

Public-Private Partnership Models and Firm Performance: An Empirical Analysis of Road Infrastructure Projects in India

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December, 2023

DECLARATION

I certify that this thesis titled “**Public-Private Partnership Models and Firm Performance: An Empirical Analysis of Road Infrastructure Projects in India**” is my original research work. This research work has not been previously submitted by me to any other University or Institute for award of any degree or diploma. Any material previously published or written by any other author included in the text has been duly acknowledged and referenced in this thesis.



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CERTIFICATE

This is certified that Mr. Puneet Koul, Registration No: 951113003, has completed his Ph.D. thesis titled “**Public-Private Partnership Models and Firm Performance: An Empirical Analysis of Road Infrastructure Projects in India**” under my supervision. This Ph.D. thesis is an authentic research study carried out by him and it is being submitted to L.M. Thapar School of Management, Thapar Institute of Engineering and Technology, Patiala, for the award of the degree of Doctor of Philosophy (Ph.D.). To the best of my knowledge, this research work has not been submitted to any other University or Institute for the award of any degree or diploma.



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ABBREVIATIONS USED IN THE THESIS

Abbreviations	Full form
ADB	Asian Development Bank
AER	Asset to Equity ratio
ATR	Asset Turnover Ratio
BOT	Build Operate & Transfer
BPC	Bid Project Cost
CFI	Consolidated Fund of India
DPR	Detailed Project Report
DBFOT	Design Build Finance Operate & Transfer
EPC	Engineering Procurement Construction
EM	Equity Multiplier
HAM	Hybrid Annuity Model
IIFCL	India Infrastructure Finance Corporation Ltd
InvIT	Infrastructure Investment Trust
JICA	Japanese International Credit Agency
MCA	Model Concession Agreement
NHAI	National Highways Authority of India
NHDP	National Highways Development Project
NIIF	National Investment and Infrastructure Fund
NPM	Net Profit Margin
OMT	Operate Maintain & Transfer Model
PCE	Partial Credit Enhancement
PE	Private Equity
PPP	Public Private Partnership
ROE	Return on Equity
SPV	Special Purpose Vehicle
TOT	Transfer Operate Transfer

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ABSTRACT

In an evolving mode of infrastructure development that India as the world's fastest growing economy has been witnessing in the past decade. Public-Private Partnership (PPP) does create an enormous scope, both in terms of research and development of delivery mechanisms and performance models. This proposed research focuses on the same to understand the road infrastructure development. Specifically, the present study reviews PPP model projects in road development, and evaluate its performance based on select financial parameters. Besides the study also conducts an analysis of concession periods of firms that have been executing these projects. The study also examines the role of the public agency and the concessionaire in the success of the PPP projects.

This research looks into the initiatives taken by government and the policy regime at large, specifically in the context of attracting PPP development; some of them include financing, and standardization of the model concession agreements. Notably, regardless of whether it is the central or state government on its own, it is not expected to meet all road development requirements with limited resources available with it. Thus, holistically, the measures taken by both the governments and its agencies in terms of introducing new models for development of the road sector were analyzed. Besides, the research also looks into various enablers provided by the awarding agencies, and further policy interventions that are required for developing road infrastructure through the PPP model. Importantly, it may be noted herein that financial performance of road projects under the PPP model has not been studied in India over a period across BOT Toll and BOT Annuity models. Therefore, this study also attempts to analyze firm performance of Special Purpose Vehicle (SPV)s that are responsible for executing the road projects.

Additionally, it may be noted that the PPP model within the road construction sector in India does not seem to be having a long history of development, owing to which relevant data of firms, available across time series, is not very exhaustive. However larger data for analysis can be built up for the future studies with additional expected data points that could possibly be available in the future, especially in terms of

analyzing the financial performance of SPVs. Nevertheless, it is imperative to consider existing studies wherein the efforts taken by SPVs in terms of deleveraging their balance sheet by selling / monetizing their existing road assets to long-term funds (e.g., pension funds, insurance funds and other private equity players) have been highlighted. Holistically speaking this study attempts to analyze research gaps in terms of financial performance of road projects being executed under the PPP model, which essentially goes on to influence the concession tenure on the nature of the PPP model being used.

Key words: Annuity, BOT, Du-Pont Analysis, Hybrid, PPP, SPV, Toll.

CHAPTER 1

INTRODUCTION

1. Introduction:

Public Private Partnership (PPP) models are extensively used in building physical infrastructure in terms of transportation networks, ports, power, and airports, coupled with soft infrastructure of education and healthcare among others. In terms of definition, PPP as per the Asian Development Bank (ADB) is supposed to “describe a range of possible relationships among public and private entities in the context of infrastructure and other services” (Asian Development Bank 2015).

Further, while describing the PPP mode of development ADB states: “the structure of partnership should be designed to allocate risks to the partners, who are best able to manage those risks and minimize costs while improving performance” (Asian Development Bank 2015). The Infrastructure Development Department, Government of Karnataka, India defined PPP as “contract between a public sector institution/ municipality and a private party in which, the private party assumes substantial financial, technical and operational risk in the design, financing, building and operation of a project” (karnataka. Gov.in).

