CHAPTER-III

AN OVERVIEW OF LITERATURE

It is necessary for a researcher to go through the available literature prior to start the research. The survey of literature is aimed at (i) to show whether the evidence already available to solve the problem are adequate, (ii) to provide ideas, theories, explanations or hypotheses valuable in formulating the problem, (iii) to suggest methods of research appropriate to the problems, (iv) to locate comparative data useful in the interpretation of results and (v) to contribute to the general scholarship of the investigator.

Studies on Importance and Development of Road Transportation

Road transport is a basic infrastructural facility required for the economic and social development of human population. There are many studies related to road transport covering various parts of India and other countries. The prominent among them are as follows;

Subramanyam (1930) devoted his exclusive attention to a study of the transport network in different parts of South India. In the regional studies of transport geography in which a single state has been selected for an appraisal of the transport system, Majid (1950) made the first contribution. He assessed the relative density of transport lines in different parts of the state and found that a thick net of unmetalled roads served time sugarcane producing zone of north Bihar and that the density of the transport lines was thickest in south Bihar where all transverse links terminated at the Ganga. But the mica zone lawfully lacked transport facilities which were a hindrance in the economic exploitation of this mineral resource. Majid also correlated the state’s transport system with market accessibility. Guha (1955) presented her valuable study of the traffic flow in the greater Calcutta area. While all the relevant aspects of the problem were treated satisfactorily, Guha’s study lacked suitable maps which could have far enhanced the value of her work.

Singh (1963) studied the road traffic flow in Uttar Pradesh and depicted his results on suitable maps. The study showed the state’s transport relations with other parts of India and assessed the regional position of various traffic divisions in respect
of inter-state movement of vehicles. It also noted the recent growth in road traffic, especially during the first decade of independence, and attributed it to the state’s economic development. Singh and Singh (1963) conducted a useful survey of road traffic in Varanasi, which reveals that in Varanasi, the chief mode of transport was still the cycle and the cycle-rickshaw, because southern and eastern parts of the city were highly congested, so an early diversion of traffic to alternative routes was needed. They also proposed the construction of a second bridge on the Ganga and a few wider link roads. Singh (1964) published his useful study on the transport system of south Bihar, focusing attention on some of its major problems and suggesting measures for their solution. Singh (1966) presented a study of Uttar Pradesh’s transport system in the context of the state’s geographical setting and analyzed its evolution. Singh (1968) pursued the nature of the links and worked out the degree of accessibility with a view to measure the efficiency of the network in present as well as future perspective in case of North Bihar.

Analysing the existing road network of Mysore State, Adrashannawar (1968) assessed the state’s transportation needs. He calculated ranking coefficients of the surfaced roads for each district and suggested useful measures for future development. Prasad (1968) investigated into the factors, both physical and economic, which have retarded the development of roads in the Chota Nagpur region of Bihar. Sinha (1971) studied accessibility by roads in Mysore state and analyzed general pattern of arteries, their characteristics and the extent/degree of accessibility. Goswami (1972) in his paper intends to provide a brief discussion of the problems and techniques of transportation mapping. Patil (1972) explains the general alignment pattern of routes, their relationship with the terrain and the future needs of the respective study areas, stressing on maintenance of inter-district and inter-State linkages. Singh (1976) studied that Manipur, a tiny state in the Indo-Burma ranges, remained largely unexplored and underdeveloped for centuries for lack of means of transport and communication. He found that Manipur is in the process of developing the roads to enter into new era of industrialization and is steadily moving towards the age of transport revolution. Deka, et. al. (1977) analyzed population as a factor in the transport development in the Brahmaputra Valley, Assam.
Chatterjee et. al. (1979) made an analytical study of the transport system of the Sundrabans region. Singh, et. al. (1982) in their article presented an occupational analysis of population engaged in transport activities in the urban centers of Eastern Uttar Pradesh. User’s centers are classified on the basis of functional specialization intensity and regional ranking. Demographic and socio-economic characteristics and their correlation with the said activities have also been statistically analyzed.

Dasgupta (1982) made an attempt to examine formation of transport network in the Brahmaputra Valley (1839-1914). Bhagabati, et. al. (1984) has analysed the pattern of road accessibility of some selected urban centres of Assam and the relationship between the degree of accessibility and the population size of the towns. Singh, et. al. (1987) highlighted the problems of planning for transport system with particular reference to promotion of tourism in Varanasi city. Bhaduri (1991) in his article studied that, for strong economic growth and over all prosperity of the nation, the development of roads is essential and it can be said that the progress of a nation is directly related to its road development activities.

