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# UNIT 1 ROLE OF TRANSPORT

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## 1.1 INTRODUCTION

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Transportation denotes the conveyance of goods and people from one place to other. Various modes of transports are involved in our every day life. Movement of people from one place to another for study, work, shopping or pleasure; movement of food as well as other items required for the people from the place of manufacture to the points of distribution; water supply, movement of raw materials from quarry or mines to factories; all these activities come under the purview of transportation.

In the modern world, transportation is a key element, and it is essential to the functioning of any society. It governs the location of activities and residences. It influences the provision of goods and services and the very quality of civilised life. The degree of development of a society can be closely inter-linked to the adequacy and efficiency of the transportation system.

In this unit, we will discuss the various roles of transportation in society and in what manner transport can influence and shape the economy of a country.

### Objectives

After studying this unit, you should be able to

- understand the scope of Transportation Engineering,
- know about the role of transport in society and in shaping the economy of a country, and
- have an overall idea about the current status of transportation in India today.

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## 1.2 SCOPE OF TRANSPORTATION ENGINEERING

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Transportation Engineering is the branch of knowledge which deals with the application of scientific principles to the safe, economical and efficient movement of goods and people. The subject encompasses a vast field. It deals with the vehicles in which the goods and people are moved. It deals with the paths and tracks on which the vehicles

move. It also deals with the terminals where goods and people are serviced. Mechanical engineers are concerned with the design of the vehicles and carriers. Civil engineers plan, design, construct and maintain the paths and terminals. Economists, statisticians and town planners also contribute to the planning of the systems. The subject is, therefore, truly multi-disciplinary in nature. For the Civil Engineer to understand the whole system, a rudimentary knowledge of the other disciplines is also essential.

### 1.3 ROLE OF TRANSPORT IN SOCIETY

Transport is a key infrastructure of a country. The economic status of a nation can be judged by the extent and scale of transportation existing in the country. Transportation has many roles to shape, sustain and enhance the economy of a country. How transport achieves these objectives is discussed here.

#### 1) Relationship between Transport and Economy

Transport and economy of a country are closely interlinked to each other. It is difficult to say whether better transport leads to higher levels of economy or whether economic growth leads to growth of transport. This dilemma is similar to the "chicken or egg first" argument. It is wiser to understand that the two are closely inter-related as shown in Figure 1.1. below.

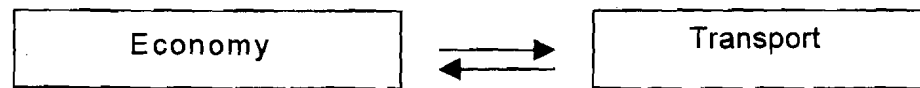


Figure 1.1: Relationship between Transport and Economy.

The rate of growth of transport of a country bears a certain ratio to the rate of growth of its economy. In the case of a highly developed economy, this ratio is marginally higher than 1.0. In the case of a developing country, this ratio can be as high as 2 or 2.5. In other words, if the economy grows at 5 per cent, the transport grows at 10 or 12.5 per cent. Figure 1.2 shows this trend.

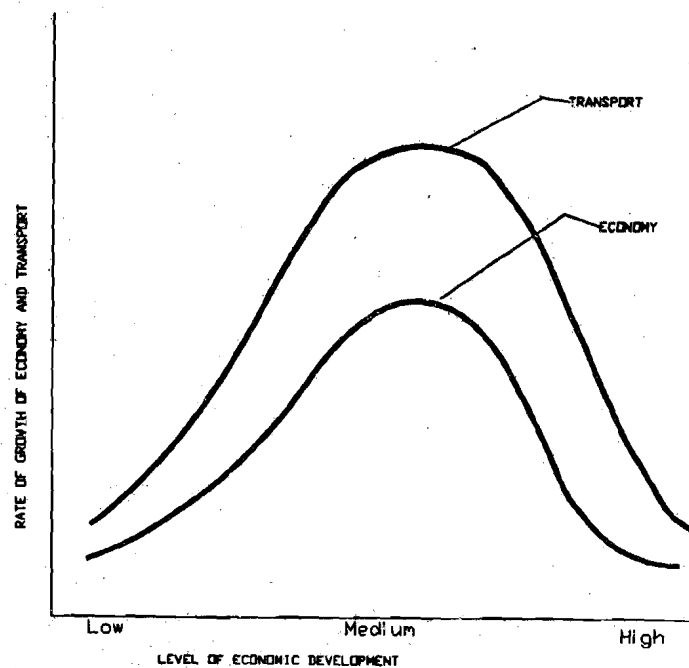


Figure 1.2: Rate of Growth of Transport and Economy under Various Levels of Economic Development

