is more than time India re-visited its transport policy with the horizons extending up to 2020 A.D.


Transport services are essential for carrying on a nation's economic and social activities. Over the year transport systems especially in our country, have developed marked distortions in resources use resulting in high cost transport systems. Among the several important measures open to bring down the high cost of a transport system are substitution of public passenger transport services by buses and thus arrest the proliferating personalised transport like cars/two-wheelers etc. The public transport is more economic and less damaging to the environment. The country would therefore, stand to gain if, in an emerging competitive environment, the management of public transport
can be improved in order to provide for adequate and efficient services suitable to the diverse needs of the public.

PRICING, COMPETITIVE, ENVIRONMENT


Though transportation in India have made substantial contribution to the state economy during the last over 50 years they never had the freedom to fix a viable bus fare on the basis of their cost of operation. Transport generally face set back, when they revise their faces without consideration to affordability to pay by the passengers. When there was a monopoly, people pay out of compulsion, as there was no alternative mode of transport. Presently, Transport should work out affordability and then operate services according to the needs of travelling public, and then only state transport will be viable and survive in competitive environments.

PRIVATISATION, PASSENGER TRANSPORT


As part of the general philosophy for privatisation of economic activities the privatisation of public road passenger transport services has also been advocated in our country. The state transport differs from one another in their operational and financial performance and the case for privatisation of the undertakings operating well would appear to be rather weak. Privatisation should be considered only where the possibilities of turning around such undertakings are hopeless. Limiting the role of the public sector in this field by promoting the privatisation
should be resorted to only to the minimal, inescapable extent. To ensure that the private sector will play its role effectively and in accordance with the stipulated standards, a controlling presence of the public sector or a regulatory environment would be necessary.

---- ----, PUBLIC, DIVERSITY


Many observers of the transport field believe that the alleviation of road congestion lies in encouraging public transport, using small vehicles operating at high frequency. An unexplored option is the operation of small vehicles catering to high value of time travellers alongside large vehicles serving low value of time travellers. The viability of these two type of vehicles serving the same route. The viability of two modes depends, therefore, on the importance of waiting time vs. vehicles time, the dispersion of the value of time, and the size of the market, when frequency and vehicles size are set optimally, congestion has little effect on whether a single mode or multiple modes should be operated, and should not affect the modal split.

---- ----, ----, FUTURE


Improved public transport services are generally viewed as the most effective means of encouraging transfer from car, especially on urban journeys. Accordingly, substantial public funds are being invested to this end. There must therefore be a presumption in favour of investment in network for walking and cycling and in other measures enabling
journeys to be made by these non-motorised modes well in advance of investment in public transport.

----- -----, -----, HYDERABAD CITY


In a city like Hyderabad where there is no Rapid Transit System (RTS) to transport the large volume of commuter during peak hours. The burden of meeting the transportation needs come on State Transport. The public pressure for a solution to this problem in the twin cities of Hyderabad and Secundrabad led to the introduction of express services, Metro line and Metro express services by the Andhra Pradesh State Road Transport Corporation (APSRTC). Though the service mix strategies adopted by APSRTC has definitely given positive results, it cannot be an ultimate solution as an alternative for Mass Rapid Transit System.

----- -----, -----, PLANNING

77. SATSANGI (P G) and JAIN (D K). Perspective on public transport planning. *Economic & Political Weekly.* 31, 40; 1996, October; 2734-46.

In the wake of wide spread economic reforms in the infrastructure sectors, a significant change in policy has been witnessed towards meeting the rapidly multiplying demands of a growing populace, especially in the transportation, particularly in metros, has been played with a plethora of problems ranging from bad quality roads and improper traffic management to gross deficiencies in over all transportation infrastructure. The problems are further compounded by
the indifference of authorities to seek meaningful and feasible solutions towards addressing the increasing pressures on the transportation system imposed by the unrestrained growth in vehicle population. It provides a conceptual framework for evaluation of policy alternatives intended to augment transportation resources and also presents an argument in favour of a multimodal transport network to meet the expedient needs of public transportation.


It highlights the global level status and Indian scenario of urban public transport operations followed by touching upon the typical problems faced in the urban bus transport operations. It further emphasises on the formulation of a typical framework to evaluate the urban bus transport system and the strategies to be adopted to optimise the bus transport system. It finally suggests the various possible traffic management and policy measures to improve the efficiency of the urban bus transport system operations.

79. WILLIAMS (James C) and MAHMASSANI (Hani S) Determining optima headways in city bus operation: A mathematical programming approach. Transportation Research. 1,1; 1996, January; 47-60.

The problems of public transportation are very severe in urban areas with inadequate internal resources, increasing population growth and ever increasing demand for transport. As a result the transportation are fraught with difficulties to match the demand with limited supply of
vehicles. In this connection vehicles scheduling assumes greater importance as more than half the investment of transport undertakings are in vehicles. The problem of determining optimal headways on a given set of routes with system constraints in formulated as a mathematical programming model and applied in the case of a city transport.

----- -----, REGULATION


Transport sought by people as a basic amenity of civilised existence. Transport binds a society or a nation together. Transport infrastructure is often a barometer of nation's prosperity. Transport and regulation cannot be separated and the greater the concern for protecting the public the more will be the need to regulate the industry. As the industry grows and as both public and private sector complete to operate a variety of modes of transport, what is required is not less regulation but more. However, 'more' will have to be tempered with positive, progressive and modern system. The tempo of economic development triggered by liberalisation, should be adequately supported by improving efficiency and effectiveness of the transport sector. In most developing countries the regulatory mechanism affecting the transportation industry needs not merely a new look but a total overhaul so that it can respond to the demands of a new century.
With the growing problems of congestion and pollution in the mega cities of India, there is an urgent need to improve public transport so that users of personal vehicles can be motivated to use public transport. This would not only help in reducing the number of vehicle on the roads, but would also help mitigate the rapidly growing menace of vehicular emissions. This requires both an augmentation of the capacity of public transport as also a quantum improvement in its augmentation. Public budgets are no longer able to support the continuing losses of state owned transport corporations. Therefore, capacity augmentation in STCs has suffered. Besides, with public management and a virtual monopoly of STCs passenger convenience has been accorded low priority, with the result those who can afford personal vehicles have shifted away from public transport. A well-structured indication of the public sector in public bus operation is necessary. Therefore, it is necessary to have an independent regulatory agency to oversee, plan for and regulates public transport in the mega cities.
objectives in a desired manner. One way to exercise such control is through enactment of various Acts, with in the framework of which these organisations have to work and functions. The provisions of these Acts should be defined in simple, clear and lucid term, and should be easily implement able. At the same time, these provisions should enable the enterprises to work efficiently to contribute, not only to their own growth, but also to the over all development of the economy. Further, there should be a periodical review of such provisions to make necessary amendments to suit the changed environment. In this background, a few important provisions of the Road Transport Corporation Act, 1950 pertaining to the management Boards of State Road Transport Corporation in the country.

--- MARKETING ---


In spite of long years of operation, the transportation has become objects of criticism that they are more operations oriented and not customer oriented. The criticisms are more in urban areas where the apparent failures of state Transport have led to proliferation of personalised modes and increased patronage for Intermediate Public Transport (IPT) like Auto rickshaws and Taxis. But still, the State Transport has been enjoying the benefits of captive audience. The recent policy changes at the centre and with the economy opening up with liberalisation of entry and exit policies, the passenger road transport may also experience multiple option and customer preferences. It is in this hostile environment the State Transport needs customer orientation and improved service quality.
----- -----, -----, PRICING


With the power sector reforms, Pricing of Public Utilities in India is acquiring a new focus. Power and transport evoke a bewildering range of responses cutting across political, social and economic barriers. Of pricing in transport, there is still confusion affecting quality, safety and comfort. Even setting aside political and social considerations, the complexity arises from the fact that the provision of infrastructure in the case of road transport is separated from the provision of services. It is time the issue of pricing engaged the attention of public institutions before the transport chaos deteriorates any further pruning can be used to solve the transport problem.

----- -----, -----, QUALITY

85. JARA-DIAZ (Sergio R) and CORTES (Cristian). Quality of service in road transportation. *Rural Psychology*. 64, 1; 1999, March; 44-57.