Mishra, et. al. (1991) described the importance of the development of transport network as an effective system of vital arteries around which the functional organization of the area takes place. He studied that the growing network of transport in Basti district of Utter Pradesh has led to the expansion of a variety of socio-economic activities and facilities during the last two decades. Saxena (1991) ascertained that the rank correlation coefficient between levels of development and degrees of connectivity is statistically insignificant. This means that the factors governing the development of road connectivity are not related to the factors governing the regional pattern of economic development. There are at least six districts, where the order of connectivity is relatively high although the levels of development are low. Similarly, in four districts the levels of development are high although the connectivity indices are of low order.

Kapila (1998) threw light on Indian highways planning. Roads have been important in India since ancient times, but were given much lower priority than railways during the British occupation. The First Road Development Plan (Nagpur Plan) was formulated in 1943. After independence, the First Five-Year Plan (1951-56) classified roads into national highways, state highways, district roads, and village
roads. The Twenty-Year Plan (Bombay Plan) (1961-81) envisaged a major expansion of the Indian road network, especially of national and state highways. In 1984, the Indian Roads Congress adopted a further major road network expansion plan, the Road Development Plan (1981-2001), which had eight broad objectives. The following new road classification system was proposed: (1) Primary system, consisting of expressways and national highways; (2) Secondary system, consisting of state highways and major district roads; and (3) Tertiary system (rural roads), consisting of other district roads and village roads. Today, national highways constituted about 2 per cent of all the roads in India, but carried about 40 per cent of the total road traffic.

**Hine (1998)** reviews the idea of a ‘level playing field’ for transport investment and the ‘new realism’ in transport policy which advocates the need for demand management through the direct regulation of street environments and the land use planning system. In addition to environmental, political and social concerns surrounding such trends, macro-economic circumstances have been an important feature of road transport regulation. In such a climate, private finance is seen increasingly as an alternative to public investment. The paper discusses the private finance initiative and the consequences for road provision and demand management.

**Hall (1999)** raises several conceptual questions concerning the actual and symbolic representations of inequality and differentiation expressed in leisure and tourism mobility which have significance for members of host communities visited, transport and land-use planning in host areas, tourists and the tourism industry. Within this framework, he explores two sets of conceptual issues which are positioned at the interface of transport and tourism. First, transport has the potential to act as a gatekeeper to culture contact, constraining or encouraging host-tourist interaction. Second, the role of tourist mobility at a local level can be critical for issues of inequality and externality effects.

**Durai, et. al. (2000)** describes the planning of rural road and its implication. He further reiterated that rural road is a basic infrastructure requirement, which plays a vital role in socio-economic upliftment not only of rural community but also of the country as a whole. It contributes significantly in meeting the transport demands in rural areas by providing access to goods, services, and social facilities easy. This also
makes rural market accessible to urban commodities. Gekonge (2001), attempts to examine Mitchell and Rapkin’s hypothesis that traffic generation is a function of various kinds of land-use development patterns over space. Preston (2001) examined that it is widely recognized that transport is an intermediate good based on derived demand. However, most transport analysis goes on to treat transport like any other good. Here it is argued that to do this is problematic and that there should be a reconsideration of the links between transport and socio-economic activity. The relationships between transport demand, transport investment and gross domestic product are highlighted and the evidence concerning transport intensity and causation is reviewed. The relationship between transport demand and socio-demographics is also reviewed and the contribution of models at a variety of geographical scales is examined.

Marr, et. al. (2004) found that transportation improvements have, in part, led to agglomeration economies and a resultant contraction in the number of different types and an increase in the volume of crafts produced. Scott, et. al. (2007) conducted a preliminary investigation determining the factors that affect traveler-perceived quality of service on rural freeways using in-field surveys of motorists traveling on rural freeways. In regard to quality of service, it is becoming more evident that travelers consider multiple factors, and the results from this survey support that notion. Specifically, the survey shows that most respondents consider three or more factors important in determining their quality of service on rural freeways. Although density still appears to be a primary factor affecting perceived quality of service, additional factors, such as speed variance and percentage of free-flow speed, seem just as important to travelers. In addition, some non-traffic performance measures, such as pavement quality and driver etiquette, were found to be important. Rathaur (2011) discusses the idea of green highways - a relatively new concept that involves environmental friendly and sustainable highway development. Green highways and bridges around the world, in the United States, Europe, China and Australia, are briefly discussed, in terms of implementation in India. Green highways are defined by five broad topics: watershed management; energy saving and emissions reduction; recycle, reuse and renew; ecosystem conservation and management; and overall benefits to society.
Studies Related to the Roadside facilities

Poorman, et. al. (1963) suggested that because of the lack of service station and food and lodging accommodations on the Inter-state highways system, safety rest area be provided. The location and spacing, size, adjoining property uses, design, layout and facilities are discussed. Three types of rest areas are outlined with different degrees of service. Greenaway (1978) studied the roadside emergency telephone system. Based on a specification drawn up by the department of transport, it is found that the system is built up of a number of modules, each capable of operating up to 16 telephones. Each module consists of: a bridging unit to which 16 telephones are connected, an answering unit at the control centre and a key and lamp strip mounted on the operator's desk.

