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# CHAPTER-I

## INTRODUCTION

### 1.1 BACK GROUND OF STUDY:

Of late, Indian road sector has seen overt divergence from its traditional public sector produced delivery system. The National Highways being commercially most important roads, Government recognizes that development of this segment of road can not wait for adequacy of budgetary allocations. The Government has set up dedicated autonomous implementing agency with dedicated source of funds to carry out historical scale of development of National Highways in India. To carry out the mammoth scale of development of National Highways, Government has resorted to outsourcing of designing, supervising and quality related activities for speedy execution of projects with international standards. The most significant aspect is it has handed over many stretches of National Highways to private sector to build and then operate for decided period where private investors are allowed to recover investments through directly tolling the road users. The modality of private sector participation to this extent is termed as Public Private Partnership (PPP) and it has become major currency for Indian policy makers like worldwide counterparts. Knowing the paucity of public funds, it is inevitably envisaged by Indian Government to attempt the route of PPP for development of National Highways on very large scale in the Eleventh Five Year Plan Period (2007-2012). The PPP route is also going to be major way of developing important State Highways. But roads being perceived as public goods, development and operations of road facility using private investments ripple many issues at planning (at project formulation level) and management (at project operation level) stages. These are issues mainly related to commercial viability of investment and public acceptance of such projects.

#### 1.1.1 Road network in India:

The road sector in India consist of hierarchy starting from rural connectivity roads with narrow single lane (3 meter to 3.75 meter width) and degrading riding quality to superior high speed access controlled six to eight lane Expressways. These roads are traditionally developed and maintained by respective State Governments (for State

Highways, District roads and rural roads) and by Central Government (for National Highways and Expressways) by means of budgetary allocations. As shown in Table: I-1, the total road network in India stands at 33,00,000 km with road density more than 100 km per 100 square km geographic area. Ironically, India stands at second position in terms of length of road net work and for road density. But in terms of superior length statistics, it is not figured in comparison with many leading nations (Zhang 2005).

**Table:I-1**

**Present Road network In India**

| **Indian Road Network As On June 2007** | |
|---|---|
| Expressways | 200km (0.006%) |
| National Highways (NH) | 66590km (2.00%) |
| State Highways (SH) | 131899km (4.00%) |
| Major and other District Roads | 467763km (14.00%) |
| Rural Roads | 2650000km (80.00%) |
| Total of Indian road network | 33 Lakhs Kms(Approx) (100%) |

*(Source: National Highway Authority of India (NHAI) home site: www.nhai.org)*

Among whole network, NH carries prime importance for facilitating interstate commerce and hence they are arteries of national economy. Even though National Highways (NH) constitutes only about 2% of this road network, they carry about 40% of the total road traffic. But NH in India need not mean a full fledged road section even at present. The Ministry of Shipping Road Transport and Highways (MOSRT&H) is the ultimate governing ministry for National Highways and ministry reports that almost one third of NH in India is yet single lane road that is like rural road.

### 1.1.2 Planning Of National Highway Development Project And Its Implementation:

The deficiency in roads sector in general and NH in particular was in view since early 1990s and there was concurrent thrust for development of infrastructure including roads in India. There were various need assessments for requirements of investments in roads. All of them basically meant huge unprecedented funding requirement for improvement of roads including NH and hence beyond the budgetary capacity of governments. In October 1994, the Department of Economic Affairs and Ministry of Finance, GOI established an Expert Group on Commercialization of infrastructure projects under the chairmanship of Dr. Rakesh Mohan. The "India Infrastructure Report" of Dr. Rakesh Mohan (1996) expressed that in India so far connectivity was emphasized and thus rural roads have increased. But now National Highways and State Highways shall expand in matching manner considering pace of traffic growth. The report identified deficiency of the road sector and it was estimated to provide Rs. 32,000 crore in 1996-2001 and Rs.63,000 crore during 2001-2006 for construction of NH, SH and Expressways. For these two periods, provision for maintenance required was estimated Rs. 9000 crores and Rs.11,500 crores respectively. This was unusual requirement because total expenditure (Centre and States) in the Eighth Plan period (1992-97) was just around Rs. 13,000 crores. This report also stated that the administrative delays and problems in case of NH shall be undone by entrusting sole responsibility of planning, developing and maintaining NH and Expressways in India to the specialist agency, National Highway Authority of India[1] (NHAI) only. Thus, State authority (i.e. respective State PWD which has been engaged in NH works as an agency for Central Government) shall be separated out of NH activities. For funding of NH development, it was proposed that a Highway Development Fund be created in India by levy of a fuel cess of Rs. 0.50 per liter of diesel and Rs.1.0 per liter of petrol.