Quality of service has a special significance with reference to customer satisfaction. This is so mainly because the service being an intangible product there are no precise parameters to measure and ensure service quality. In the case of service industry like road transportation, the quality of service is also susceptible to high variability. This is due to the fact that road transport industry is a performance industry where in the new service is to be performed each time. Hence it may also be inferred that the quality of service can be measured and judged on the basis of certain performance parameters.
Quality assumes greater importance in a market oriented economy and the success or failure of any enterprise depends upon the quality or lack of it. Psychometric analysis has been carried out to process the information obtained from the survey and a composite index, called Level of Transport Service (LOTS) is used to measure the service qualities. This methodology can help to identify the deficiencies in different aspects of quality for a particular category of bus service in an STU.

--- ---, ---, ---, PERCEPTION

In spite of long years of operation, the Road Transportation in India has become objects of criticism that they are more operations oriented and not customer oriented. Transportation were created with the objective of supporting social and economic developments by offering cheaper travel linking hinterland with urban centres subsidized service to the poor, better passenger amenities and well organised maintenance. The need for a service marketing orientation for the road transport emphasized through a diagnostic study carried out earlier. Before formulating strategies and developing control processes for implementing them, it may be useful to understand the service quality gaps in the service delivery.
88. REDDY (Bucha P), REDDY (Goverdhan B) and REDDY (Krishna B). Optimum service plan for a workshop of Andhra Pradesh State Road Transport Corporation: A simulation approach. *Indian Journal of Transport Management*, 19,10; 1985, October; 629-35.

The manpower, machine hours, space, equipment and various other resources in workshop are limited. Every establishment therefore, needs to plan for optimum utilisation of its resources to get the desired output. An attempt is made here to examine the random arrivals of buses coming for service and the corresponding service times, and the arrival and service patterns are then simulated using Monte Carlo simulation based on the observed data.


Geographical Information System (GIS) and Global Positioning System (GPS) projects have been planned and developed for implementation in Andhra Pradesh State Road Transport Corporation (APSRTC). Apart from attempting for a data based efficient scheduling process through GIS, a proto model has been developed and tested for implementation of automatic vehicle location and display system as a passenger interface strategy for the first time in the country. The system also enable on time capturing of the data such as punctuality, cancellations, volume operated, seat availability etc., which are the parameters having a bearing on the passengers satisfaction and ultimately the growth and image of a transport undertaking.
MISHRA (Rajeshwar). Levy of penalty/compensation payable by the supplier to state transport under ASRTU rate contract. *Indian Highways*. 28,10; 2000, October; 63-70.

To monitor the quality of purchased materials, state transport has a right to send random samples from the consignment to the laboratory of central Institute of Road Transport (CIRT) for testing as per contractual specification. If the sample fails in the laboratory testing, State Transport cannot only recover the compensation based on the test report but also the test charges, cost of the material consumed during the testing and an administrative penalty under ASTRU Rate Contract. Its aim to educate the concerned personal in State Transport and also the suppliers regarding the levy of penalty compensation whenever a sample fails in testing.


Road Passenger Transport (or Bus Transport) is a growing industry, presently served by both Public Sector State Transport Undertakings (STUs) and the private sector. Considering the type of operations in road passenger transport, it has a voluminous data generation and as such there is a wide scope for computerisation of its different sub-systems for efficient management. The sole of computers in STUs in improving the quality of service rendered to the travelling public and the customer satisfaction.
Passenger road transport occupies a prominent place in the infrastructures requirements of a nation for its economic advancement recognising the importance of this sector as a prime public utility service. The Government of India immediately after Independence passed legislation for the formation of state Road Transport Corporation/State Transport undertaking (STUs) in each state to suit their requirements. At present there are 69 such STUs in India covering almost all the state and union Territories. The financial, performance of almost all these STUs are however for from satisfactory and majority of them are heading for a total break down. The physical performance is measured in terms of the productivity of capital, labour and materials used, the profitability in terms of net margin and the operating margin.

State Transports are at cross road today with a totally changed environment. Therefore each ST will have to create and sustain a competitive advantage in the changed environment. They will have to examine in the competitive strategies of cost leadership, differentiation, focus, quality improvement, vertical integration etc. Unless the top managements seriously design and implement strategies suitable to the organisations they will find it difficult to carry on the existing business of transport operations.

Subject like vehicle replacement, service reliability, cost controls etc., important in STUs; but the strategy, leadership and organisational culture directly affect the performance of an organisation. Hence identifying the appropriate operational strategies and their effective implementation will brighten the future of STUs, which are presently passing through a turbulent environment.


The changes in the Motor Vehicle Act 1988 and the new Economic Policy adopted by the country in 1991 are heralding many changes across the broad in the STUs. It is necessary for them to have a close look at the customers and their needs so as to adopt suitable marketing strategies to face the competition. Market research and market segmentation become the essential parts of management to face the competitive environment.


It is made to examine the appropriateness of a Intermediate Public Transport (IPT) system; for Amritsar city in Punjab; the problem and issues by it; and the policy measures hence required. It is concluded that
IPT is significant for the city's transport system and medium sized IPT modes like Scooter, Rickshaw and Cycle-Rickshaw are the most popular modes for intra-city mobility. At the same time this system poses some traffic and transportation problems related with urban growth, road geometric, parking, encroachments, mobility etc. for which planning and administrative measures are suggested to resolve the issues risen as a result of its indispensability.

97. MISHRA (P K) and NANDAGOPAL (R). Thoughts towards the next continental transportation system. *Yojana*. 33, 20; 1989, November; 21-8.

This study premise is that the primary road type transport need of India is not a denser conventional highway network; the need is to leap over the on-going finishing touches on the current national highway system and think in 21st century terms of a new higher level transport network. It offer several assumptions for future mobility needs as well as the land development patterns and suggest principal design parameters for the next continental transport network.


Bus transport plays a significant role in mobility system of any community. Organisation and running of bus services is however a complex task involving management of men machine and money. Balancing the demand and supply, ensuring safety and achieving financial viability are some of the operational aspects that require regular attention. It is envisaged that advances in the field of
information technology would assist in handling many of those problems. A computer based Geographic Information System (GIS) in particular is considered useful to address several issues related to bus transport. A pilot application of GIS for bus operations in Greater Mumbai is presented. It illustrates the power of GIS for data organisation, analysis and visualisation that needs to be harnessed for bus system management.

--- -----, -----, PUBLIC, INFORMATION TECHNOLOGY

99. SUDHIR KRISHNA. The role of information technology in improving public transport system. *Indian Journal of Environmental Protection.* 20, 4; 2000, April; 82-90.

Some improvement that could be made through applying the latest development in information technology to the integrated management of public transport system including giving priority to public bus transport at intersections and increasing the quality of information provided to the passengers. The number of passengers will increase as public transport conditions improve with resulting the economic and environmental benefits.

--- -----, -----, URBAN, DEREGULATED

100. KHEZWANA (M) and MAUNDER (D A C). International experiences of deregulated urban public transport systems. *Indian Highways.* 28, 12; 2000, December; 33-46.

Ownership, regulation and control of the urban public transport sector and especially the stage bus industry continue to be an intensively debated in both the developed and developing world. Proponents of private sector ownership and free competition argue that such conditions generate an efficient and effective stage bus service. Other promotes
varying levels of regulation, control and government involvement, including ownership, because of market imperfections and a loss in social welfare. Some international experiences where levels of deregulation have occurred in respect of urban public transport systems. It is hoped this will shed some light on the deregulation system and may point the way to possible deregulation of the urban public transport system.

IDE, IDE, IDE, DEVELOPMENT


Society needs for more space and for improved performance from the road network are causing the expansion of urban areas into surrounding rural country. Urban public transport, which went through a period of rapid modernisation in the late seventies, is facing a new challenge, which is difficult to define.

----- -----, TARRIF FIXING


Though the scheme has certain advantages, there is a possibility of private bus operation forming a cartel or become a powerful lobby. But these apprehension should be tacked effectively. The business environment is competitive and “Merger and Takeovers” are becoming the order of the day. The hire scheme should work well if it is properly designed, implemented, mentioned and controlled. A public sector undertaking as a model employer generally incur huge costs on
personnel with productivity levels dropping slowly. In such a situation an appropriate level of hired vehicle service mix should help the STUs to gain advantages of the scheme.