Another example of the close relationship between the economy and transport can be had from the car-ownership rates in different countries (Table 1.1).

**Table 1.1: Per Capita GNP and Car Ownership Rate in Selected Countries  
(Data for Mid - Nineties)**

Country	Per Capita GNP (in US \$)	Car Ownership Rate (Cars Per 1000 Persons)
India	310	4
Pakistan	440	6
China	530	3
Egypt	710	19
Indonesia	880	10
Thailand	2210	22
Brazil	3370	76
Malaysia	3520	113
South Korea	8220	114
Australia	17980	459
U. K.	18410	348
Germany	25580	495
USA	25860	504
Japan	34630	342

The wealth of a country depends upon the production, distribution and consumption of goods and services. Since resources are not uniformly distributed across the country, it becomes necessary to transport goods from place to place. Transport thus fulfils the derived demand to overcome the spatial separation of the resources (both material and human).

## 2) Place Utility of Goods

Natural resources are spread over the earth unevenly. In order to satiate human wants, they have to be transformed into consumer goods. The production of such goods can take place either at the very source of the raw material or at any other convenient location. The goods so produced have to be all over the different places of consumption. A good transport system gives 'place utility' to the goods. It makes it possible to transfer a commodity from a place where its marginal utility is low to a place where its marginal utility is high.

## 3) Transport Bridges the Separation between the Producer and the Consumer

The modern industrial era has given rise to two distinct classes, i.e, the producer and the consumer. The two are generally separated spatially. Transport bridges this gap. The wheat grower in Punjab cannot consume all the wheat he grows. Consumers in the South and East get their wheat from Punjab. The textile mills of Ahmedabad disgorge their product in the rest of the country. The tea consumer in U. K. is far away from the Assam tea gardens, but he enjoys his daily cup of tea.

## 4) Time Utility of Transport

Transport of goods and people involves time. Time has utility just as any other commodity and hence a cost. The rapid developments in transport have made it possible for people to talk in terms of time rather than distance. Thus, we talk of 10 hours travel time between London and Delhi instead of the distance. A poor transport system results in

delays. Delays get translated into additional costs.

#### 5) Preservation of 'Quality' of Goods by Quick Transport

Certain articles like milk, fruits, vegetables, meat, fish, flowers etc are perishable and require to be transported in a short time. Apples from Kashmir will rot if not transported quickly to the rest of the country. Milk from Gujarat arrives daily in rail wagons to Delhi. Fish from Chilka lake (Orissa) moves by train to Calcutta. Jasmine flowers from Mangalore are air-lifted daily to Bombay.

#### 6) Specialisation and Economies of Scale

A feature of the industrial age is specialisation. This gives rise to mass production. Economies of scale are possible. Many automobile ancillary units are located in Madras. But the product from these is consumed at motor vehicle manufacturing centres far away. Take the case of the Railways the wheels and axles are manufactured in Bangalore, the coaches are built at Madras, the locomotives are made at Chittaranjan, the rails are rolled out in the steel mills in Bengal and Bihar, the concrete sleepers are made at various centralised locations. An efficient transport system makes this possible.

#### 7) Exploitation of Natural Resources

Natural resources are the back-bone of the economy of developing countries, many of which have single-product economy. Take for example Saudi Arabia : its oil reaches many distant places in the world through a good system of pipe-lines and shipping. Coal from Bihar burns the chimneys in the South. One of the motives behind building India's rail network in the latter half of the nineteenth century was to tap its natural resources like cotton and jute to feed the mills in U. K.