Under these circumstances, a National Highway Development Project (NHDP) was launched by then **Honourable Prime Minister Mr. Atal Bihari Vajpayee** on January 2, 1999 supported by dedicated revenue based on cess on fuels. The NHDP was initially comprised of Golden Quadrilateral (GQ) work (Phase-I) and now the scope is extended up to Phase-VII. NHDP Phase I was approved by Cabinet Committee on Economic Affairs (CCEA) in December 2000 at an estimated cost of Rs. 30,300 crore (1999 prices) comprising 5,846 km of Golden Quadrilateral

connecting four metropolitan cities of Delhi, Mumbai, Chennai and Calcutta; 981 km of North-South and East-West corridors; 356 km of Port Connectivity and 315 km of other National Highways, a total of 7,498 km. This was expanded by adding North-South and East-West corridors (total 7,300 km), connecting Srinagar to Kanyakumari and Silchar to Saurashtra respectively and Salem to Cochin under Phase II. Now collectively NHDP was estimated to cost Rs 54,000 crore (1999 prices). Later, NHAI was also asked to four lane port connectivity of 400 km and other projects of 600 km at a cost of about Rs. 4,000 and thus revising cost to Rs. 58,000 crores. The idea is to ensure nationwide road connectivity of superior standards. These are the only Phases actually under implementation stage whereas remaining Phases are mostly at planning stage. The implementation of these two Phases however has seen many problems.

The implementing agency (NHAI) was asked to complete Golden Quadrilateral by December 2003 which was completed about 90% by Dec 2005 and yet to see 100% completion. The problems narrated by NHAI for delays are –utility shifting, termination of some contracts in GQ, land acquisition, contractors' sluggish progress etc. The NHAI has adopted private sector participation for design, supervision and quality assurance and some BOT projects are taken up inviting private funds. Though NHAI is implementing NHDP making a clear break from the State PWDs and has established a new paradigm for the delivery of road projects, generic problems are found same as State PWDs during execution. The East-West Corridor (Phase- II) is also substantially delayed beyond scheduled completion by December 2007. Most importantly, the implementation of NHDP is carried out so far utilizing cess funds (through EPC contracts) and merely around 10% of investment has come from private sector despite NHAI was mandated to act on business principles. If NHDP was to be implemented through cess funds, it is like budgetary allocations then State PWD already existed to do the job. Hence, the changed delivery system of NH has not really delivered the expected goods so far.

Knowing the problems with EPC type of contracts awarded by NHAI, Committee on Infrastructure (COI) was set up by Government of India on August 31, 2004, chaired by the Prime Minister of India. The COI is expected to see rise in private sector participation in highways. Under Chairmanship of Prime Minister, COI has concluded that for higher quality of construction and maintenance of roads and

completion of projects without cost and time overrun, contracts based on Build-Operate-Transfer (BOT) model are inherently superior to the traditional EPC contracts. Consequently, the Working Group for Eleventh Plan (2007-2012) has envisaged 50% of the requirement of funds during the 11th Plan (2007-2012) for implementation of NHDP (total estimated requirement is Rs. 1,73,501 crores) to be received from private sector participation. Thus the thrust of highway development has been concentrated on BOT type of private sector participation formats wherein private investors make upfront investments and recover costs with some returns mainly through tolls from users. The Public-Private Partnership (PPP) is the term often coined for such private sector participation which is more synonymous with highway projects undertaken on BOT format. Since PPP projects typically involve transfer of public assets, delegation of Governmental authority for recovery of user charges, private control of monopolistic services and sharing of risks and contingent liabilities by the Government; the need to secure value for public money and protection of user interests are to be ascertained through some mechanism. In practice, the Concession Agreements are found all that defining and regulating PPP. The concession agreements are the Government award for allowing private concessionaire to exploit natural monopolistic conditions created by virtue of these agreements for substantially long period.