John (1980) discussed about the popularity of motel instead of hotel because the highway traveler's rejection of the hotel (most hotels were located in congested downtowns and lacked adequate parking facilities) prompted the rapid evolution of cabin camps, cottage courts, motor courts, motor inns, and, eventually, highway hotels. Standardizing influences were exerted first through trade associations and then through chain and franchise corporations. Changing motel morphology was characterized by evolution rather than revolution until the revised tax code of 1954 and the Highway Act of 1956 vastly accelerated motel construction attracting corporate investors. Hotels and today's larger motels are very similar with increased emphasis on public as opposed to private space and increased formality. Thus in fifty years the motel has come full cycle as an alternative to hotel accommodation.

Clark (1983) while investigating the roadside facilities on trunk roads. The researcher examines the services that are currently provided on the improved route of the A303 trunk road for the 150km length from Amesbury to Exeter and compares these to what was available on the old route. It queries whether the facilities, which range from restaurants, cafes and lay bye tea cabins; garages and petrol stations; telephones and public conveniences and picnic areas, are satisfactory. It considers the balance to be struck between private and public provision and suggests that a greater number of picnic areas, with toilets, telephones and parking for cars, caravans and lorries, should be provided by the highway authority.
Brenda (1994) investigated the traffic inspections anticipated as well as spontaneous, which is basically to check roadside facilities, such as rest areas, check points, or even by a highway patrol or truck regulatory officer on the shoulder of a road. The evaluating of the differences, if any, between violations found during the two broad classifications of inspections is also done. The data used are taken from all the inspections conducted in North Dakota during calendar year 1993. This is conducted to provide the office of motor carrier management staff with the information to improve the roadside inspection procedures and to allocate motor carrier safety assistance program funds as efficiently as possible. This will, in turn, result in the maximum removal of unsafe equipment and drivers from service. Sengupta (2001) identified various problems related to road network as inadequate capacity, congested city sections, safety, railway crossing and delay in the toll section, lack of wayside amenities and non availability of emergency medical help during accidents. Some problems are due to the pavement-related deficiencies such as insufficient pavement thickness, poor riding qualities, weak and disturbed bridges etc.

Berthelsen and California Department of Transportation (2002-03) in this paper discussed about the safety of road side rest area along the highways in California State. California's state highways are served by 88 roadside rest areas, first developed in 1962 and now stretched to capacity. Parking is tight and they are used heavily at peak travel times, with most of the structures forced to continue operating well beyond their original 20-year design lives, resulting in costly and difficult maintenance decisions. The California department of transportation has developed a master plan to guide, their renovation and upgrading and for adding new ones where feasible. The plan recommends 80 new ones and lays out the prime goals of a typical rest area. They are : traffic safety by allowing drivers to pull over and rest in a safe spot; amenities for commercial drivers of interstate rigs who often don't have access to private rest stops anymore; security and access to facilities by all users including those with disabilities; opportunities to create partnerships with local private businesses and other agencies to maximize the impact of investments; and esthetically pleasing, consistent architectural designs that at the same time reflect regional character. One new element is trying to incorporate drop-in facilities for highway patrol officers to provide more security and extend the scope of the patrol.
Yokota (2004) describes the Japanese concept of "michinoeki" and presents guidelines for design and implementation of this concept in developing countries. "michinoeki" is translated as roadside services. The roadside services encompassed by "michinoeki" have the following characteristics: (1) Along with providing commercial services, "michinoeki" are also venues for providing public services, such as health care including AIDS and HIV care, sanitation, cultural activities, and education and training. (2) In addition to travelers and drivers, local residents can also become "michinoeki" users. (3) Opportunities to be service providers are open to local businesses and community groups. It is also found that local residents can also increase their business expertise and income.