The need to build infrastructure projects is largely due to the desire on the part of public institutions to provide quality infrastructure in a time bound and efficient manner. The Indian government has been promoting the PPP model for development of various infrastructure needs such as roads, power, ports, airports, health services, tourism etc. “Maximum investment in PPP projects till date has happened in road sector” (Ministry of Finance, Govt of India). The initiatives taken by the Indian government thus far in terms of adapting the PPP mode for development of road sector is thereby understandable, since road development does lead to a multiplier effect on various national economic drivers. Datta, (2012) beautifully summarizes the same by stating that better road connectivity can and does provide businesses with an opportunity to improve their profitability.

Road sector development brings in efficiency gains for the transportation sector that leads to significant reduction in the cost of transporting goods, which in turn, reduces production costs for several industries, while benefitting the consumers at large. In

fact, better road connectivity can also facilitate transporting perishable items such as agriculture produce from rural hinterland to cities in a timely manner, reducing thereby wastage in the food supply chain. Road development can also help in creating employment in the construction sector, and provide stimulus to industries, such as cement, steel, infrastructure equipment manufacturers etc. Notably, governments across many countries have been aggressively promoting road development projects in order to better connect its people, states, districts, and remote areas. Interestingly across Europe maximum numbers of PPP projects have been undertaken for developing the road infrastructure (Gunnigan & Rajput, 2010).

Notably, private participation in road development projects in the PPP mode helps in creating incentives for the private players to build and maintain the road infrastructure for a long period of time. Importantly, since private players have a stake to maintain these infrastructures for longer time periods, they work diligently to ensure that the roads developed remains robust on a long- term basis. Moreover, such infrastructure development projects do put significant stress on public finances; and that's another reason to call for the private participation. Notably, the PPP models for executing infrastructure development projects in India were formalized in 2000s (Asian Development Bank, 2015). Ever since, private sector financing became the norm for both central and state government projects.

The PPP model, especially in terms of road development was introduced with BOT (Toll) and BOT (Annuity) models, and/or their variants. In case of BOT (Toll), the revenue for the private developer came through collection of tolls on the road stretch. In the BOT (annuity) model, the awarding agency i.e., National Highways Authority of India (NHAI) provided fixed annuity for the tenure of the concession period. Subsequently to attract investors into road development under PPP, newer models such as Hybrid Annuity was introduced, wherein 40% of the project cost was being provided by the awarding agency apart from the annuity over the period of the concession (Ministry of Road Transport & Highways, 2015).

To further monetize assets for road development projects, the Indian government introduced the Transfer Operate Transfer (TOT) model, whereby an investor is

assigned a particular road stretch for a concession period on payment of upfront money to the awarding agency. Additionally, it may be noted that road development projects under the PPP model within India are being developed with the help of firms that basically serve as Special Purpose Vehicles (SPV)s, and are promoted by typical commercial entities. Therefore, it is imperative to study and understand these commercial entities vis a vis their motivation for taking up of such projects.

In the recent past to facilitate channelization of funds towards infrastructure projects, the Indian government has enabled setting up of an Infrastructure Investment Trust (InvIT) that has a tax efficient pass-through status for PPPs relating to infrastructure projects. InvIT structure thereby does play an important role in freeing up the developer's equity capital and attracting new set of investors into road projects.

This study details the commercial entities that carry out PPP projects with the help of various SPVs promoted by them. Besides, carry out a peer financial performance comparison of SPVs/ firms that operate within this sector under BOT (Toll) variants and BOT (Annuity) models. Specifically, the present study attempts to understand whether the type of PPP model under execution has any impact on the performance of SPVs. This study also looks to understand the rationale for private players to take up such projects, coupled with the policy enablers provided by the government, as well as challenges faced by SPVs/ firms executing such projects.

1.1 Objectives of the Study:

Largely this study identifies three broad objectives based on an in-depth review of literature covering India's journey in road development projects under the PPP model.

- 1) To study the policy, regulatory framework and the contribution made by the PPP projects in the road infrastructure sector development in India
- 2) To undertake a comparative analysis of BOT (Toll) & BOT (Annuity) PPP models and their impact on the financial performance of the firms engaged in the road infrastructure development projects in India
- 3) To analyze the influence of the concession tenure on the type of PPP models

Largely, road infrastructure projects have become increasingly complex over the past decades (Williams, 1999). Owing to which, risk elements, albeit in varied nature, specifically under the PPP model have been widely studied (e.g. Christine, 2005; Curtain & Betts, 2017; Adeoye & Islam, 2019; Tiong, 1990 & 1995; Blanc-Brude & Strange, 2007; Blanc-Brude et al., 2009; DOLOI, 2012; Xenidis & Angelides, 2005; and Demirag et al., 2012 among others). As mentioned earlier, we conduct an empirical study of PPP road projects in India, while assessing financial performance and concession tenures, especially for projects developed under BOT (Toll) and BOT (Annuity) mode.

Further, it may be noted that roads built with the PPP model is 24% more expensive than the roads built through traditional method for the reasons: (a) PPP recognizes and prices the construction risk; (b) PPP incentivizes higher capital expenditure at the stage of construction, thus enabling lower operations and maintenance costs; (c) recouping of higher transaction cost in PPP projects (Blanc-Brude et al., 2009). Importantly, road development projects under PPP are substantially debt funded structures, whereby equity tends to get replaced, especially by debt in financing transport services (Silva et al., 2004). In toll-based projects ‘traffic flow’ becomes a critical determinant on a project’s performance for Special Purpose Vehicles (SPVs). Thus, it is important to carefully study traffic levels being anticipated and the possible impact vehicular traffic hold on the viability of a project per se (Carpintero & Barcham, 2012).