Under this background, cases of BOT projects are studied for their relevant issues emerging at planning and management stages. The very important dimension of PPP project i.e. Public (users) it self is interacted for its issues on acceptance/non-acceptance of such projects.

## 1.2 RATIONALE OF STUDY:

As depicted above, huge unprecedented private investment is expected to be attracted mainly for National Highways and some important State Highways in coming years. The private investment will be on PPP route and hence will be associated with handing over of public assets of highway for considerable tenure and users will be exposed to this new owner of assets on use point. The transfer of monopolistic operation of assets will be regulated by concession agreements signed by the Government with the private concessionaire. It is quite interesting to view this process of awarding monopoly to operate a public utility in economic perspective.

The roads are perceived as public goods by users owing to its free provision by State but it takes various forms under different regulations as given in Table:I-2. As illustrated in this table, the road transforms from public goods or common resources in to natural monopoly when it is put to tolling after developing for present and future needs. Usually economists explain natural monopoly as a position when due to economy of scale, a single firm can supply a good or service to the **entire market** at a lower cost than two or more firms (Mankiw 2004). More over, natural monopoly goods are produced at very high fixed cost required at inception as compared to subsequent low variable costs. Hence planners consider that it is wasteful to have multiple providers of such goods/services e.g. it will be meaningless to erect two bridges in competition over a river in rivalry when capacity of one bridge is in need.

**Table: I-2**

**Status of Roads under Varying Economic Conditions**

| **Private Goods** | **Public Goods** |
|---|---|
| Excludable and Rival e.g. congested toll roads | Neither Excludable nor Rival e.g. uncongested nontoll roads |
| **Common Resources** | **Natural Monopolies** |
| Are Rival but not excludable e.g. congested nontoll roads | Are Excludable but not Rival e.g. uncongested toll roads |

*(Source: Mankiw 2004)*

So it is worldwide practice to allow by regulation, monopolistic conditions to the utility provider so that he can be insulated from ruinous competition and durability of his original investment is secured. The Indian experience of regulating public utilities (including roads) is at nascent stage as it begun from late 1990s. But it was widely believed by the policy makers (especially from European nations who were pioneers in granting concessions for public utilities) that the public interest would be best promoted by grants of special privilege to private persons in such industries. These included patents, subsidies, tariffs, land grants to the railroads, and monopoly franchises for public utilities. However, the final result was monopoly, exploitation, and political corruption (Gray 1940). A group of economists labeled them "the sinister

forces of private privilege and monopoly," that prevailed in early decades of 1900s using the theory of natural monopoly wherein protection of consumers faded into the background (DiLorenzo 1996). In 1968, Harold Demsetz observed that under the argument of -ruinous competition, excessive duplication and durability of original investment many public utility fields (including roads) were wrongly insulated from competitive forces and he proposed that though competition within a natural monopoly market is costly, it is possible to set up competition ***for* the market** (Demsetz 1968) to avoid problems with monopolistic pricing and under-production. In the words of Edwin Chadwick, who proposed a precursor to Demsetz's idea in 1859, competition *for* the field substitutes for competition *in* the field (Engel et al. 2002). So, unlike other consumption goods, Demsetz believed that a user need not be offered two bridges standing near by over a river and competing on rivalry but the pricing of single utility asset under monopoly can be influenced by inviting competition for getting such concessions that will resemble with market price under competition. The public utility auctions based on Demsetz's idea are known as "Demsetz Auction" and it is world over in practice with little variations. In practice, the natural monopoly is awarded to the private firm in terms of concession agreement (under mutual agreement or adopting "**Demsetz Auction**") and regulators dictate the private provider of services to charge the users either based on rate of return regulation or price cap regulation. The concept is simple; it allows the private concern to recover investment on agreed rate of return by allowing pricing to earn that return under rate of return regulation. In case of price capping, the agreement is based on implicit rate of return to be earned by the private investor but the prices are capped based on initial calculations for that level of return and irrespective of actual rate of return occurring to the investor, prices are not adjusted. This regulation can result in to winner's curse if the cost overruns and/or estimated revenues are not generated from pricing. Similarly it can result in to windfall if the concessionaire manages saving in cost and/or attracts more than estimated revenues from pricing. Hence in case of occurrence of estimated conditions, both the regulations perform at par for the users as well for the investors. But any variation could make big impact on the stake holders of the assets.