Yokota, et. al. (2006) focused in their paper on roadside stations facilities that make it possible to address not only traffic problems but the widening economic gap between urban and rural areas and poverty in rural areas where people lack basic health care, opportunities for basic education, and opportunities to increase incomes. Roadside Stations benefit users such as local residents in several ways: 1) empower local resident through community driven development; 2) incubate local businesses; 3) provide social services; and 4) improve road safety. Roadside stations can serve as a tool that meets these needs. Indoria (2009) described in his editorial that roadside amenities are provided primarily to meet the needs of long distance travellers and are aimed at reducing fatigue related accidents, at the same time enriching the experiences related to travel on the roads. Stopping and resting at regular intervals, while driving, helps reduce fatigue of the drivers and by providing facilities for the road users to stop clear of traffic, collisions with vehicles parked on the shoulders are also minimized. Roadside amenities may also contribute to regional economic development.

Carson, et. al. (2011) investigated the benefit of public rest areas in Texas and demonstrated its application in select corridors throughout the state. It is also explored how the novel safety rest area development approaches that could reduce the public cost burden borne by individual public agencies. Based upon the available supporting data for Texas, a benefit-cost ratio relationship was developed that included safety, comfort and convenience, and excess travel and diversion benefits accrued by highway users; direct monetary benefits accrued by highway or other public agencies;
economic development, tourism and specific business enterprise benefits accrued by external entities and direct monetary cost accrued by highway or other public agencies.

Salma (2012) studies the various aspects of land use planning along highways and regional road network in the country, which she found significant road transportation today has become the most important means of communication and all development efforts are, therefore, concentrated towards planning, design and construction of nation-wide network of roads at all levels. The impact of such development without proper planning on the social, physical and environmental aspects is not found very positive. Negative issues such as lack of road safety, environmental degradation of surrounding area is occurring in spite of improved means of communication and economic development. The rate of road accidents, loss of life every day is testimony to what the nation has achieved by not paying adequate attention to integration of land-use planning and road infrastructure. The physical characteristics of any roadside area reveal the inadequate planning of the road layout. Problems arising are: encumbrances on roadsides, especially on the road reserve areas of both sides by all kinds of uses; unrestricted/unplanned growth of shops, markets, bazaars and settlements within close distances of highways and local roads; lack of planned areas for stoppages of buses, trucks for passengers and goods which continue loading, unloading directly into the busy road; tree plantation along curved roads indiscriminately cause severe accidents by limiting the vision of drivers, a problem accentuated in darkness and unlighted roads; and location of industries and institutions along roadsides in most areas cause conflict among pedestrians and vehicular traffic and result in fatal accidents.

Studies Related to Road Accidents and Road Safety

Codling (1974) and TRRL (1974) presented considerable research, using published national road accident statistics, into the effects of weather on road accidents. Whitelegg (1987) examined geographical variations in road accident and casualty rates. Stern, et. al. (1989) explore a fairly neglected aspect of the relationship between atmospheric environment and human behavior concerns the association between thermal conditions and road safety; an aspect which has both a theoretical and a practical value. The study examines two hypotheses concerning the
effect of heat stress on the risk level of road accidents and their type, based on the common assumption that the occurrence probability of road accidents follows the poisson distribution, the N order model for identifying ‘black spots’ is used with a 7 year data set from the Arava road in Israel. Risk level of road accidents general is found to increase with the severity of hot weather. The majority of accidents occurring under hot conditions are those involving only one-person judgment, from which ‘running off the road’ accidents are especially associated with high levels of heat stress. The common lore linking heat stress and road safety is statistically confined.

Stern, et. al. (1990) pointed out in their article the relationship between atmospheric environment and human behavior. It concerns the association between thermal conditions and road safety. The study examines two hypotheses concerning the effect of heat stress on the risk level of road accidents and their types. Palutikof (1991) presented considerable research, using published national road accident statistics, into the effects of weather on road accidents. Preston (1991) examined geographical variations in road accident and casualty rates. Edwards (1996) provides the first geographical overview of the relationship between accident frequency and the weather has been established. He explained the spatial dimension of weather-related road accidents is examined. The term weather related has been chosen carefully, on the understanding that the weather might be a contributing factor in an accident, although not necessarily the principal one. Variations in accident frequency in fine weather, rain, high winds, fog and snow are detailed and comparison made between frequency of accident occurrence and weather conditions across England and Wales. Findings establish that the reporting of accidents in hazardous weather broadly follows the regional weather patterns for those hazards.