----- -----, TRAFFIC, AIR POLLUTION


The main road-traffic parameters that determine air pollution i.e. the total volume of traffic, road speeds and the composition of the vehicle fleet. Changes in the amounts of pollutants emitted, and the impotence of each of the three parameters, have been computed by using a traffic assignment model, which also represents emission factors. The types of policies that may be implemented to reduce the environmental impact of transport are then considered. The impact of deterioration in traffic conditions is limited in compression with the effect of forecast increases in traffic. As a consequences if cities and urban transport are to achieve sustainable development, expansion must take place in a controlled way.

----- -----, -----, ENVIRONMENT


An ever increasing population with aspirations for a quality of life, hitherto unknown is placing tremendous stress on all our environment and this phenomenon can be appreciated in case of deforestation, soil maladies, floods and droughts, urban congestion and ubiquitous pollution of air, land and water with increase in population day by day the need for food, clothing and shelter is increasing and thus the situation is imbalanced over a period of time. But it is not all that
hopeless and we can still improve the situation if only we could recognize our shortcomings and change our approach to make use of the resources available to the best extent and cure the problems periodically for the survival of the mankind. Progressive approaches of this will be taken as tool, to cure the problems in various aspects of environment.

----- -----, -----, RESTRAINT, POLICY, DELHI


The pressure on Delhi’s road bids fair to become unbearable. It has become necessary to curbs the use of privately owned vehicles and promote public transport. Traffic-restraint policies could be ‘imported’ to meet the former objective. As for the latter one, what seems to be indicated pending the completion of the mass rapid transportation system some 20 years hence is a policy package with expansion and upgradation of the ring railway as the centrepiece.

----- -----, -----, SAFETY, MADRAS


Accident occurs driving the eight half early period in 23 road section of two or trials in Madras city have been analysed by using step wise regression approach. Here, it considered 22 variable relating to physical conditions of the road, traffic flow, environmental conditions and human behaviour. This study throws light on management stages for the improvement of traffic safety in transportation.
As urban areas continue to grow in size and road travel continues to increase, traffic congestion will extend over larger areas for longer periods of the day. This will result in substantial social environmental and economic costs. It involves developing comprehensive traffic management of existing arterial roads and Local Areas Traffic Management scheme (LATM) as well as encouraging the use of public construction of selected new high capacity urban arterial road links are also of vital importance. The progressive, implementation of such approaches should result in a reasonable level of safe, efficient, and effective mobility with an acceptable balance between the harmful effects of travel and its benefits in urban areas in future.

Public transport is either discriminated against or abjectly treated. This is despite the advantage of public transport origin from it frugality in the consumption of space and energy in the causation of air pollution. The reason for the apathy and difference to public transport is not difficult to find. It lies, in the fact that most decision-makers, even the public transport sector itself, drive their opinions from their own in personal experience of transport almost entirely in their own private areas.
Trip chaining is a growing phenomenon in travel and activity behaviour. This search for ways of fulfilling activities with less travel input has produced a number of responses one of which is trip chaining. A particularly important policy implication of trip chaining is the potential barrier it earlier in attracting car user to switch to public transport. It seeks to improve our understanding of trip chaining as a barrier to public transport use. A series of discrete choice models are estimated to identify the role that social economic and demographic characteristics of households have on the propensity to undertake trip chins of varying degrees of simplicity/complexity that involve use pf the car or public transport with an embedded commuting or non-commuting primary purpose.

Urban, Cost


The cost of mobility to the community varies according to the different type urban area and the means of transport used. In areas where population and employment densities are medium to high, public transport is always cheaper than the car. The combination of high density and a vigorous public transport system constitutes the most efficient from of urban transport system.
The strategies that are needed to promote a global environmentally sustainable urban transport policy. What does sustainable development mean in urban transport terms? For a first cut at an operational definition we can begin with the Brundtland Commissions definition: "Sustainable development is development that meets the needs of present without comprising the ability of future questions to meet their own needs.

New Transport capital expenditures are typically evaluated in isolation from the transport system to which they belong. A focus on evaluating the total transport system impact of new transport project implementation is called for. Total transport rider ship has generally shown only minimal improvements and at time has declined. Financial performance has been disappointing in most cases, particularly when understood in the context of the additional system cost imposed through the reconfiguration of bus networks to serve the new systems. Low cost approaches to improving basic transport services can often be more effective then the bus basic capital project.
The urbanisation trend in India is going to generate urban transport demand, which is unlikely to be met, by the present level of initiatives. The fast and unplanned growth of private vehicle ownership has already created unmanageable environmental problems of pollution, congestion and serious safety of the government hazards in most urban areas. All these are the results of dubious policies on urban transport. The competitive efficiency of urban public transport integrated with non-motorised modes has been overlooked repeatedly in all urban transport planning efforts. Gross nationalization of public transport, particularly bus systems in urban areas, leaving marginal and ad hoc mechanism for private involvement, did not allow formulation of formal strategies for development of balanced public transport taking advantage of all available modes and productive efficiency. A sound technological policy framework with product innovation through computation and marketing can rejuvenate the urban bus system to face the challenge of twenty first century.

Urban transport environment has become a Quail issue today from the point of view of heavy congestion, poor speeds on road, road safety of citizens, suffocating air pollution and dumbfounding noise pollution. It is also responsible for high consumption of petroleum product, which is precious resource in the national interest. In fact, urban transport problem is mainly peak hour mobility. The option should be such that
less vehicles should carry more people to ensure mobility. Present position is exactly contrary to this approach. When one bus can carry 60 people, the equivalent traffic is actually travelling by 40 two-wheelers, 30 auto-rickshaw or 20 cars. There are several option such as suburban rail (EMUs) metro etc. It brings out that fundamentally this responsibility belongs to Municipal Corporation in the interest of mobility and safety of citizen and up keep of the city environment. It is public utility.

----- -----, -----, PLANNING
115. SARIN (S M) and BHATIA (N L). Urban transportation planning and operations. Indian Highways. 28, 10; 2000, October; 119-30.

Transport is essential to the functioning and development of any society. The demand for transport is derived demand and is generated out of the needs of the people to travel for different purposes. The urban transport system operating in different cities in India is basically road based and consists of different type of vehicles labelled as private vehicles, public vehicles, hired vehicles and goods vehicles. The transport system vehicles operating in urban areas are primarily road based. The condition of road networks in terms of capacity and riding quality are deplorable in most of the cities though some major cities present a comparatively picture. The urban transportation planning process can produce a vast verity of proposals designed to alleviate problems associated with the movement of passengers and good in the cities. As a result and despite the investment of massive capital in the improvement of existing roads and developments of new road the malady of traffic congestion persists throughout the urban areas in India.
Four steps modelling procedure, which has been conventionally applied in urban transport planning, has been used at district level. This exercise of trip generation, modal split, trip distribution and traffic assignment has been carried out for Malapuram district by considering development block as traffic Zones. Trip generation equations have socio-economic and demographic variable independent variables and trip produced as dependent variables. Trip distribution has been done by using the furness method and traffic assignment has been carried out by applying multiple proportional assignment method. Modal split is based planning priorities involving modal split in favour of buses.

Origin and growth of a city is intimately linked with the development of transport facilities. Integrated urban transport can be developed and applied as an effective tool to achieve a desirable urbanization pattern as well as to serve the different systems efficiently and effectively. As the efficiency of urban economy is largely determined by the uninterrupted, free economic and efficient flow of goods and services. Urban transport can be important in economic, social and environmental terms to any developing country. As such the transport policy should comprise action to maximize the carrying capacities of the existing road network, improving the public transport operations and reduce accidents and
environmental pollution. After evolving such a policy an effective and speedy process of implementation needs an effective institutional framework and financing structure.