#### 8) Transport and Industrial Development

One of the factors an industrialist reckons with when starting a new industry is the proximity to raw materials and availability of adequate transport facilities to carry the finished goods to the consumption centres. Industrial development takes place quickly in areas having a good transport infrastructure. An example is the agglomeration of industries in Bombay and Calcutta. Both these cities are very well connected to the hinterland by a good system of railways and roads and both have good port facilities. Railways tend to concentrate heavy industries along their network. Roads disperse medium and small scale industries.

#### 9) Transport and Agricultural Development

Modern agriculture is dependent on adequate supply of fertilisers, improved seeds and pesticides. Agricultural surplus has to move to markets. A good system penetrating to the rural areas activates quick agricultural development. Punjab and Haryana, the States which brought about the Green Revolution in the country, have roads linking all their villages.

#### 10) Cost of Goods

A good transport system implies reduced transport cost. Lowering transport costs generates new demand. The economy as a whole flourishes. The cost of Korean cement landing on India's shores is lower than that of indigenous cement. Korea has a good internal transport system, port facilities and maritime shipping.

#### 11) International Trade

Different countries have different natural endowments and acquired skill. Thus, all have to import and export. India's exports in 1996-97 were valued at Rs. 85,600 and its imports Rs. 97,100 crores. This order of trade is possible because of transport, be it oceanic or air-transport or surface transport.

#### 12) Administration of Large Areas

The world today consists of a large number of political units, each having jurisdiction

over a vast area and having its own uniform political structure. The governance of vast areas under the modern system of administration is possible because of the facilities afforded by modern transport and communications. India is a vast country with 3.3 million sq kms of area and a population of 950 million. It has a federal system of government, consisting of a strong centre and many states. A good transport network (roads, railways, air transport etc) and a good communication system (telephone, telegraph, postal services, radio, television, wire-less, press etc) enables the country to be governed.

### 13) Defence and Strategic Needs

The defence of a country requires quick movement of troops and materials to the border areas. From the strategic point of view a good transport system in the country and in its border areas in particular can be of invaluable help. India's border roads illustrate this point. India has a vast coast line to defend. This can be facilitated if good ports exist and a good land transport system backs up the port facilities.

### 14) Transport and National Integration

A vast country like India with diverse regional customs, life styles and languages requires strong centripetal forces to achieve national integration. Transport is one such integrating force making it possible for people to travel and intermingle.

### 15) Tourism Development

Tourism, both domestic and international, is dependent on transport. In India, travel to places of religious importance was common even in the olden days. But it had to be achieved by walk, on horse-back or in bullock-carts. Only the brave and sturdy could undertake a journey from South India to Badrinath. Not so now, when fast trains and buses have conquered space, time and drudgery. Kashmir, a tourist attraction, depends on the Jammu-Srinagar highway and the air link for its tourist clientele. International tourism has made rapid strides because of air transport.

### 16) Settlement Pattern

The settlement pattern in a country is largely determined by transport. In India's case, the early Aryan settlers established numerous settlements in the great Indo-Gangetic plain, mainly because the land was flat and fertile and communication was easy. The river towns, many of which have become big cities now (Varanasi and Patna for example), grew because navigable rivers helped the settlements to form and develop. Other river cities in India are Vijayawada (on the Krishna), Rajamundry (on the Godavari), Cuttack (on the Mahanadi) and Guwahati (on the Brahmaputra). When trade from one country to another by sea began, the foundations of great port cities like Bombay, Calcutta and Madras were laid.

### 17) Urbanisation

As countries march towards industrialisation, migration of people from rural areas to towns and cities takes place. Thus, we see a high proportion of people living in towns and cities in the developed countries (for example: USA - 74%, Japan - 76%, Germany - 86%, U. K. - 92%). In contrast, the developing countries have low urban population (for example: Nepal - 7%, Bangladesh - 18%, China - 22%, India - 25%). In the latter countries, urban population is growing very fast annually faster than the country's population growth (for example: Bangladesh - 7.9%, Nepal - 5.6%, India - 3.9%).

The migration of population is facilitated by transport.