In India, Government is following price capping regulations for development of highways except few pioneering cases of rate of return regulations. The Demsetz

auctioning is widely followed by State and Central Government at initial stage for awarding of concession for highways that is widely known as BOT agreements. In principle, the present Indian practice of awarding concession for highways is partial application of Demsetz auctioning as next round of competition for field for adjusting the prices to the market conditions is not made during long tenure of concession. The Indian experience of such agreements is very brief as it has entered highway sector very late in 1990s and such projects are constructed and put to operation mostly from year 2000-2001 onwards. Thus actual implementation of such auctions after the award is made for natural monopoly is very new area of study and yet academically unexplored by the researchers. Hence in this study, cases of both the price regulations are selected to study the effect of price regulation on the viability of projects which is in turn helpful in understanding issues related to sustainability of the selected route of PPP, giving due consideration to users' preferences. The scope of study is also covering aspects related to award of natural monopoly to private sector in terms of provisions of concession agreement and its actual implementation.

If the scarcity of funds is compelling to Sovereign to hand over fields of public utilities, Kerf et al. (1998) quotes the famous nineteenth century economist **Alfred Marshall** for this decision. The prescription is, not to follow usual practice of least cost to Government but the focus shall be on pricing and service standards. The Indian practices need evaluation for this aspect.

## 1.3 OBJECTIVES OF STUDY:

The overall objective of this study is to bring out planning and management issues to promote sustainable Private Sector Participation (PSP) in roads development and understand factors affecting willingness to pay ( or not to pay) for using the roads.

Precisely the objectives are:

i) To inquire into the status of prevalent practices with reference to road facility creation and financing of the same through international experience.

ii) To inquire into the prevalent views with reference to control of road facility as a public good and methods of ownership, transfer of ownership, viability of projects with the help of literature review.

iii) To understand the status of road development in India , the urgent need for road development, the causes for private sector participation and regulatory development for the same.

iv) To identify present level of PSP (Private sector participation) and scope for the same in roads development.

v) To identify issues related to PSP at project formulation level and management level based upon case studies.

vi) To inquire into 'Willingness To Pay' for use of road facility.

vii) To find out measures to promote sustainable PSP in roads development and to understand factors affecting willingness to pay for using the roads.

## 1.4 SCOPE OF STUDY, RESEARCH DESIGN AND SOURCES OF DATA:

Since a national level highway programme (NHDP) is already underway in India, the implementation of this programme, policy reforms and various agreements in vogue for PPP route of private sector participation are providing opportunity to study the PSP related issues for the road sector. The NH being commercially important for nation and being trend setter for development of road sector, study of this segment has been emphasized as compared to remaining categories. The research work is designed to cover the planning and implementation of NHDP at programme level keeping in view international experience in taking up such programmes. The library work and internet searches helped in gathering relevant information on this subject matter. However, no text books on comprehensive studies of Private Sector Participation in Roads are available for ready reference. The research work also encompasses project level study of selected case studies under PPP route in India. The user's preferences in terms of willingness to pay are inquired conducting preliminary surveys for Willingness To Pay.

### 1.4.1 Selection of Case Studies:

The selection of case studies from projects implemented in India on PPP route is based on two basic criterion .As discussed in subsection **1.2**, the monopolistic conditions of PPP projects are regulated either by rate of return based or price capped based regulation. Hence, cases from both of these categories are selected from

growing population of PPP projects. As a population, 25 BOT projects by MOSRT&H and 55 BOT projects by NHAI thus 70 projects are so far awarded in NH segment during last decade but more than half of them are yet to get in to operation stage or has just begun to collect tolls (Paragraph **4.8.5** Chapter-IV). Hence, effective population is around 35 projects for NH segment. Knowing the fact that these projects have come into operations from around year 1999-2000, the tenure of toll operations have been seven to eight years only. More over, first batch of BOT projects on NH had small concession period and are already transferred back to Government whereas recent projects are yet at nascent stage. The BOT statistics at State level is yet not officially available but can not be more than twenty as found from discussion with officials in this field. Gujarat State has completed five projects on BOT basis on State Highways out of which four are under tolling and one has completed the tolling stage. Except few projects (mainly by IL&FS), almost all projects on NH and State Highways are based on Price Cap regulation.