PROBLEM, SOLUTION


The development of the centres have been largely haphazard due to skewed development, with the result there is severe mis-match between carrying capacity and 'carrying demand' of urban transportation network. The manifestation of such urban chaos is found in the condition of traffic congestion, wasteful use of fuel, pollution, and urban blight. The reason behind such chaos can be traced to lack of appreciation of transport planning road infrastructure planning, failure of developing counter magnet, existence of multiple agencies and multiple law and Acts. The solution to such urban transportation problems lies in looking at the urban development plan in a comprehensive way taking into account not only the transportation need of the city but dovetailing the same with the urban planning of surrounding influence zone. For urban design and planning it is essential to keep future transportation scenario ahead of land use planning. Transportation capacity of a city should govern the development of other urban forms and not vice versa, which is generally the practice, being followed in Master plan development. Transport system management techniques, which are low cost yet effective solution, should be implemented as short-term viable solution.
A massive rise in the pollution level consequent upon exponential growth of urban road traffic in India is currently causing much concern for environment and health. The situation is especially grim in the metro cities where toxic automobile emission and noise remain way above tolerance level. The efficacy of technological innovation as well as emission legislation as major weapons to fight the vehicular pollution menace in the Indian context and finds that while better engine technology helps in pollution reduction in the long run depending on market penetration short term gains can be achieved through use of alternate fuels. In the ultimate sense, strict emission legislation and administrative initiatives remain the deriving force behind adoption and development of newer technologies with the aim of making the air cleaner, either in the long run or in the short run.
order to differentiate cheap and unscientific spares from the local market, the components are required to undergo, certain quick test at the purchase order acceptance level itself to identify the quality of the products. Here, a few automobile components for the purpose and suggest certain quick test for their performance.

-----, BUDGET, DISTRIBUTION


Urban transport is modelled as a set of services provided by an integrated transport sector, the objective of which is to set prices and to invest in service infrastructure so as to maximize a social welfare function over the community. An integrated transport sector that has concerns about pricing its services to reflect the cost of congestion, about balancing its budget and about the effects of its prices on individuals at optimality equations derived which are useful as a source of relationship to consider when formulating policy.

-----, CONGESTION, TRAFFIC, INVESTMENT


A theoretical investigation of the inter relationship between traffic growth and highway congestion, and the context to which these may be influenced by transport investment. The context of the work is both substantive and methodological, and relates to the long-standing debate about the economic efficiency of highway investments, particularly those in or near urban areas. There is a general concern that increasing
congestion is itself serving to 'suppress' demand, which may be 'generated' or induced' by highway investment and thereby impart lower than anticipated benefits in a transport system.

-----, COST, COLLECTIONS, REVENUE

123. BHOPLE (R S) and PATKI (Alka). Reducing the cost of Revenue collection: An option available to the transportation. Indian Journal of Industrial Relation. 32, 3; 1996, January; 42-9.

The rapidly increasing cost of operation pose a challenge to the transportation. Any amount of increase in efficiency is proving inadequate to offset the effect of these rising costs. The state transport spends a lot on collecting the revenues. This revenue collection field offers an excellent opportunity where drastic cost can be carried out. But this is easier said than done. The problems associated with, attempting such a cut in the cost of collection and evolves ways of over coming them in a bus based city transport system.

-----, ----, FUNCTION

124. HARISH (R) On the calculation of scale economics from transport cost functions, Yojana, 33, 17; 1983, September; 16-22.

A method is presented to decide how to calculate the degree of scale economics from estimated transport cost function, which include aggregate out put and attributes as arguments. It is shown that the cost elasticity of each of these aggregates should be weighted by a factor that depends crucially on the relation between the aggregate and the output vector. The method is applied to commonly used output indices and attributes showing that the weights ranks from one to Zero. Some of them are interrelated and their values depend upon the operating rules of the firm.
---, ELECTRIC VEHICLES

125. KREITH (Frank), NORTON (Paul) and POTESTIO (Denasue). Electric vehicle: Promise and reality. *India Journal of Economics*. 81, 307; 1996, February; 45-52

Electric vehicles promise to improve the environment and reduce dependence on petroleum as a transportation fuel. In reality, electric vehicle technology has yet to produce a vehicle competitive with those powerful by internal combustion engines. Current electric vehicles cost roughly twice as much as comparable conventional gasoline vehicles. Government should be wary of mandating a specific technology that has not been proven in mass production.

---, EXPRESSWAY, PLANNING

126. TENG (James T C) and HERRIGTON (P R) Planning of expressway alignment by using remote sensing techniques. *Journal of Transport Economic and Policy*. 32, 3; 1997, September; 283-94.

The satellite data has been very useful in finalizing the expressway alignment and presenting a synoptic view of the entire areas, which is very important for the planning point of view of any major project. Moreover the remote sensing techniques coupled with latest computer software application are time and cost effective with fairly accurate results and facilitates quick decisions and actions take at the administrative end. The technique may be adopted by other states for transportation project that will result in saving time, many and manpower and will bring quick administrative decision.
EXTERNALITIES, APPROACHES


The various approach available for handling the negative environmental external costs of transport. It looks at the nature of the policy tools that are available and sets them in the context of the different environmental problems that are confronted. The nature of political regimes is important both for the likely intensity of environmental policy and for the types of policy instruments that are favoured. Even with in democracies, however, there is a tendency to favour command and control instruments over fiscal policies.

FARE, FIXATION, MECHANISM

128. WILSON and BRYAN. A mechanism for fare fixation in transportation. *Urban and Rural Planning Thought*. 7, 5; 1960, May; 37-44.

Fare fixation in Transportation is a difficult exercise. Since there are no clear-cut guidelines with regard to the fare pricing mechanism. It is axiomatic that the transportation which bear the burden of operating uneconomic routes and socially obligated services, should at least get the fare which should meet their cost of operation. The methodology suggested to cover the relevant cost areas for an appropriate price fixing methodology besides suggesting measures to monitor the performance of transport for attaining the optimal resource utilization, keeping the level of inefficiency at the lowest.
FREIGHT, INTERMODAL

129. HOLCOMB (Mary C) and JENNINGS (Barton). Intermodal freight transportation, transload option. *Economic and Political Weekly*. 34, 14; 1999, April; 827-35.

The current use and definition of intermodalism does not take into account the second type of intermodal freight transportation strategy, the transload option, which involves multimodal movement of non-containerised freight. When the transload strategy becomes an active part of the definition, in modalism becomes a “logistically linked movement using two or more modes of transportation”. The goal is to create a seamless transportation system that meets needs of both the public and private sector. It provide some insight into the use and impact of transloading as a strategic component of multimodal capability will enable the exploration of new means of designing and operating transportation systems.

POLICY


A Significant effort is underway with in the federal, state, and local transportation community to address the highway need for freight transportation into the 21st century, but more can and should be done. Identification of deficiencies and implementation of strategies to improve the highway component of the system are essential to avoid gridlock as the number of vehicles using the system continues to increase. It identifies some significant freight generators and many initiatives underway to address the highway side of freight transport. It
provides an overview of various factors and events of significance affecting traffic operation on the highway.

-----, -----, SAFETY, HIGHWAY

131. CLARKE (David B), CHATTERJEE (Arun), RUTNER (Stephen M.) and SINK (Harry L). Intermodal freight transportation and highway safety. Political Economy Journal of India. 4, 1 & 2; 1995, January – June; 71-80.

The shift away from the use of a single mode of transportation for a shipment in favour of an intermodal approach is a trend in contemporary freight transportation. One interesting aspect of the shift of truck traffic to road intermodal service is the corresponding impact on highway safety. Every highway trailer shifted to intermodal service represents a change in combination truck traffic patterns on the highway system, as do intermodal services, which capture new business before it ever reaches the highway system. Its aims were to identify potential implication of intermodal transportation on highway safety.

-----, -----, TRUCK, COST, EXTERNAL


Form a societal perspective; it is desirable for all transportation users to pay their full social (private and external) costs. We estimates four general types of external costs for intercity freight trucking and compare them with the private costs incurred by carriers. Estimated external costs
include: accidents (fatalities, injuries, and property damage); emissions (air pollution and green house gasses); noise; and un recovered costs associated with the provision, operation, and maintenance of public facilities. The analysis reveal that external costs are equal to 13.2% of private costs and user fees would need to be increased about threefold to interline these external costs.