Baviskar (1998) in his paper discusses: (1) the spatial trends of accidents on NH-3 and NH-50, both of which pass through Nasik; (2) the results of a traffic census on important roads in Nasik for 1981-90; (3) observations on the NH-50; (4) the time distribution of accidents on the national highways; (5) the seasonal trend of fatal, serious, and minor accidents on the national highways; (6) analysis of accidents for different categories of roads; (7) observations of the physical features and road conditions of different sections of NH-3 and NH-50; and (8) the accident
environments on the NH-3 and NH-50. The results of the study emphasizes that the main safety initiatives on Indian national highways should be specific very local improvements of accident black spots, correction of short geometric curves, provision of paved shoulders, increase of sight distance, removal of roadside hazards, flattening sides and slopes, and placing guard rails on high embankment and bridge approaches.

Sharma, et. al. (2000) focused on road safety considerations on Indian National Highways. There is lack of traffic education, apathy and contempt for road discipline, and very lax enforcement of traffic laws. The work of the Transport Research Laboratory (TRL) has shown clearly that mismatches in interactions between vehicles, road users, and the road environment can lead to accidents. Specific causes of accidents include: (1) median kerb stones in dual carriageways and poor visibility of kerb stones; (2) staged road construction; (3) lack of maintenance of road signs; (4) driver errors; (5) plantation of trees in rights of way; (6) depressed side shoulders; (7) contractor errors; (8) bridge railings; (9) poor drainage; and (10) haphazard crossing of roads by pedestrians and cattle. Mittal, et. al. (2001) underlined the characteristics of road accidents. It is found that accidents involving vulnerable road users were higher on lower category roads than on state highways. Although speeds were lower on lower category roads, the proportion of vulnerable road user was higher and injuries in this group were likely to be severe. Overall, deaths and injuries were lower on lower category roads than on state highways. Hit and run cases were more frequent on lower category roads.

Lai-Fa Xie, et. al. (2011) explores traffic collision records for roadside safety crashes which were analyzed to supplement the qualitative auditing suggestions. The performance of Chinese roadside barrier designs was also evaluated based on a comparison with their counterparts in the United States. Several critical issues were identified and countermeasures recommended. First of all, it was found that the current Chinese highway design standard is silent about the dimension specifications of roadside clear recovery zone (CRZ), which does not lend itself to safe roadside safety design. Second, it was realized that the existing roadside barriers are not strong enough to protect the heavy trucks from running off the road. In addition, some roadside obstacles are found to be unprotected or un-treated, such as barrier ends, and drainage ditches. Based on these observations, pertinent
countermeasures for each issue were discussed in detail in this paper, and a roadside safety audit report was generated for the Jiangxi Provincial Communications Department to guide the RGE project roadside design.

**Studies Related Satisfaction Level**

**Lord (1975)** studies travelers’ attitude towards rest area on roadside. Today's traveler has begun to look to rest areas as far more than a "wide spot in the road" on which to pull off and relax. Particularly on interstate highways, today's rest areas must be equipped to satisfy more than the need for rest. They must provide clean, well-lighted sanitary facilities, picnic and parking areas, safe drinking water, telephones, motorist information, and an ever growing list of support services. Another facet of the problem is the rest area and how it can be most effectively used to meet motorists' needs. Operation and maintenance problems are becoming increasingly complicated and costly. The need to clean and service the rest area, prevent vandalism, and operate sophisticated sewage-treatment and drinking-water purification equipment has created additional problems. An information gap has developed that motorist information systems at rest areas may help to fill. **Chol (1998)** explain the attention has been increasing to know the consumer satisfaction in the marketing literature. It is also point out that satisfaction is a psychological outcome emerging through experiences whereas service ability is commercial with attributes of service itself.

**Awotona (1990)** briefly documented the conventional mass housing approach deliberated adopted as a public policy in Nigeria during the period 1970-1980. The consequences of the espousal and implementation of this policy option which was based on the assumption that only government had the instrumentalities and competence to “house the masses”, are also examined. The decade 1970-1980 started with both the federal and state government according very low priority to the housing sector in their development plan. The advent of the oil boom era (1973-1976), however, changed this. The tremendous increase in revenues as a result of this led to a greater public intervention in the housing sector. A series of actions, programmes, re-organization and creation of institutional framework and policies which had a direct impact on housing supply throughout the country was taken by both the federal and government sector. This paper notes that amongst the major factors that were responsible for the ineffectiveness of public policy and programmes, to stand out
prominently. These were: lack of incentives for the private sector to participate actively in the housing sector; and, the inadequacy of mortgage finance institutions in Nigeria.

Transport, environment and energy, Farrington and Ryder (1993) outlined the application of environmental assessment to British transport infrastructure development and supported the development of strategic environment assessment as a means of strengthening policy making processes. Hine and Russell (1993) assessed the relationship between traffic conditions and pedestrian crossing behavior on high-density mixed-user streets which determine the extent of the traffic barrier effects.