Under this background, two projects on State Highways and two projects on NH are selected which also represented Price Cap regulation (for State High cases) and Rate of Return regulation (for NH cases).Among these four cases, three representative projects have been selected with substantial ongoing tenure of operations whereas one completed project of Chalthan Road Overbridge is selected for illustrating historical litigation for local traffic problem. The selected NH cases are part of NHDP. A limiting fact is some element of commercial confidentiality plays a restrictive role in selecting case studies. The selected case studies are:

1. Construction Of Four Lane Road Over Bridge In Lieu Of Level Crossing Near Village Chalthan On NH No.-8 in Gujarat State (Chalthan project)
2. Construction of Delhi –NOIDA Toll Bridge in NOIDA (UP State)- IL&FS project ( NOIDA Project)
3. Construction Of Four Lane Vadodara – Halol Road SH No.-87 with access control divided carriage and Service roads km 8/300 to 40/00 in Gujarat State-IL&FS project (Vadodara- Halol project)
4. Construction Of Additional Two Lane Bridge Across River Narmada With Approaches on NH No.-8 km 192/0 to 198/0 in Gujarat State (NICE project)

Keeping the objectives of study in view, the scope of case studies include aspects of project formulation that encompasses - basis of project selection, actual site conditions, decision for fixing toll rates, derivation of toll period, types of concession regulation adopted in framing agreement, traffic characteristics for planning level issues. The study of actual operational part of concession agreement is relevant for understanding of management issues. The operational part is most important to know about the robustness of concession agreement in inviting and protecting private and public interests. The audited financial results of companies are found useful to describe commercial viability of project. The project details, concession agreements and operational details like toll revenues and expenses were gathered from offices of concessionaires and some details are availed from internet. Also, relevant details are traced from Government offices.

### 1.4.2 Preliminary Survey For Willingness To Pay:

Regarding primary data, Willingness To Pay (WTP) surveys are conducted on users of one of the case studies. The field surveys on NH could have been difficult to conduct looking to the exorbitant volume of traffic beyond 60,000 PCU per day. This limitation guided to select Vadodara- Halol toll road for WTP surveys. The users consist of two wheelers, three wheelers, cars/jeep and commercial vehicles like Trucks and buses. The samples are collected from population of Cars and Trucks only to represent passenger movement and goods movement respectively. Practically the surveys for cars are done on toll road itself. For trucks, looking to the limited decision making capacity of truck drivers in choosing toll roads versus free roads and communication problems with truck drivers, it was preferred to make personal dialogue in the offices of truck owners/operators (which are located near Golden Chokdi near entrance point of Vadodara- Halol Toll Road) in presence of truck drivers. Looking to the sensitivity of issue, mailing or telephonic interviews were avoided for gathering primary data collection.

The primary data collected from field survey for Willingness To Pay is statistically analyzed using multiple variable linear regression model. The results are tested for goodness of fit (coefficient of determination adjusted $R^2$) and significance of individual coefficients of regression. An analysis of variance (ANOVA) technique provides F-test which is used herewith to verify overall significance of the model. For

data analysis of survey results, Microsoft Office- Excel Worksheets are found useful tool.

## 1.5 SCHEME OF CHAPTERS:

The course of intended work basically maneuvers around programme level private sector participation for NHDP and some PPP project specific details leading to answer important questions like – what is really changed delivery system for highways and how effective it is in enhancing private sector participation in development of roads, what are the basic issues of private interest and public interest to be equated in designing a monopolistic concession etc. The actual stream of chapters is arranged as below.

**Chapter-I** is encircling study back ground justifying rationale for taking up this study. The study framework is derived and objectives of study are narrated with methodology.