### 18) Pattern of Growth of Cities

Transport brings about a dispersal of activities in cities. As city population increases, further growth takes place at the periphery. This in turn is possible if fast transport facilities are provided. A classic example is the growth of Bombay suburbs, powerfully propelled by the Western and Central Railway suburban lines. Commuters travel from 50 kms to the city centre daily. In American cities, "Exurban" Expressways are coming up

fast as people tend to live far away from the centre of the cities.

#### 19) Social Development Activities

Social development programmes such as health, education, family planning, housing, cooperation, water supply, sanitation, social forestry, development of non-conventional energy etc rely heavily on a good system of transport. This is particularly true of rural India, where the majority of the population lives. The uplift of scheduled tribes and backward classes, living in inaccessible and remote pockets, can be achieved only if a good system of roads exists.

#### 20) Disaster Management

Transport plays an important role in fighting floods, draught, famine, earthquakes, cyclones etc. It brings relief and succour to the needy. Rescue operations become easy. Supply of essentials by air-dropping saves many lives. The establishment of warehouses in particularly every part of the country and storing them with grain transported from the surplus regions, has virtually eradicated famine in the country.

#### 21) Transport the Cause or Effect of Development ?

A question often asked is : Is transport the cause or effect of development? Some maintain that transport must precede development and investments must be made in transport in anticipation of demand. Others argue that transport is a "derived" demand—derived from growth in other sectors—and hence long-term investments in transport should be made only after demand has materialised and bottleneck situations develop. Perhaps the best answer to this controversy is "that the chicken-or-egg-first argument for transport is of academic interest". Transport development must take place in step with overall economic growth. Transport inadequacies should not strangle growth.

#### 22) Transport in Developing Countries

What role does transport play in transforming the economies of the developing countries? In these countries, exploitation of natural resources is hampered for want of good transport facilities. Agriculture is practised on primitive lines, because modern inputs like fertilizers, quality seeds, implements, pesticides, and know-how do not reach the small farmers. Industrial activity picks up slowly when transport is obsolete. Obstacles to movement inhibit growth of market, raise cost of production and increase prices beyond reach of consumers.

It is worthwhile to go back to the early stages of growth of the industrialised countries and learn how they achieved rapid industrialisation with the help of transport. U.S.A, is a good example. Between 1850 to 1890, construction of railways absorbed more capital than any other sector of the American economy. With the advent of motor transport, investments on highways were increased. It is often said that the highways of America built the nation rather than the nation building the highways. It built some roads "in advance of, not in response to", the roads "shaping the economic and social landscape rather than being shaped by it". "From roads to riches" sums up how America transformed itself to an industrial giant.

#### SAQ 1

- a) What is the relationship between transport and economy of a country ?
- b) What is "place utility" of goods ?
- c) What is "time utility" of transport ?
- d) What are the various roles of transport in shaping a country's economy ?
- e) How does transport help in disaster management ?
- f) How does transport shape the settlement pattern of a country ?

## 1.4 TRANSPORTATION IN INDIA TODAY

India has a reasonably good transportation system, covering many modes. India's economy depends upon its transportation system to a large extent. The modernisation of the present system will greatly facilitate the speedy economic growth of the country.

### 1.4.1 Principal Modes

The principal modes of transport in India are :

- 1) Railways
- 2) Roads
- 3) Air Transport
- 4) Oceanic Shipping
- 5) Coastal Shipping
- 6) Inland Water Transport
- 7) Pipe - lines

### 1.4.2 Railways

The Indian Railways have a route length of nearly 63,000 km. It is multi-gauge, but the present policy of government is to have a uni-gauge system. The sides and diagonals of the quadrilateral connecting the four cities of Delhi, Calcutta, Mumbai and Chennai constitute the trunk route carrying nearly two-third of the freight traffic and half of the passenger traffic. The railways have been gradually losing to roads in the movement of goods and passengers. It has been estimated that between 1951 and 1985, the railway share of freight traffic had dropped from 85 per cent to 30 per cent, and the share in passenger traffic had dropped from 62 per cent to 16 per cent. This trend is continuing further. It is expected that by the year 2000, the share of railways in freight would be 25 per cent and that in passenger traffic would be 13 per cent. The modernisation of the railways has lagged behind the needs. Track renewal, doubling of tracks, electrification, introduction of modern technology locomotives, coaches and wagons and modernisation of the signal system are some of the areas where improvements are urgently needed.