Clemens, et. al. (2010) examined in their review has been undertaken as part of the New Zealand Transport Agency (NZTA) research project improving the benefit to cost ratio for highways through multi-use management. It specifically contributes to the objective understanding the perceptions and values of road users, designers and managers. The purpose of the review is to provide a summary overview of current literature concerned with the environmental and landscape values of roadside corridors and their design and management, with reference to the New Zealand state highway corridor.

**Impact Studies on Surrounding Communities or Area**

Heder, et. al. (1980) highlights this is a guide for transportation planners in creating attractive environments for people using transportation facilities and for those in the surrounding communities. The book which is based on 45 case studies, it is illustrated by several photographs, begins with a formal discussion on art and then proceeds to facility design, potential impacts and improved procedures. A comprehensive section on sites and opportunities discusses topics such as cityscape, gateways, passageways, streets, plazas, and the renovation of older works. A number of procedures for managing arts programs are discussed. The section on highways provides design policy advice for planners on route selection, sign control, roadside development, and historic presentation. Other sections of the book discuss buses and streetcars and rapid transit. Aesthetic impacts involved in integrating transportation facilities with their surrounding communities are discussed. References are provided to funding sources and 141 publications.
Filani (1993) examined the general effects of road building, hindered by a lack of road maintenance, on rural development in Nigeria, creating opportunities for agricultural expansion, mobile health facilities and banks in rural areas. The complex issues involved in redeveloping redundant urban waterfronts were addressed by Desfor (1993) who examined the pressure for change in the structure of the Toronto Harbour Commission and Hoyle (1994) who assessed the perceptions of port authority representatives, urban planners and developers across Canada.

Gutierrez, et al. (1996) examined in their paper is to assess the impact of the future Trans-European Road Network as far as accessibility is concerned. Accessibility analysis and presentation of results is undertaken using a vector geographic information system (GIS). In accordance with the results of the study, the new planned links appreciably modify levels of accessibility to economic activity centers, thus reducing distances and bringing the peripheral regions closer to the central ones. In accordance with the analyses carried out, the benefits of these new infrastructures will affect the whole of the territory of the European Union, albeit particularly so in the peripheral regions. Linnerker, et al. (1996) devoted exclusively to a study of the M-25 London Orbital Motorway which has affected levels of accessibility in Britain. Changes so caused are thought likely to affect regional development and the objective of this research is to evaluate the nature of this relationship. The regressions also include a number of other potential explanatory factors. Accessibility is measured using time, distance and cost impedance functions for heavy goods vehicle movements. Here the results are somewhat different from those found in previous research involving different spatial and temporal circumstances.

Button, et al. (1997) studied that there are important social changes that are influencing the way transport is now viewed. In particular there are concerns that current trends in transport are not sustainable over the long term. Some of the main forces for social change and the way that they interact with transportation are described. It highlights a number of key areas were conceptual research work could prove advantageous and considers institutional mechanisms that would foster, in particular, transatlantic initiatives in these fields. Bryan, et al. (1997) examines the impact of a major road improvement programme on the economic development of
North Wales. The paper identifies the economic impacts of the road on a selection of firms and organizations in North Wales, and provides a modeling framework to examine the static and dynamic effects of road improvements. Road improvements across North Wales are found to be a necessary, but not sufficient, condition for economic development in this peripheral area.

Lahti (1997) estimated the environmental effects due to roadside rest area. The environmental effects that arise at roadside rest areas are due to, e.g., storm water, sewage and refuse. To treat the storm water properly it is important to know which pollutants it contains. The most common way to treat the storm water is by local leachate treatment using e.g., surface infiltration, percolation storage, ditches, ponds and wetlands. The sewage quality may vary depending on what is connected to the system. Most common is mixed sewage. To successfully treat mixed sewage locally, one should know, for instance, the load and the geological conditions. Purification may be carried out by different types of infiltration, watering of crops, or wetland or aquatic systems. If toilet systems separating urine and faeces are used, the residual products may be treated in different ways. The faeces can be composted and the urine may be used for watering crops. In most cases today some sludge is produced and this has to be processed. The kind of sludge produced depends on whether a sludge separator or a septic tank has been used. After-treatment of sludge may be performed by different methods, e.g. spreading on cultivated fields, composting, sludge digestion, freezing or dewatering. Most of these methods are not suitable for use near roadside rest areas. Alternative toilet systems can be subdivided into the following types: urine-separating, single-flushing, double-flushing, and wet-ash pit toilets, and earth closets. The dry toilets are most interesting from an environmental point of view. This assumes that no chemicals are used, urine and sewage are not lead directly into the ground and the transportations are short. A disadvantage is that some dry toilets have a limited capacity and do not work perfectly if the load fluctuates. When the toilet system is selected, it is important to consider the amount of attendance and maintenance required. The waste left at the roadside rest area mostly consists of the sort of things that the road users bring with them on their trips. The alternatives for handling the waste are traditional waste collection and disposal or sorting at source. One way of reducing transportation is to let the waste
degrade naturally. Other measures that can be considered to improve the adaptation of roadside rest areas to eco-cycles is to choose products with an environment-friendly stamp, examine the materials that are used and the amount of maintenance the roadside rest area will need.