**Chapter-II** is encompassing relevant literature review for harnessing the objectives of study. The study postulates Private Sector Participation to the extent of Public Private Partnership (PPP) as inevitable conceding world over argument for diminishing financial capacity of states to directly finance road projects as compared to growing demand. This is investigated by study of literature.

**Chapter-III** is basically related to study of spectrum of Private Sector Participation and understanding of conceptual structure of concession for roads that holds the key to design highway projects on Public Private Partnership. The international experience for contracting out highway works on non PPP basis and on PPP basis are studied in this chapter that is helpful in design of concession for PPP projects. The structure of PPP is studied in terms of delivery process and various possible forms of PPP are also studied depicting various levels of private sector participation allowed by different countries. How other countries including the pioneer European countries have waded through such movement is studied and evaluated for their road development programmes. The Latin American experience of canceled and renegotiated enormous PPP contracts and in particular Mexican Toll Road Programme being similar to Indian NHDP are important aspects of international

experiences in PPP. This chapter establishes base for evaluation of PPP in developing Indian highways in subsequent chapters.

**Chapter-IV** presents the development of National Highways in India through various agencies and the issues related to planning and management of National Highways Development project (NHDP).This chapter is encompassing various policy shifts in developing National Highways in India and emergence of project formulation under PPP contracts. The projects on national highways have been traditionally implemented by State PWD under auspices of MOSRT&H, Government of India. The changing role of executing agencies and emergence of central autonomous nodal executing agency i.e. NHAI is explored in view of massive investments envisaged under much proclaimed ambitious NHDP. The financing structure of NHDP is evaluated at programme level and contracting documents are assessed in terms of what kind of partnership is embedded in such contracts. As and where required, cross references are made to similar massive programmes undertaken by US (Interstate Highways Project) and China (National Trunk Highways System).

**Chapter-V** discusses PPP case studies of highway projects executed under private sector participation in India. The highway projects under private sector participation are essentially formulated as toll projects on BOT basis and the entrepreneur invests upfront signing a concession agreement between himself and Sovereign. The risk-reward characteristics of such investments are experienced during construction stage and toll operation stages. There are host of risks attached to project formulation and implementation of such projects. The selected case studies evaluate robustness of such agreements for various ground realities or risks perceived /encountered. The contracting document i.e. concession agreements are perused for evaluating security of private interests after welcoming private sector participation but keeping public interest at the top. As discussed earlier, these project specific studies are selected for both type of pricing regulation. The outcome of monopoly awarded through concession on commercial viability of such projects and on the sector itself is explored keeping users' interest in view. The bankability of concession agreement, lenders' recourse, users' recourse etc. issues are explored using details of case studies for sustainability aspect of PPP.

**Chapter-VI** discusses user's preference in tolling a highway after developing it for present and future needs. A field survey for cars and trucks is conducted to understand the issues related to willingness to pay (WTP) for passenger traffic and commercial goods traffic respectively. The survey results are useful in identifying various attributes of WTP based on primary data collection. The statistical analysis is carried out using standard statistical tools and statistically significant variables able to explain WTP are derived for construction of a linear multiple regression model. The results of this survey are useful in explaining users' response to PPP policies undertaken by Governments in India.

**Chapter-VII** presents the conclusions derived based on the detailed study. The issues emerging out at planning and management stage are studied and listed for policy implications.

The study is thus made and presented in seven chapters with list of references (and end notes as applicable) kept at end of each chapter. At the end of seven chapters, Bibliography is put up. This is followed by Appendix – 1 and 2 of questionnaires used for primary data collection. The Appendix – 3 and 4 are related to application of coefficient of correlation for both the survey results. After this introductory background and defined objectives, relevant literature review is conducted in next chapter before getting into the policy, programme, agencies and case studies related to private sector participation.

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**End Notes:**

1. The National Highway Authority of India (NHAI) came into existence with effect from June I5, 1989 but it was operationalised only in February 1995 i.e. in the Ninth Plan. These initial operations were not part of NHDP and till almost year 2000-2001, respective State PWDs were the agencies implementing NHDP. Even to day, many NH stretches related to NHDP are managed by State PWDs and not yet taken over by NHAI in want of adequate administrative and financial capacity.

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