----, GLOBAL CHANGE


To identify advantageous transport policies and strategies, a review of factors, which may reshape the national transport task in the future, was undertaken. This generated some alternative to the prevailing assumption and perception about expected future conditions. Exponential growth in global population presents one key influence on the future; discontinuous change of some sort is likely, either voluntary or crises – individual. The implication of potentially rapid change of this type is considered. In the transport sector, based on this past cycle of growth saturation and decay of previous technologies, there are indication that are new form of transport infrastructure could be accepted early in the next century. Given such a development, transport can contribute in the short term to a reduction in un sustainability and in the longer term to an alignment of transport sustainability with the wider goal of a sustainable economy.
It makes a real contribution to the programs and process transportation require to develop, manage, and maintain a workforce suited to their future missions. It may also suggest new programs, curricula, and continuing education courses for universities and training organizations that are preparing the future transportation workforce and transport agency. Construction maintenance and service workers are important segment of the transportation workforce and efforts to develop interest in these areas are critical to the success of the highway program. The changing and increasing demands for more efficient and safe transportation system the challenge to develop and display new technologies, and the pressure on transportation to continue in increasing the competitive international markets are pushing workforce development. It takes a concerted effort by the entire transportation community working individually and in partnership to plan, develop and train the new transportation workforce.

---, IMPORTANCE, impact on LAND USE

SHANKER (Venkataraman). The importance of transport impact on land use in strategic planning. The Indian Journal of Public Administration. 65,3; 1999, July-September, 536-44.

The impact of transport policy on the direction and magnitude of land use change are difficult to identify or measure and clear casual relationship are almost impossible to define. Further more, the study of such effects falls distinctly between the remits of land use and transport
planning. However successful coordination of land use and transport strategies in pursuit of urban policy objectives requires estimation and analysis of these impacts. It examines current practices in the assessments of transport impacts on land use.

-----, INDIA


Transportation today is thriving across India and its future looks bright. It preserves many of the transit friendly provisions added to transportation law that emphasised transportation planning and greater consideration of transit alternatives. It allows states and localities to the flexible surface transportation funds formerly limited to highway construction for transport. It continues to support a strong federal role in the funding of transportation. This marks the third consecutive year that rider ship has risen, a trend we believe will continue for this foreseeable future. There are many reasons for this optimization.

-----, CHARACTERISTICS, TECHNICAL


The aim of this study is two fold. First, it aim to put forward new information concerning the technical characteristics of transportation on the basis of a sample of medium and large size Indian states. Secondly, it aims to analyse the level of productive efficiency of three selected undertakings. It is hoped that result of these will be useful in evaluating the possible changes in public policies relating to passenger road transport in India. a higher level of utilization of busses and there
capacity would lead to a higher level of productivity. Therefore, the transport systems, which operate with larger route length per bus, is most likely to experience a higher level of productivity.

---, ---, COST, ANALYSIS, POLICY


To understand the current transportation situation in India, it provides a framework within which personal expenditures; environmental consequences and social effect can be measured by common metric, costs. The analysis includes all modes of transport but has a specific focus on passenger transport modes. It present the cost categories considered and methodologies and assumptions used in driving the costs, a summary of the total magnitude of cost, a differentiation of internal and external costs, and a cost comparison according to various travel modes. It concludes with a brief analysis of the implications of the result for evaluating transport policy and pricing options.

---, ---, ENERGY CRUNCH

139. BHALLA (M K) and CHARABORTY (S K). Energy crunch transportation: The Indian context. Yojana. 33, 23; 1989, December; 29-35.

The recent energy crunch has reinforced the need for efficient use of energy resources. Transportation ranks first in oil consumption in developing countries and hence there is an imperative need to conserve energy in this sector. As much as 56% of the petroleum products in India are used by transport sector. Since growth of the economy is a vital factor for developing countries the growth in energy consumption
cannot be curtailed fully. It brings out the potential for conserving energy in Indian transport with proper planning and efficient management.

----- -----, -----, PEOPLE


The road transport in India shows that it would not be possible to restrain the growth in populations of buses, trucks and cars in India. However, because of the population the modal share of non-motorised modes will continue to be large. The relatively low numbers of motorised vehicles would make it possible to plan for sustainable growth. This would be possible only if we are able to develop innovative technologies and traffic management systems, which are specific to India.

-----, -----, PRICING

141. SARDESAI (A V) and VIRUPAKSHA (T). Issues in pricing: Case of public transport in India. *Indian Journal of Industrial Relation*. 31, 3; 1995, January; 11-5.

Pricing of public transport is a complicated affair involving a multiplicity of economic and social considerations. The history of price is informed more by ad hoc decision taken under political compulsion than by rational analysis of costs and subsidies. The demand and supply characteristics of transport require an in-depth understanding of why people travel in order adequately influence pricing decisions. At the same time rational pricing cannot by itself ensure quality or adequacy. But it is an essential pre-condition. It is therefore necessary to take it out
of the preview of politics and bring it under statutory regulatory commission.

-----, -----, PROBLEMS, ECONOMIC


Transport situation in India particularly in the cities and bigger towns is in critical conditions and is entailing high and rising economic and social costs. The situation will worsen in coming years unless urgent measures are taken to tackle the situation with a strong political commitment. On the supply side options to augment transport capacity to meet the increasing demand may have there place as neither to in this effort but more drastic demand management measures including realistic pricing of transport services are required to be adopted and practiced. The pace and pattern of the growth our cities and towns would need revamp. If our transport situation has to remain manageable the country may have to obtained act for smaller cities by emphasizing accessibility for facilities to people rather than promoting and stimulating mobility of the motorized variety.

-----, -----, -----, TRAFFIC


Its main purpose is to examine the causes of present shortcomings of the Indian transport network. These are two main reasons for the problems now experienced with respect to the flow of traffic on certain transport infrastructure, namely changes in traffic trends in terms of both quantity and structural and deficiencies of the investment policy. On the basis of
the growth excepted in economic activity and the changes under way in India, it would highly likely that road traffic will increase at far more rapid pace than the overall capacity of transport infrastructure available and therefore, be conducive to much more congestion.

---, ---, SYSTEM, ENVIRONMENT, DEVELOPMENT, RURAL, URBAN


It represents a comprehensive review of the environmental costs of the different modes of transport both in rural and urban in India. It describes various ways of minimizing environmental degradation through making the transportation system more pro-nature. Transport and urban environmental problems are reflected in traffic congestion, lack of parking space, pollution, noise and accidents. The result is environmental degradation leading to high rates of respiratory and other disease. It is opportune giving a liberalized the regulated and commercialised economy and its transport services and increased global concern with the environment.

---, INFORMATION, TECHNOLOGY


Operations of more than one hundred twenty thousand buses by transportation called for information updating and retrieval for planning and management from the voluminous and discrete operational data spread over different locations. Information technology has proved as an important tool for decision support with the advent of database
technology, distributed data processing at remote locations has help in improving customer services. It determines the role of information technology and database promotion for effective decision making by transportation managers.

-----, -----, TRAVELLER


Developments are already underway for the integration of information systems across different public transport modes and between public transport information systems covering different regions. The highway agency is also advancing in its development of information databases and systems for motorist. If such integration can be achieved than travellers, and in particulars drivers, have the prospect of being presented with comparable information on travel options across modes. An integrated information services has great potential inform and influence travel choices.

-----, INFRASTRUCTURE, PROJECTS, FINANCING


Inadequacy of financial resources for the government has resulted in a backing of capital work and maintenance attention to transport infrastructure leading to a crises situation. Infrastructure leasing is a novel method of financing transport projects, which merits serious study. The main objective is to examine the principle of infrastructure leasing, which is a form of privatisation and its applicability to Indian transport
projects with emphasis on road project. An attempt is made to refer to similar leasing project executed in the recent past in other countries and to learn from there experience.

-----, -----, SERVICES, PROVISIONS


It purpose to model competition in freight transport and to work out the role of government in providing infrastructure for the competitors. Freight transport could in principle be provided by the firm owned by using firm owned trucks or transport services could be out sourced by purchasing their services from truck transport firms. We link production in the rest of the economy to transport demand, provided by two competing modes of transport. Given infrastructure, a fuel tax, and the stock of vehicles.

-----, LAND, RENTS


It defines a transportation improvements “impact zone” as the area within which resident households and business firms regularly utilize the improvements. Their simple parables suggest that the increases in impact zone and land rents that usually accompany improvements do not accurately reflect its benefits. Seemingly modest variations in the demand and supply relationships that characteristics impact zone residents can have major effects on the relationship between benefits received and the land rent challenges that are measured.
150. NAYAK (K C) and BHATT (H K). An integrated land use/transport for development of India. *Indian Highways.* 22, 7; 1994, July; 103-13.