Kanaroglou, et. al. (1998-1) describe an analytical framework for making assessment of the impacts of highway infrastructure improvements on the economies at small communities is an integral part of Ontario’s environmental assessment process by taking account of direct and indirect impacts of highway improvements, including local road network change such as bypasses, widening of the collectors (connecting links), or widening the arterial road in the vicinity of the community. Such changes affect the local traffic flow and business activities that are dependent on transient traffic. Kanaroglou, et. al. (1998-2) analysis the economic impacts of highways infrastructure improvement. They also describe an operational model that is based on the analytical framework introduced in Kanaroglou, e.t al. (1997). The model makes use of widely available data and can be used as a planning tool for fast and efficient assessment of short term direct and indirect local economic impacts in terms of a community’s sectoral employment levels. The accuracy of the assessment can be improved by modifying the model parameters using information collected locally. The model can presently be applied to communities in Ontario.

Christopher (1999) examines the long-term impact of suburban Denver's I-225 beltway on surrounding land uses following its introduction into a relatively undeveloped area. Analysis of residential, commercial, and office uses indicates that while the beltway did not serve as a catalyst for large-scale development, there was a gradual reorientation with higher residential and commercial densities along and route. Office densities were less affected by the immediate access provided by the route. Land use development occurred in three stages: (1) penetration of residential development into the corridor with little commercial or office development; (2) proliferation of residential development and penetration of commercial and office activities; (3) proliferation of commercial and office development and reorientation toward beltway.

Gutierrez (2001) evaluates the accessibility impact of the future Madrid-Barcelona-French border high-speed line. Accessibility impact of the new
infrastructure is measured by means of three indicators: weighted average travel times, economic potential and daily accessibility. These indicators respond to different conceptualizations and offer complementary information about the issue accessibility. The results are quite different: very concentrated effects in the daily accessibility indicator, less concentrated in the economic potential one and more dispersal in the location indicator. The sign (polarizing/balancing) of these effects depend on the geographic scale: polarizing effects at the national level and balancing effects at both corridor and European levels are identified. A geographic information system (GIS) was used to carry out this study.

Li, et. al. (2001) analyses the impacts of the National Trunk Highway System (NTHS) development programme on the pattern of accessibility gradients, trying to draw implications for regional growth. Obviously, this programme will bring about substantial improvements in accessibility across the nation. There is evidence, however, that highway investment exhibits diminishing returns over time. Greater improvements in the nodal accessibility of the major coastal cities, as compared with cities in interior and periphery provinces, in the initial stage of the highway development programme are found. But as time progresses, the NTHS will bring about more balanced development in the spatial sense. Mittal, et. al. (2001-2) assessed the economic impact of encroachment on roads in Delhi. The road traffic is increasing by 10 percent but roads only 3-4 percent. The investment in roads has gradually come down in the Five Year Plans of India. The present infrastructure of network cannot cope with massive increase in volume of vehicles as well as traffic on city streets. However, it is observed that in many busy places 40 to 50 per cent of the road infrastructure is being encroached by standing vehicles, men, hawkers, rubble or a ditch which not only obstructs movement but also causes hazards or inconveniences to moving mass of people and vehicles. The widths of roads have been reduced to minimum in most of the case because of excessive road encroachments on almost all types of roads - minor, major or highways.

George (2003) did a case study to investigate the potential implementation of a road-user charging cordon in the Lake District national ark, examining the response of three distinct stakeholder groups visitor resident and business operator, to the imposition of road-user charges. The road-user charging was deemed an impracticable
transport demand an impracticable transport demand management strategy for the Lake District National Park due to the potential equity costs exceeding road network efficiency gains. Chandrayudu, et. al. (2010) examined the satisfaction level. An attempt is made here at Srinivasa Mangapuram in Tirupati, Andhra Pradesh, a world famous and culture place to find out pilgrim tourists satisfaction level. The views of 500 tourist pilgrims are converted into numerical values. The factor-wise level of satisfaction is calculated and satisfaction index is computed. In tourism several kinds of people come in contact with one another among tourist travel agencies, residents, entrepreneurs and administrations. It is quite imperative to keep cordial relations with them. It relies on the behavior of the people and the destination where they get the services. Satisfaction of tourist assessment about certain attractiveness and particular activities in respect of tourist is useful in making modifications in tourist programme and facilities.