To study the first objective, it was attempted to understand existing policies and regulatory framework on PPP projects. Besides, this study analyzed various challenges and enablers provided by government bodies in promoting road infrastructure development. Notably, the present study thoroughly explored information available in public domain by way of research articles, various reports issued by government agencies, including Ministry of road transport and highways, along with Ministry of Finance and reports of multilateral development institutions (i.e. World bank, ADB, annual financial reports of SPVs executing road projects under PPPs along with analysis of credit rating reports by credit rating agencies (i.e., CARE, ICRA, FITCH and CRISIL) to specifically examine the issues faced.

To meet the second objective, this study conducted a comparative analysis of BOT (Toll) & BOT (Annuity) PPP models, vis a vis their impact on firms' financial performance engaged in the road infrastructure development projects. Notably herein, the present study used annual financial reports of firms executing the road projects under the PPP model to collate information on the financial parameters that SPVs generally adopt. In fact, performances of BOT variants were studied on toll and annuity mode with the help of the DuPont model to examine the financial performance i.e., NPM, ATR, AER and ROE generated by the SPVs operating road projects.

The Du Pont model was developed in the early 20th century by E.I. DuPont de Nemours and Company, the model helps in examining factors affecting financial performance of firms. In the Du Pont model returns are decomposed as return on equity (ROE) into three factors -Net Profit Margin (NPM), Asset Turnover (ATO) and Equity Multiplier (EM). Finance texts available have advocated decomposing profitability into profit margins and asset turnover for their efficacy in performance evaluation of companies (Bernstein et al., 2001), (Stickney & Brown, 2006). The Du Pont components provide insight into the operating characteristic of a firm (Soliman, 2008). Du Pont models has been used in the assessment of the performance of various industries (Bhagyalakshmi & Saraswathi, 2019), (Sheela & Karthikeyan, 2012), (Herciu et al., 2010).

To measure SPVs, we analyzed their financial performance, using it as a benchmark, specifically to measure the profitability. However, it is important to note that there is a covenant that SPVs financial performance can effectively vary over a project's life cycle, especially since an average concession period varies from 15-30 years to generate revenue from a toll stretch. This study undertook project performance for ten years 10 years (no. of Projects-13), 9 years (no of projects-8), 8 years (no of projects-4), 7 years (no. of projects-4), 6 (years no of projects-5) and 5 years (no of projects-13) aggregating 47 projects to measure SPVs profitability; and this must be acknowledged as a limitation of this study.

The reason to take these 47 projects is due to the constraint in availability of data on wider time series. This is primarily due to the road project development on a large scale under PPP is not having long history. Further some of the projects financial

performance is not readily available in the public domain as particular SPV may be acquired by private investors. This study has taken latest available financial data on road project without considering the life cycle stage of the project. It is important to note that the performance of the SPVs can change on complete life cycle stage of the project. Financial information over a life cycle of PPP projects in road sector is not possible at present as the PPP models are not having long history in India. This may be seen as one of the constraints to the study.

In terms of our third objective, study attempts to analyze the influence of the concession tenure on the type of PPP models. To examine the same, average concession period of sample BOT Toll and BOT Annuity projects has been carried to analyze concession period and their influence on the type of PPP model.

1.2 History of Public-Private Partnership Projects:

The history of the PPP can be traced back to 17th century. In France, concessions to privately fund infrastructure were started in 17th century. The canals were the first type of infrastructure to be financed by the PPP model. In the initial days of the republic, the U.S.A constructed highways on toll basis with the involvement of private turnpike companies. However, possibly the most publicized versions of PPP had the origins in the United Kingdom with Private Finance Initiative (PFI) in 1992 (Vives, Benavides, & Paris, 2006).

This program was carried out with the objective to involve private sector in services, which were earlier in the domain of public services. According to the European Services Strategy Unit, this program was further developed by the Labor government in 1997, where it stressed on achieving ‘value for money’. Largely, PFI was responsible to raise financial resources from the private sector for infrastructure development without affecting borrowing by the State (European Services Strategy Unit, 2001).

Different financial crises faced by the world did have impact on development of PPP projects in UK (Connolly & Wall, 2011). Herein, it may be noted that growth of PPP projects is dependent on the overall economic environment of a nation. In the recent times, PPP for infrastructure building has gained traction in various countries; for

instance, PPP has widely been used by individual Australian States to create infrastructure (Malone, 2005).

Holistically speaking, PPP is used to create and built upon existing infrastructure, as governments have to prioritise their spendings, as well as explore avenues of ‘asset creation’, where private players can bring in their capital and technical expertise to create faster infrastructure development. Therefore, availability of financial resources is imperative for any PPP projects, in which, Pension funds for instance, could be an important source of funding (Shaik & Narain, 2011). In the study by (Izaguirre & kulkarni, 2011) on economic crisis of 2008 with reference to private funding for infrastructure projects across sectors in the developing countries, India and Brazil were two countries where funding provided by domestic financial institutions had ensured that the crises did not make any serious impact on the growth of PPP projects.