### 1.4.3 Road Transport

Road transport has emerged as the dominant mode, wresting the place from the railways gradually over a period of five decades. This has been possible because of certain inherent advantages such as flexibility, door-to-door service, speed and the involvement of private operators. The number of motor vehicles has grown from 0.3 million in 1951 to 25.3 million now. The average rate of growth of road traffic is in the order of 8-10 per cent per annum. The length of roads has increased from 4,00,000 km in 1951 to 21,00,000 in 1991. Even then, about 50 per cent of villages are yet to be connected by roads. The quality of roads needs to be improved considerably.

### 1.4.4 Air Transport

Air transport has been growing at the rate of 8-10 per cent in recent years. There are about 90 airports. Air transport is poised for a phenomenal growth in the coming years.

### 1.4.5 Oceanic Shipping

India's export and import trade is largely handled by ocean transport. There are 11 major ports and 163 minor and intermediate ports in the country. The port infra-structure needs immediate augmentation of capacity and modernisation. The poor facilities in Indian ports can be gauged by the fact that the turn-around time of ships in India is 4-10 days, whereas it is 6-48 hours in most foreign ports. Internationally, ports operate 55-65 per cent capacity. In India, however, most ports operate at 100 per cent capacity, thus indicating serious congestion.

### 1.4.6 Coastal Shipping

India has a coastal line of nearly 600 kms, and there is a good scope for movement of goods along the coast. At present, coastal shipping carries little traffic, and this is mostly of coal. If terminal and handling facilities can be improved, coastal shipping can take over a good share of goods movement. This will make transportation cheaper, less polluting and energy efficient.

### 1.4.7 Inland Water Transport

India has a number of navigable rivers and canals. Transport of goods can take place efficiently on these with country boats and mechanised vehicles. At present, only a small quantum of transport movement takes place by this mode. The main drawback for greater utilisation of this mode is the non-perennial nature of flow in Indian rivers. If the rivers and canals are periodically dredged and good terminal facilities are provided, the quantum of goods moved can be substantially increased.

### 1.4.8 Pipelines

Pipelines exist in India for transporting petroleum crude and products, gas and solids in the form of slurry. These materials are best transported in pipes, rather than by road or rail, giving rise to energy savings and overall cost savings. There is a good scope for increasing the pipe-line network in India.

Transport in India has not been developed to the desired level, with the result one finds serious bottlenecks and inefficient operations.

Public sector investments on transport have not kept pace with the needs. The government are now seriously considering the participation of the private sector in the modernisation of transport. Toll roads under the Build Operate Transfer (BOT) and railway projects under the Build, Operate, Lease and Transfer (BOLT) are being considered.

### SAQ 2

- a) What are the various modes of transport in India ?
- b) What are the shortcomings of India's transport system and how can they be remedied ?

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## 1.5 SUMMARY

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In this unit, we have dealt with the importance of transport for a country's economy. As we have seen, transportation is a key infrastructure of a country. It has many roles to play in shaping, sustaining and increasing the economic prosperity of a country.

You have studied in detail the following in this unit:

- various roles of transportation in moulding the country's economy, and
- various modes of transportation system existing in India.

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## 1.6 KEY WORDS

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### Place Utility of Goods

It is a transfer of commodity from a place where its marginal utility is low to a place where its marginal utility is high.

<b>Time Utility of Transport</b>	The transport system which saves time in transporting goods and people.	<b>Role of Transport</b>
<b>Oceanic Shipping</b>	The transportation take place through the sea between the countries.	
<b>Coastal Shipping</b>	The transportation along the sea-coast within the country.	
<b>Inland Water Transport</b>	The transport take place through rivers and canals within the country.	

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## 1.7 ANSWERS TO SAQs

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### SAQ 1

- a) Refer section 1.3
- b) Refer section 1.3
- c) Refer section 1.3
- d) Refer section 1.3 to 1.3
- e) Refer section 1.3
- f) Refer section 1.3 and 1.3

### SAQ 2

- a) & b) Refer section 1.4