It describes a novel methodology for the development of an integrated regional infrastructure strategy using an interactive land-use/transport models for India. The model was used for forecasting and evaluating alternative investment, pricing and regulatory policies. The proposed plan includes a recommendation on infrastructure investment for transport, public utilities, land and building development. It also advocates a long term marginal cost pricing for the use of inter urban infrastructure and short term congestion pricing urban areas, as well as the introduction of regulation in land use to encourage corridor development, integrating land and infrastructure use.


Knowledge of the interaction between urban land use, transport and the environment is fundamental to understand the impacts of transport on city's environment. The understanding of the land use, transport and environment system is often guided by limited experience. The complexity of the urban system is therefore, often not fully understood. There is a need to develop a computer based integrated land use transport environment model to deal with the urban changes and the complexity of the urban system and to assist in understanding this relationship. An integrated land use transport interaction model, city plan, has been developed to help transport engineers, urban planers and the community in understanding the complexities of the urban system.
Behavourial and institutional changes have complicated the land use and transportation interaction, leaving urban spatial policy in despair. Solutions to this quandary are fostered by how we are learning to control the land use side of the relationship through growth management and through the management of travel of demand in general. It is made sustainable urban development and urban productivity in national economic development.

Utilities have major impacts on environmental quality, especially in urban areas. A first glance liberalisation or privatisation of utilities would not appear to offer any environmental benefits. If such a change occurred within an adequate administrative legal framework, however, the result could in fact by increased attention to sustainability. In this context, a case study of opportunities for improving sustainability in regard to road transport is presented.
It determines the public investment in public transport and their effects of technology and broad choice, largely with reference to Madras. Import substitution subsequently operated to the advantage of firm that had been favoured by these choices in this situation, the critical issues to be that of indigenisation with cost and quality control. As public sector decision on technology affected the fortunes of competing firm differently during the early period of the first plan by the corresponding period of the second, these choices had decided the fate of most of the firms.

A wave of economic dogma has swept part of the world raising competition to the level of policy, and including public transport in its domain. There are several countries, where privatisation, deregulation and competition have been adopted as policy for public transport. The policy should more importantly address priority for public transport in the allocation of space and funds, and that policy on ownership and operation should be based only upon a complete understanding of the demand for public transport and the intricate operation management needed to meet that demand. It concludes that competition is not a useful strategy to obtain efficient, effective and high quality public transport.
Much attention is currently being given to the relationship of land use and transportation. At the heart of this issue is the nation of urban sprawl: the wasteful use of developed land on the fringes of urban regions. It provides the literature on urban sprawl and also provides a historical background for understanding transportation system. It concludes that transportation policy entered a new period after the passage of the intermodal surface Transportation Efficiency Act of 1991, which required state transportation agencies and metropolitan planning organisation to work together in formulating transportation programmes.

The increasing spread in terms of the surface area occupied by residential areas within transport regions, rise in the total population and larger transport regions have led to a considerable change in peoples transport requirements with regard to how space allocated to cater for journey desires. Heavily concentrated traffic flows within confined areas are being replaced by often difficult to gauge numbers of traffic flows of the most varying density all over transport regions. This development is being further underpinned by the fact that, alongside changes in residential habitats and to other important elements of the urban structure, decentralised development is occurring which is the opposite of what public transport would ideally like to see.
The change is a continuous process and frequent changes have its own costs. But the price state transport will have to pay for their inertia outweighs this cost. The future will witness even more dramatic and unpredictable changes than today. The challenge for the state transport is, therefore, to adopt to these changes with determination. There will be only two types of organisation in the future, the swift and the dead. The state transport must learn now to adopt to the winds of change before it is too late. It is an uphill and painful task and the sooner the state transport embarks on this journey, the better it is, and else they might never have the chance tomorrow.

Guidance and information systems, computer aided driving, parking control, park and ride terminals and freight transport management all arise the hope of solving traffic problems without major changes to transport policies and life styles. A critical review, however, shows that there is no all-sowing intelligent technology, which would allow basic decisions in transport policies to be avoided. The author pleads for an overall approach, within which price policy measures should have more weight.
In large urban areas transport system for movement of passengers plays a very important role in the functioning of the city. Urban transport in the large cities involves several modes ranging from ordinary bus transport to rapid transport system, which move over several transport networks. This could be very conveniently used for restructuring of transport network or a part thereof, even for a complex metropolitan transport system. The conventional comprehensive method of transportation planning analysis often becomes prohibitive in terms of cost and time. The alternative path of taking ad hoc decision is, therefore, followed in most of the situations. This quick response method may be adopted in such cases with necessary adaptation to suit a particular situation.

The nationalised transport is bound to survive along with the private sector in the present context. They have acquired confidence among the public because of the safe and secure travel they provide and have proved as the only cheaper mode of transport for the common man in the country. The nationalisation is bound to sustain and grow in a country like India since it is originated from the philosophy of providing adequate economic and efficient service to common man when a large
number of private bus operators who totally disregarding the transportation needs of rural poor from the point of view of social and economic development.

---, NATIONAL, URBAN, POLICY

162. SHARMA (R C). Need for national urban transportation policy. *Indian Journal of Industrial Relation*. 34, 2; 1998, October; 83-95.

Urbanisation is inextricably linked with the process of economic growth. A certain minimum growth of urban population is, therefore, unavoidable. Ideally, the new additions to urban population should mainly be deployed in new urban areas by providing appropriate opportunities of employment, housing and other civic facilities. In India, however, the distribution of additional population has been uneven. The concentration of immigration has been in major urban centres in turn, has put severe strain on the city's civic system, including this transportation facilities. In this situation, concerted efforts need to be made to develop transport facilities commensurate with the city's travel demand. The mission stated that, the urgent need for formulating a coherent and well-integrated national urban transport policy providing clear-cut guidelines on various crucial aspects.

---, OPPORTUNITY, CHANGE


Research into the effects of spatial configuration on the use of transport mode has to date dominantly been based on analyses of actual travel
Behaviour or prediction of future transports mode choices. However, in this research it is not mode clear what choice opportunities were available for travel behaviour of the various population categories, given their desired activities and time space opportunities. It describes a time space theoretical and methodological framework based on the concept of action spaces, within which the choice opportunities of different types of households of various areas can be analysed. It is shown that residents have more time - space opportunities to make use of existing environmentally friendly, transport modes than had been expected. The possibilities differ between types of action spaces and types of households.

-----, PLANS, PARKING LEGISLATION


The Intemodal Surface Transportation Efficiency Act (ISTEA) has created a new framework, within which transportation planning is to be conducted, including the preparation of regional plans. Although parking policies typically are the product of only local concerns, they embody the requirements and opportunities described in ISTEA for applying a broader perspective to transportation planning. Parking was not found to be a key component of most regional transportation system. Some plans to indicate how parking policies and parking management strategies may be used to support and promote broader transportation or urban goals.
This is an exciting time to work in the transportation and air quality arena. The legislative and regulatory process is in a continual state of flux as new ideas are generated and more is learned about what works and what does not. The research element has been and will continue to be a crucial part of enhancing our basic understanding of the relationship between transportation and air quality and of developing good policy that furthers national environmental and mobility goals. Research also needs to be performed on transportation planning issues such as travel demand and drive behaviour. The research that the Transportation and Air Quality Committee will foster over the next 10 years will provide considerable progress toward understanding these complex relationships.

The magnitude of environmental pollution arising out of transport vehicle is more often due to factors, which are non-transport in character. Traffic regulation and management measures many a time are the major cause for the enhanced environmental pollution land use development control and regulation through crucial in restricting environmental pollution is often an ignored aspect under the guise of economic development. It is made to bring out the broad spectrum of
factors influencing enhanced pollution and the need for short medium and long term planning strategies, to achieve sustainable transport development.

-----, POLICY


Transport, though a catalyst, is an important component of development. A framework of coherent policies is required to make the sector market oriented, in order to enhance its efficiency and make it responsive to the needs of this country. The role of the state needs to be defined clearly. It should reduce its activities as a primary provide of transport and lay more emphasis on the important areas of policy formulation, safety, independent regulation of the market etc. Some of the macro economic measures being implemented will enhance the avenues for financing transportation. Transport project will become more financiable if attention is given to reducing delays in approval and in getting government bodies to act cohesively. Innovative project structures are required to develop private public partnerships for transport infrastructure.