On the other hand, countries that were dependent on external finances had witnessed slowdown in PPP projects. Thus, it becomes important that domestic funding resources in the form of pension funds, insurance or deepened bond market play an active role to channelize resources for PPP. According to a survey carried by (Sachs et al., 2007), there is a positive correlation between PPP opportunities and perceived ‘political risks. Major findings of the survey highlighted that political risk especially in matured economies, such as Korea, Japan, and Singapore are minimal; whereas India, Indonesia, China, Thailand are perceived to be relatively risky, but do present high PPP opportunities. Notably, the political risks can impact PPP by way of concerns on the currency convertibility, transfer restrictions, breach of contract, legal and regulatory challenges along with the bureaucratic risks (Sachs et al., 2007).

In Latin America, Chile for example has been a success story for development of road projects due to strong regulatory factors in terms of laws concerning concession agreements and general laws for both investors and investments. In Chile, bidding from the lowest cost point moved to least present valued of revenue bidding, which in turn entails the winner demanding least amount of money from the concessionaire, and is thereby awarded the project. In this case, the concession period ends at the point when the bidder gets the desired level of revenue from the project (Hill, 2011).

According to a World Bank report private investment commitment in the year 2019 for infrastructure projects in low- and middle-income countries totaled US \$ 96.7 billion across 409 projects, across 62 countries, with five countries having the highest level of investments. China had 142 projects worth US \$26.3 billion: Brazil had 33 projects, worth US \$ 18.6 billion: India had 34 projects, worth US \$ 7.6 billion: Vietnam had 12 projects, worth US \$ 4.5 billion: and Russia had 13 projects, worth US \$ 4.1 billion with continued domination of transport having the largest private participation. The highest number of projects was sponsored by domestic entities in China, Brazil and India being relatively more mature markets in terms of PPP implementation record (Marcelo et al., 2020).

World over it has been witnessed that efforts have been made to make PPP a successful mode of creating infrastructure, which has seen successes as well as failures on certain projects. However, looking at it in terms of the need of infrastructure, the PPP model is indeed here to stay with possible improvements / evolution over a period.

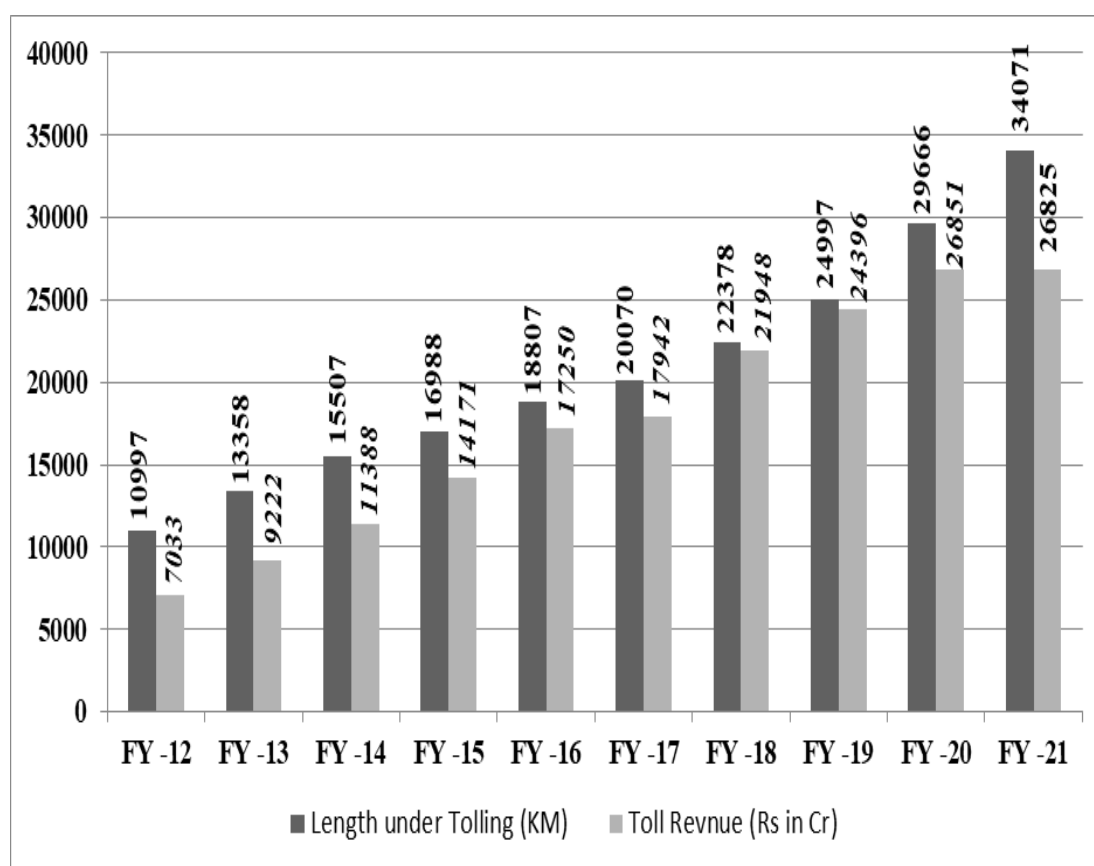
1.3 Public-Private-Partnership in India:

India's more than two decades of PPP experience requires continuous engagement with stakeholders to improve performance of PPP at every stage of the contract (Kelkar, 2015). Road Infrastructure being a building block for development of any country does play an important role in a nation's economy. In India for example, the distribution of highways under the PPP model are mostly in those states, where economic development is more visible and governance standards are comparatively better (Anant & Singh, 2009). Road development has a trickle-down effect on many sectors of the economy. As per the world road statistics for 2018 with data for 2016. India's road density was at 1.80 Km/Kms when comparing it with major economies of the world ; this is equivalent to Germany, and higher than that of United Kingdom at (1.73 km/kms), USA (0.68 km/kms), and China (0.649 km/kms) ; while the same is lesser than France (1.98 km/kms). However, it may be mentioned that the paved / surfaced road length in India was at 63.24 per cent of the total road length, which is much lower in comparison to advance countries like France and United Kingdom at 100% and China at 75.9%. (Basic Road Statistics of India , Gov. of India, 2016-17).