Rathore, et. al. (2012) in their paper studied that Environmental Impact Assessment (EIA) include assessing of the present status of air, water, land, noise, biological and socio-economic components of environment. With an estimated population of 25 lakhs for the year, 2011, it mainly relies on public transport with 48 per cent share of passenger trips; this includes standard buses, mini buses and tempos (magic). Bus Rapid Transit (BRT) is a high-quality, high-capacity bus service that travels on exclusive lanes along designated routes, often compared with the speediness and comforts of a streetcar. BRT buses reducing travel time by 15 to 30 per cent and with proper passenger facilities will surely revolutionize the public transport in Bhopal. While, time saving benefits, fuel savings, reduction in air pollution and in traffic congestion and noise and vibration reduction fall under the positive impacts, there are some negative impacts also on environmental components of this project; which can be seen on three stages: the design stage, construction stage and operational stage.

Conclusion

Many studies have been conducted related to road transportation, its importance and development, the roadside facilities, road accidents and road safety, the satisfaction level of consumer and the impact of road development on its surroundings conducted in India and abroad. Road transportation is a basic
infrastructural facility required for economical & social development of human population. Majid (1950) found lack of transport facilities in mica zone and unmetalled roads in sugarcane zone. The traffic flow is studied by Guha (1955), Singh (1963), Singh and Singh (1963) in Calcutta, Utter Pradesh and Varanasi, respectively. Singh and Singh (1963) proposed second bridge on the Ganga and few wider link roads, Prasad (1968) investigated into physical and economical factors which are related to the road development in Bihar.


The roadside facilities have been studied by Grevingary (1978), John (1980), Clark (1983) and Brenda (1994) among which the telephone facility, motel instead of hotel, rest areas and check points are the prominent one. Yokota (2004) studied the planning of roadside facilities and Yokota, et. al. (2006), Indoria (2009) and Carson, et. al. (2011) focused on the benefits of roadside facilities. Salma (2012) found lack of planning and inadequate attention to integration of land-use planning and road infrastructure.

The effect of weather conditions on road accidents is found positive by Whitelegg (1987), Stern, et. al. (1989), Stern, et. al. (1990), Preston (1991) and Edward (1996). The hazardous weather and heat stress are found major factors of road accidents. Sharma et. al. (2010) found that lack of traffic education and very less enforcement of traffic laws are the major causes of road casualties. Mittal, et. al. (2001) concluded that rate of accidents is higher on lower category roads than state highways but deaths and injuries were lower on lower category roads than on state
highway. Lai Fa-Xie, et. al. (2011) explores traffic collision records and performance of Chinese roadside barriers which is not found strong enough.

The travelers' attitude and satisfaction level is studied by Lord (1975), Chol (1998), Awotona (1990), Hine and Russell (1993) and Clemens, et. al (2010) with respect to various facilities. Various studies as Linnerker, et. al. (1996) Button, et. al. (1997), Bryan, et. al. (1997) and Lahti (1997) have been conducted over the impact of road development on surrounding areas.

A specific focus on impact of road development on the economic growth of surrounding areas converged by Karnaroglou, et. al. (1998-2) and Bryan, et. al. (1997). Both concluded that road development gave rise to economical level of surrounding community Mittal, et. al. (2001-2) assessed the impact of economic growth on encroachment on roads in Delhi and concluded that 40 to 50 per cent of road infrastructure is encroached. That the environment is ill effected by roadside rest areas is highlighted by Lahti (1997). Chandryadu, et. al. (2010) examined the satisfaction level of pilgrims in a world culture place in Tirupati, Andhra Pradesh. Rathore, et. al. (2012) studied Environment Impact Assessment (EIA) which includes assessing of the present status of air, water land, noise, biological and socio-economic components of environment.

In a nutshell it is concluded from the above review of literature that road development and road transportation is an essential infrastructure which eventually prompts the development of roadside facilities to the satisfaction level of the passengers. The roadside facilities have positive effect over the surrounding areas as far as economic growth is concerned but have negative effect on the environment. The traffic education and enforcement of law can prevent the road-casualties.