-----, -----, URBAN


During the last two decades, the population of many cities in India has doubled. This huge population growth were accompanied by a substantial expansion of urban geographical boundaries and much higher levels of economic activity. These in tern placed new and heavy
demands on the urban transport systems. Pressure on urban transport is likely to increase substantially in the future to provide efficient transport help, distribute the incomes/benefits equitably to all sections of people, add minimum environmental pollution and consume less energy. To achieve these often, conflicting objectives, there is no well-defined policy at the national or local level. Hence, urban transportation has been developing in a haphazard manner. In order to provide guidelines and encourage streamlined development and operation of urban transportation system, there is an urgent need for a national urban transportation policy.

-----, -----, -----, DEVELOPMENT


The birth and growth of cities is intimately linked with the sustainable development of transport facilities. Urban transport is an important component in the economic, social and environmental infrastructure. Integrated urban transport can be developed and used as an effective instrument to achieve a desired urbanisation pattern for sustainable development as well as to serve the different systems efficiently and effectively. A coherent land and transport management policy will achieve the compatibility of urban transport networks, transport modes and type of transport services with the pattern of physical development and social economic characteristics of the population in various parts of urban areas.
India is presently experiencing massive and rapid urbanisation, within urban areas where travel demand is increasing in geometric proportions. Urban transport system development is not keeping pace with the demand and the negative impact of such an unbalanced development is acutely felt today. Since the quality of life in these centres is adversely affected there is an urgent need for setting directions of growth, allocation of resources and co-ordination of actions and operations through a well-defined and comprehensive national urban transport policy. The dimension of such a policy are many which include planning, technology, fiscal, monetary, institutional, education & training, research & development, information system and legal measures.

The issue of pollution is not just a problem for transport operators and their customers but one for the general public to consider as well public transport companies really ought to think of the entire population as potential customers. Reducing pollution is clearly one-way of improving its public image and, in the long run, winning new market share.
Privatisation as choice probability, Policy process and program outcome: Case of transportation management association. Indian Journal of Industrial Relations. 34, 1; 1998, July; 73-80.

Privatisation of travel demand management products and services in urban and suburban activity centres is analysed using data on transportation management associations. Private sector participation in transportation management is affected by both time and space. Private sector financial support is related to a prior participation. Implementation is influenced more by space at first and more by time later on. Initiators play a key role in choosing transportation management products and services. Transportation management association have moderate effects on individual travel behaviour.


Transportation fellowship program Service as a catalyst for research, training, technology transfer and enhancing the capabilities of professionals in industry and academia changes in technology demand that transportation professionals be responsive to a complex dynamic environment. While newly developed transportation technologies that employ the latest in telecommunications, information systems and electronics are being developed the organisational environment is also undergoing changes. In addition, state transportation agencies have moved toward intermodal and seamless transportation planning to
address regional public transportation needs, freight movement, and environmental and societal concerns. Future transportation professionals must understand innovative management techniques and communication with a broad range of constituencies from fellow workers to community leaders.

-----, PUBLIC, BENEFITS, NON-USER


The ways the provision and use of public transport services benefits not only those who use them but also the community as a whole, there including non-users. There is a wide and impressive range of benefits which public transport gives to the community as a whole, which include those who never use it. Some of these benefits are obtained from the provision of public transport but the vast majority result from the use made of it. Higher levels of public transport patronage can mean less congestion, fewer accidents and a better quality environment if these trips would otherwise have been made in the short run or long run, by private car. Thus, providing efficient and effective public transport and marketing it to potential car user is extremely important in gaining the benefits.

----, ----, FINANCE


The successful experiences of fund mobilisation to finance public transport through the use of innovative and non-traditional methods
across the world, declining rate of budgetary allocation to infrastructure sector as a whole, makes it imperative to look for some other options to raise finance. Issuance of municipal bonds by the concerned implementing agency is not rare today. Devolution of power to local governments has led to experiment many approaches to raise finance. This is the reason; many projects are either at the verge of completion or being planned by their respective agencies under partnership arrangements. Sooner or later, many Indian local governments have successfully raised funds to facilitate investment in the sector.

----, ----, MULTIMODAL, NATURE


A judicious selection of the mode of public transport to be used on various links of a city transport network and their operation in an integrated fashion is essential to provide an economic, quick and reliable service to the commuter. As the city grows and the level of demand grows, it will become necessary to upgrade the capacity of the transport system on the affected corridors. In other words, the mass transit network in a city would keep expanding and the use of low capacity Public Transport (LCPT) keep moving further away from the city centre.

----, ----, OIL CONSUMPTION

177. JAYACHANDRAN (S S), KAMESH (S) and BLAMUGUNDAN (B). Lubricating oil consumption in passenger road transport. Indian Journal of Transport Management. 19, 12; 1995, December; 759-65.

The lubricating system is one of the important systems in an automobile engine since it removes a lot of heat and reduces the wear and tear of the moving parts. Since the leakage of lubricant oil renders the lubrication
system ineffective a study was under taken to find out the spots of such leakage and suggest remedial measures. The consumption of oil before and after implementing the suggestion have been estimated and it was seen that there is a drastic reduction in the consumption of oil as a result of carrying out the suggestion.

-----, -----, SERVICES, PRICE


Because a public Transport Authority in practice makes decisions about both price and frequency of service will ahead of their implementation. It analyses the joint optimisation of price and frequency. The optimal price also equals the operator's average variable cost minus a positive external effect. The intuitive reason for the subsequent financial deficit is that a subsidised price will encourage more passengers, which in turn raises the optimal frequency and benefits all passengers. It also has revealed that the application of dual behaviour and valuation with respect to frequency potentially has a considerable impact on design investment and information criteria in the public transport sector.

-----, -----, URBAN, ENVIRONMENT


About one third of the population in India now live in urban areas. India's population continues to grow, live and work in metropolitan cities, which in turn, posed new challenges and placed high demand on the urban transport system. Pressure on urban transport is likely to increase substantially in future so as to provide efficient transport, add
minimum environmental pollution and consume less energy. Public transport can offer part of the solution to the problems arising from urban travel against the increasing demands on space resources and environment. Public transport systems in the country, therefore needs to be substantially improved. The effectiveness of measures to improve public transport will be greater, if carried out in correct and aimed at improving the quality of life for all citizens. The author is to draw attention on the way public transport and environment challenges are to be faced for a vital and sustainable future.

---, ---, ---, PRICING


Pricing of urban public transport provided by STUs is an area, which lacks a sound methodology. The prevailing administered pricing mechanism has distanced the public transport from the market realities, affecting performance and efficiency of STUs. Though a sound public transport acceptable to majority of the public will depend on how reasonably it is priced. Provision of a very cost effective public transport in cities may not be feasible if it relies on a single aggregate level pricing methodology, which is in vogue. Nor the pricing alone can be in financial viability. In the emerging socio-economic environment, what is required is an integrated strategy, which simultaneously minimises the cost, manages the demand, maximise the supply and provide enough flexibilities in pricing to reflect the market realities and overall welfare considerations.
Transport and regulation cannot be separated and the greater the concern for protecting the public, the more will be need to regulate the industry. Both public and private sector compete to operate a variety of modes of transport, what is required is more regulation. The temp of economic development triggered by liberalisation should be adequately supported by improving efficiency and effectiveness of the transport sector. In most developing countries the regulatory mechanism affecting the transportation industry needs not merely a new look but a total overhaul, so that it can respond to the demands of a new country.

---


The increasing growth and variety in the transport sector is posing new and complex problems for regulation. Its developments in the search for an appropriate regulatory mechanism and argues for a more balanced approach so that regulation can become positive and enabling. It also attempts to define the structure and role of transport departments, which are the ultimate arbiters in ensuring a better quality of transport leading to a better quality of life.
183. WINDLE (Robert) GRIMM (Curtis) and CORSI (Thomas). Re-evaluating returns to scale in transport. Kurukshetra, 122,7; 1994, April; 13-8.