The statistics of comparison with major economies show that there is a huge scope for enhancing / lengthening the Indian road network, especially in terms of having increased length of paved / surface road network along with a scope to improve road density. As per the Ministry of Road Transport and Highways, under the aegis of the Indian government the national highways comprise only 2 per cent of the total road network whereas they carry over 40 per cent of the total traffic in India.

There have been major investments in PPP, especially in terms of developing road infrastructure ; this has resulted in increased road sector getting covered under tolling. Notably, generation of toll based revenue is critical for private players to show continued interest for investment in road projects under PPP. The total collections of fee at national highways and the length of roads on which toll are collected are mentioned below:

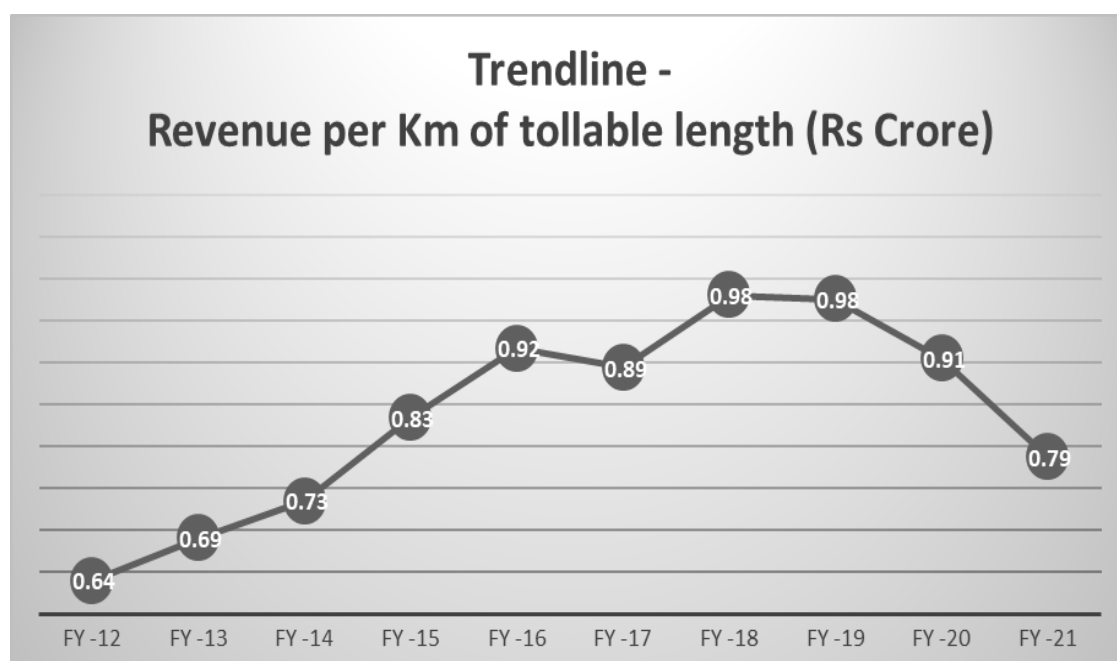
Figure: 1.1 Toll Revenue



Source: National highways authority of India, 2020

The break up of the revenue of Rs 26825 Cr in FY21 shows that the revenue generation from the road stretches over a period of time has shown a considerable increase along with the coverage of more road stretches under toll. Based on the trend of growth of tollable road stretches and the tollable revenue highlighted in the above figure 1.1 over the years, tollable revenue has increased with a minor exception of decline in FY 21, which could be attributed to the sudden outbreak of the deadly Covid-19 pandemic, and its related restrictions in vehicular movement.

Figure: 1. 2 Trend in toll revenue growth per km



Source: Based on NHAI data

It may be seen in the above figure that there is a growing trend in the toll revenue, with a major exception being FY 21, primarily on account of performance being impacted due to Covid-19 related challenges. On comparing toll generated on annuity or toll based stretches, it has been observed that despite toll based projects having lower lengths, they have been in a position to generate more revenue than annuity based stretches, as highlighted in the table below.

Table: 1.1 Toll Revenues Annuity Vs Toll

(Rs crore)

Break up of Revenue	Toll Plazas	Total Length Km	Toll Revenue in FY 2020-21
Public Funded/ Annuity (18,669Km), OMT (1,593 Km)	387	20,262	8,645
Revenue Share from BOT (Toll) Projects	1,643		
BOT (Toll)	243	12,572	15,454
TOT	19	1237	1083
Total	649	34071	26825

Source: National highways authority of India, 2021

It may be mentioned that the contribution of revenue sharing between NHAI and project developer is at lower level of Rs 1643 crore. TOT being an evolving model, shows a contribution of Rs 1083 crore to the revenue. Additionally, it may be mentioned that in case of projects that are funded with budgetary resources, the toll collected is deposited in the Consolidated Fund of India (CFI). In case of OMT Project and BOT (Toll) revenue share project, the toll collections are shared as per the concession terms of the respective projects between National Highways Authority of India (NHAI) and the concessionaire. Notably, government share from such projects is also deposited in the CFI. The toll collections remitted by NHAI to CFI are channelized back to the NHAI as an investment (Press Information Bureau , Gov of India, 2018).

Going forward, with constraints on budgetary resources with the government, and the need to increase the road quality, it is expected that private players will play an important role in the road sector development under PPP model.

The present study is important for both corporates and policy makers, as it helps in analyzing the existing performance of PPP projects under the aegis of road development projects. It identifies areas that need to be strengthened to hasten development with private funding. In fact, this study does provide directions for further research in this area.

The reminder of the thesis is structured as follows: The next chapters include a review of extant literature, highlighting the problem definition/ research gap, significance and scope of the study, and the conceptual and theoretical background. Chapter 5 encompasses a review of PPP models, an analysis of the same, specifically within the Indian context and discusses firm performance measures. Chapter 6 provides an overview of firms that normally execute road development projects in India. Subsequent chapters include research design and methodology, followed by hypothesis development, data analysis and conclusion.

CHAPTER 2

REVIEW OF LITERATURE

2. Review of Literature:

An extensive review of literature has been conducted to probe various issues related to PPP, adopted for infrastructure development across the world. A thorough study has been done to understand the infrastructure requirements, global initiatives in PPP projects in the transportation sector, and roads in particular. Besides, efforts have been made to understand how PPP models in terms of road construction is operating in developed PPP markets such as Europe, Australia, US, Chile etc.

A few representative and highly relevant literature and previously conducted studies are summarized and discussed below in order to highlight the background and theoretical premises on which, the proposed research study is based:

(Guasch et al.,2014) study highlighted that in the past three decades, Latin America (Brazil), South Asia (India) and East Asia Pacific (China) emerged as three major developing economies, concentrating about 90% of PPP transport projects in the world. (Joha & Janssen, 2010) stated that PPP refers to a long-term relationship between both the public and private sector to work towards a common goal. (Menendez, 1998) emphasized importance of the government's role in developing transport projects under the PPP mode. The study in fact pointed to a few constraints faced by PPP transport projects such as political, bureaucratic, regulatory, financial, and methodological reasons. The study also highlighted the need of government enablers that could provide for the development of transport projects under the PPP model.

(Amadi et al.,2018) studied the importance of management of both internal and external stakeholders in PPP projects. (Satish and Shah, 2009) looking into private participation in infrastructure stressed upon the limitations of government resources, vis a vis the capacity to meet the requirement of infrastructure development. (Hammami et al.,2006) large market size and customers' higher purchase power are crucial determinants of PPPs. Other findings of the study include the aspects of macroeconomic stability,

minimal corruption, rule of law and previous experience of PPP projects; these it believes are the essentials for effective PPPs in infrastructure. (Alexandersson and Hulten, 2007) stressed upon advantages of PPP, whereby the authors believed that they encompass improved service quality, lower project costs, risk sharing, earlier and faster construction, and better budget fulfillment. On the other hand, the disadvantages of PPP include higher costs of capital, complicated contracts, and limited flexibility in modifications of the contract terms.

(Levinson et al.,2006) studied factors to measure the success of a PPP project that include both social and government acceptance, budget on schedule etc. (Hodge and Greve,2011) stated that PPP projects could be termed as success or failures based on various macroeconomic parameters, like overall benefit to the society, or at organizational level, based on its impact on efficiency, productivity etc., or at a project level based on the innovations carried out or other benefits in terms of employment generated, products or service delivered. In case of the procurer/government, if the PPP project meets the laid down objectives, it can be termed as a success. From the sponsor point of view if the project meets the financial return objective the project may be termed as a success.

(Kamaruddin et al.,2011) highlighted the importance of commercial entrepreneurship in PPP, as all businesses do have a profit motive. (Estache et al.,2000) emphasized on financing and regulatory challenges in road sector development in toll projects at various stages that include the development and execution phase, along with risks faced in terms of demand risk and consumers unwillingness to pay for services. The authors also stressed on the need for governments to provide financial cushion to developers by various means such as by providing equity and debt guarantees, exchange rate guarantees, subsidies, subordinate loans, minimum traffic and revenue guarantee, shadow toll, concession extension, revenue enhancement and change in regulatory obligations. (Datta, 2012) underlined that better road connectivity results in several national benefits in terms of firms carrying less inventory level which is a sign of less raw material holding cost, which in turn goes on to boost profitability. Secondly, it provides firms with flexibility to change suppliers, as they are in a better position to negotiate terms. The author concluded by saying that improved road development does help companies in making proactive

choices, which were possibly not feasible earlier on account of poor quality of roads.

(Connolly & Wall, 2011) studied the impact of global economic crisis (2008) on PPP projects that were signed during 2007-2009, owing to limited funds, as an economic uncertainty prevailed. (Izaguirre & kulkarni, 2011) studied the impact of 2008 economic crisis on private funding for infrastructure projects across sectors. Data drawn for the study was with special reference to developing countries. The authors identified India and Brazil as two countries, where funding provided by domestic financial institutions have ensured that the crises has not made any serious impact on growth of PPP projects. (Malone, 2005) believed that PPP projects are being used in various social and infrastructure projects in Australian states. The main benefits explained that may effectively be motivating the states to take up PPP mode could be (a) limited resources being at the disposal of the states; (b) creation of efficient infrastructure; (c) ability to bring forward capital expenditure; (d) ability to ensure on-going maintenance of facilities; and (e) the ability to gain value for money for the government.