The measurement of returns to scale in transport industries has become increasingly sophisticated. To increase the understanding of return to scale in Transport Industries by examining the relationship between firm size and the characteristics between firm size and the characteristics are positively correlated with, and influenced by firm size. As a result, when firm direction that reduces unit costs.

184. ASHUTOSH GULAM and MUKUNDA (M R). Dilemmas of transportation security. The Indian Journal of Economics. 84, 321; 1997, May; 135-44.

Transportation security has become an issue of major concern and its salience is likely to increase because of such trends as globalisations between communications and transportation technologies. Transportation security must be viewed within the context of national security that the character of modern transportation systems provides new opportunities that can exploited by terrorists and that the existing security system suffers from severe weaknesses. There is a need for an overall strategy based on a systematic view of the problem, including its social dimensions.
Proper pricing of transport services is becoming more and more important in our country to enable the transport agencies. Particularly those in the public sector, to generate the necessary amount of internal resources and to attract capital from outside to improve and expand their services to meet the increasing demand. In view of the wider economic, environmental and social impact of the transport services, it may not be adequate for the transport agencies to achieve financial viability in the conventional sense alone but also to achieve an extended or enlarged social viability i.e. to recognise the wider social costs and benefits of providing the services by appropriately accounting for them, even if, to begin with, such an accounting were only to be approximate.

Faced with the mounting demands of users in respect of service quality, public transport networks are now grasping the need to devise and introduce quality approaches in order to provide satisfactory service. Such action is not easy since it affects every level of a company, from the operational and commercial sides through to human resources management. It also entails increased collaboration with other transport protagonists, particularly the local authorities, with a view to taking an integrated and multilateral approach to quality.
Local public transport undertakings are facing a future in private ownership and operating in a deregulated market place. The need to maintain market share and increase profitability has focused attention on quality of service. It concentrates on the definition and measurement components of quality management process for local public transport services. Existing methods based on passengers waiting times, lost mileage expanded sets of measures and indices are reviewed. It is concluded that a single measure is unlikely to encompass all aspects of quality of service Similarly, indices which collapse measures of difficult attributes of quality of service into a single abstract value appear to have limited appeal.

Public Transport in India is passing through a difficult phase in their existence. They have not received any, capital contribution during the last decades. The business environment in the country has undergone a sea change and the perception of the Government with regard to the ownership of public transport have radically changed Public Transport have to review their operation whether to follow the strategy of vertical integration and own all allied function or to adopt the strategy of unbundling and make use of private sector which has move flexibility and higher employee accountability. Considering the momentous
changes that are taking place in the business environment, public transport have to make quick changes in their policy framework and adopt suitable policies that will result in profitable growth.

-----, -----, GROWTH, STABILITY


The growth strategies adopted by transportation showing positive results. The solution of the present problem of transportation appears to be growth strategies rather than stability or consolidation strategies. Thus government policy should be to encourage growth with profit rather than prescribe consolidation of operations as a strategy for transportation. The growing overhead cost in transportation the growth strategy, which bring in economy of scale in operations become inevitable. If there were no growth, there would be reduction in market share. Thus growth strategy appears to be the most suitable policy option for transportation.

-----, SYSTEMS, DYNAMICS


The main focus is to review and evaluate the strength and weaknesses of system dynamics (S D) with respect to its suitability and appropriateness in transportation modelling. This evaluation helps in appreciating how the SD modelling style can contribute to understanding better the relationships between elements of the transport system and between transport and its environment. It establishes the case with which system
dynamics can be applied to construct useful tools for testing alternative transport related policies.

-----, -----, INTELLIGENT


Intelligent Transport system is a description given to the application of modern computer and communications technologies and approaches to address transport problems. They are not necessarily new, but them more accessible to practitioners and more readily understood by the general community. They offer huge potential for beneficial advances in ecology, safety, equity, mobility and efficiency but also challenge many of the technical, cultural and socio-economic equilibrium, which have developed over time. The development, introduction and use of intelligent Transport system to maximise their benefits whilst minimising real or perceived negative impacts will require careful planning by transport and other authorities.

-----, -----, MANAGEMENT, INFORMATION


Information systems have become a key tool for transportation officials in governments providing accurate and timely data for decision-making. Operational systems, however, often do not meet this need because they have been developed for day to day transaction oriented tastes, whereas the information need of senior management are usually cross functional. Executive Management Information System can close this gap. It describes how executive management information system, can be used
by transportation executives, and provide guidelines for their development.

-----, -----, PERFORMANCE, APPRAISAL


If the transportation is to survive in this competitive environment, they have to build upon the strength of their employees. Performance appraisal system definitely will play an important role this process. At present, performance appraisal system in transportation is more or less a routine work and does not contribute much. Performance appraisal system can be potent tool if used properly.

-----, TECHNIQUES, OPTIMISATION


Use of optimisation techniques in transportation planning is very vital keeping in view its importance in the national economy, large investments required in developing transport facilities and their impact on the development of a region. Transport sector has a wide spectrum of problems. Each problem is different from the other though it may have some common points and therefore, require different optimisation techniques to solve them.
Some municipalities are using intelligent transportation system to reduce congestion and improve the efficiency of existing transportation network. Recent legislation has spurred research in and development of intelligent transport, but it is the private market that will build on these investments over the next 20 years. Intelligent transport system technologies are needed at boarder crossing and intermodal transfer points worldwide to make international trade more efficient and therefore more profitable for trading partners. These highlights help to show how the intelligent transport has come in a very short time in the annals to surface transportation.

-----, TRAINING, PROGRAMME


Competence Based Training Programme (CBTP) is playing a vital role, in improving the productivity and quality in many fields and the current focus is in the field of surface Transport. A sincere attempt to tap the potential of this new concept is, therefore called for, to give a new thrust on competency based training programmes, to the transport sector which is a labour intensive and manned by professionals field with emotions.
There is a tendency to define 'sustainable urban development' in terms of the transport system and sustainable transport in terms of reduced greenhouse gas emissions. One weakness 'sustainable transport' comes to be seen as a series of problems that can be fixed, rather than in strategic terms directed at a desired future vision of society. Giving transports a dominant role in defining sustainability means giving it such an influence that we end up manipulating elements in the urban context in order to further a transportation end. A better way would be to work from principles and purpose, and to think belong transport. 'Sustainable transport' will be a consequence rather than a cause of a shift to a sustainable future.

It demonstrates the application of system dynamic methodology within the conventional four steps urban transportation planning process to produce an integrated dynamic urban transportation planning model. Travel time has been used as the main parameter to set the equilibrium state between various sub models. In addition to predicting the equilibrium parameters at any point of time the model is used to test different transportation system management policies. It presents the validity of the resulting model as a potential tool for urban transportation planning.
A new kind of underground urban motorway has evolved in response to increasing urban congestion and environmental constraints. These "metro routes" are underground tunnels that can accommodate up to six lanes of traffic safely and more in expensively than conventional road facilities. The cost of constructing metro routes can be made much lower if they are reserved for light vehicles, and the associated environmental and safety impacts can be minimised through innovative design. The metro routes have the potential to transform the transportation industry by offering new solution to urban transportation problems.

Macro level studies of the effect of transportation infrastructure investment on regional economic growth have shown positive relationship between the level of public investment and the rate of private capital formation, employment, and output growth. At a micro level, however, it is not quite clear how to model and measure the effects of an additional investment in a transportation facility like a highways link on local economic growth. It is further exacerbated by the fact that negative environmental externalities from infrastructure expansion are mainly experienced at the urban and regional level and thus strongly affect their economic well being. It analysing the economic effects of
local infrastructure investment and then proceeds to purpose a model, which shows analytically the impact of changes in accessibility caused infrastructure expansion, on location and out-put decisions, and the use of labour by production firms.

---, ---, SYSTEM, MODEL, REGULATED

201. SPENCE (Nigel). The model of regulated urban transport system as an example of combined operations of individual and public transport. *Social Change*. 24, 1& 2; 1994, March-June; 119-23.

The current economic policy with respect to the urban transport sector is based on the law on local self-government. This law stipulates that it is the municipality, which is responsible for supplying the needs of the local community for urban passenger transport service. Consequently, the burden of organising, managing and running urban transport service lies with local authorities both in towns and in the cities.
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