(Adeoye & Islam, 2019) compared PPP projects in developing and developed economies; they highlighted that PPP projects in developing countries from the experience of Nigeria highlighted institutional corruption, poor risk management capabilities. On the other hand, the complex nature of PPP projects within a developed economy like UK had its strengths in terms of proper risk allocation among participants, quality private consortium, economically viable projects, political and public support, along with transparent procurement processes. (Sharma, 2012) studied factors that influence PPP development in infrastructure projects. The major findings of the study refer to the fact that PPP projects are more in demand by countries that are macroeconomically stable, abide by quality in terms of both regulations and governance. Interestingly, the author did not find any role of political factors and budget constraints in developing PPP projects.

(Kulkarni, 2009) propose that growth of PPP depends on a nation's macroeconomic, as well as microeconomic factors. He further added that for countries like India and Mexico, the contract period is the most important determinant of success of a PPP project. Besides, he believed that the concession period for PPP projects should be on

the higher side, so that it compensates the private entrepreneur for the risk under taken in completing a project per se. Additionally, the author has suggested future areas of research that include the number of years that are ideal for the contract period, especially since in developing countries, demand estimation is difficult due to greenfield projects.

Drawing from Latin American experience of 90's (Vives et al.,2006) in respect of infrastructure funding have stressed that PPPs are impacted by legal and political risks, financial resources with the state, institutional capacity, willingness to pay, tariff sustainability, location etc. (Eisenkopf & Knorr,2006) conducted their study with reference to the German Transportation model of the nineties, where the PPP model was not successful, owing to reasons such as, underestimation of the project cost and overestimation of the demand. The authors thereby emphasized upon risk allocation in PPP projects that need to be done based on the parties that are best suited to control both the risk and risk factors, and are better positioned to identify risks involved with PPP projects at various stages of planning, project development, operations, and demand.

(DOLOI, 2012) conducted a questionnaire survey on seven major PPP projects in Australia. The study identified key risk factors that influence time performance of the project as site condition and design complexity. Besides, the author identified market dynamics as the most critical attribute that influence both construction cost and operational performance of PPP projects. He also identified Partner dispute as an important factor in influencing time and cost performance. Additionally, technical obsolescence was believed to have important bearing on the operational performance of PPP projects. (English, 2006) analyzed Australian PPPs that have been used for delivering projects on major toll roads, hospitals, prisons, schools, utilities, and sporting facilities. The author emphasized that the justification of PPP by the government is based on risk allocation, which produces anticipated value for money (VFM). Thus, to oversee performance of PPP projects, the author stressed on auditing PPP projects to investigate the achievement of anticipated VFM.

(Sachs et al., 2007) looked at PPP opportunities and risks in China and select countries. They surveyed staff of international lenders, investors, and insurers along with legal and financial advisors from both public and the private sectors. The author believe that political risks can impact PPP projects in any country. They also noted that political risk in matured economies, such as Korea, Japan, and Singapore are minimal; While on the other hand, in countries like India, Indonesia, China, and Thailand are relatively risky, but do comparatively promise higher PPP opportunities. (Brown, 2005) studied various financing structures, which have been used for building transport infrastructure under the PPP model in Australia. Projects executed under this model were mainly in the form of JVs, which have been financed by using a combination of equity raised mainly from partners, superannuation funds, shares sold to public etc. The debt raised was primarily from banks, CPI-linked bond issuance, and from federal government. Public agencies have been putting conditions, where they can terminate concession at certain periods once the target IRR has been achieved by the project developer.

(Benkovic' et al., 2010) acknowledged multiple resource constraints at the level of public finances, owing to which, the private sector goes on to play an important role in infrastructure building. According to the study, private participation effectively depends on the risk and the return on investment to the extent that these are deemed to be reasonable and acceptable. (Li et al., 2001) believe that VFM in PPP projects can be achieved with the help of taking measures associated with project efficiency, sustainability, multi benefit considerations and effective procurement arrangement. The authors suggested that Macro risks of a project should be borne by public agencies, while meso-risk (project engineering) should be borne by the private sector; micro risks on the other hand, should be shared by both public and private agencies.

(Grimsey & Lewis 2002) stated that PPP projects involves transfer of risk from the public to the private sector. The authors identified various levels of risks, which stakeholders of the project development, namely procurer, sponsor, and lender face. According to the study, a procurer's risk perspective is based on VFM, along with contingent risks up to financial closure. Specifically, key risks for the procurer include bid qualification and interest rates. Sponsor risk perspective on the other hand, is

based on the impact on return, with project risks, such as demand factors, mid-life capital expenditure and operational performance. A lender risk alludes to default/delays on interest and principal. (Singh, 2011) studied PPP in the context of developing economies; the author stated that developing economies (e.g., India) face risks, such as construction / implementation risk, market risk, finance risk, operations risk, maintenance risk and legal risk. (Cheung & Chan, 2009) analyzed challenges faced in the BOT model for development of infrastructure, and emphasized on BOT projects facing difference in legal systems, causing difficulty in drafting BOT agreements. The authors believe that the private sector may not be interested due to unattractive package; while from a government's perspective, it may at times be wary of awarding project under PPP, as it may be accused of collusion with business, comfortable financial resources with the government and need to have shorter take off time for the project.

(Brandao & Saraiva, 2008) explained that to sustain interest of the developer in high-risk public infrastructure projects minimum traffic growth (MTG) need to be provided to the developers. This support would facilitate speedier financial closure and project execution. In fact, guaranteeing MTG may keep the level of contingent liabilities for the government in control; it would facilitate the government in extending guarantees to multiple projects without creating major contingent liabilities on its finances. (Wibowo, 2004) studied contingent liabilities that a government incurs while extending various types of guarantees for a BOT infrastructure project; some of these include minimum revenue guarantees, debt guarantees, tariff guarantees and minimum traffic guarantees. The author emphasized on better environment for private participation rather than falling back on guarantees. Further, he states that if a private player knows that he can fall back on guarantees to reduce project risk, it would make him less efficient in managing risks.

(Carpintero & Barcham, 2012) studied the gap between the expected results from private toll roads at the time of project execution and the actual results obtained. The Projects studied were from Latin American countries; the authors identified a few primary problems in the projects due to poor concession designs, inaccurate forecasts, or opportunistic bidding. Further, the authors emphasized on the need to carefully

study traffic levels being anticipated, and the possible impact vehicular traffic hold on the viability of a project.

(Anant & Singh, 2009) explained that in India, distribution of highways under PPP model are mostly in those states where economic development is more visible and governance standards are comparatively better. According to the study, states with lower economic development should consider opting for more BOT annuity types of projects in developing the state's infrastructure. In fact, according to the study, to attract infrastructure in highways, clear cut contract terms should be spelled out along with obligations of various parties in the contract. The authors also emphasized on the need of an independent agency, which should arbitrate or adjudicate between government agencies and concessionaries/ contractors. (Pathak ,2011) stated that the PPP model works best in existing assets or brownfield ventures. According to the author, Greenfield projects should be developed by government agencies, and the same should be run under PPP model once the assets are created. Further, the author believe that a 'reverse BOT' method should be used once the asset is ready to generate revenue. On being commercially operational, private participants would be ready to take up such projects at lower returns, since the project development risk has been mitigated.

Again, while speaking about BOT projects (Maniar, 2010) stated that these projects tend to face risks, such as delay in approval, change in law, cost overruns, dispatch constraints, land acquisitions, compensation and enforceability of contracts, financial closure, tariff adjustments and environment risk. As mitigation measures to these risks, the author suggests establishing JVs with Indian government agencies, along with some form of government guarantee for adjusting the tariff or extending the concession period. Besides, other mitigation measures could include insurance for political risk, entering into contract with project participants, and standby credit facility form the lender, among others. (Lind & Brunes, 2014) proposed avoiding cost overruns in infrastructure projects by way of a) using more PPP and decentralization of budgets, b) organizational process involving review of projects at different stages by the external reviewers.

(Mahalingam, 2008) analyzed both bottlenecks and enabling factors that affect state-level PPP projects in India; some of the key factors identified by the, albeit at the state level in development of PPP projects include institutional factors, such as the lack of legislation, along with an absence of policies and frameworks. Organizational factors retarding the growth of PPP projects encompass lack of capacity in promoting and implementing those projects. Projects-level handicaps include economic viability, social acceptance, viable tariffs, and equitable contracts, among others. (Devkar & Kalidindi, 2013) highlighted the absence of a robust pipeline of bankable urban PPP projects; the authors believe that it is a concern for both policy makers and private players in India. Notably, both central and state governments must improve quality of project development process by way of creating project development funds, panel of transaction advisors and establishment of state level PPP nodal agencies.

(Srivastava & Kumar, 2010) studied several PPP based infrastructure projects in India that have been through SPV, wherein the standalone cash flows of the project are of vital importance to sustain the project. Notably, the SPV structure helps companies to insulate their existing business to a large extent from the risk inherent in infrastructure projects. The study identified PPPs having significant advantage in terms of attracting private capital to create public infrastructure and enhance efficiency. (Demirag et al., 2012) explained that PPP projects are undertaken with a view that certain risks would be better managed by the private sector. However, when these projects are actually taken up by the private sector, usually by way of SPV structure, they look for contractual mitigations in terms of risk insurance, performance guarantee, interest rate swaps and inflation hedges. Therefore, the risks from SPV's are transferred to multiple agencies, which in turn add to the additional costs on the project, and thereby impacts the government's economic argument for the risk transfer. (Blanc-Brude & Strange, 2007) discussed PPP arrangement lenders pricing of loan takes care of the systematic risk (i.e., traffic); but idiosyncratic risks such as construction, cost overruns or delays are not priced, which are primarily mitigated by contractual agreements.

(Haldea, 2013) emphasized on the fact that financing requirement of infrastructure is large, and resource mobilization with the public sector cannot meet this challenge; accordingly, private capital is inevitable to sustain the growth momentum for

infrastructure development. (Fisher & Babbar, 1996) studied eight projects of toll road form across countries. The study revealed that to have robust private financing of toll roads, it is imperative that countries, where these projects are coming up have stable economic and political environment, coupled with local capital market, which can provide long term funds. There are challenges in private financing of toll roads due to difficulty in public acceptance of tolls as a standard method of road finance, developing of standard concession models, improving legal and policy framework, and targeting projects that generate attractive returns while adequately addressing project risks. (Malini, n.d) stressed on the need to identify various sources of funds for project execution under PPP, starting from equity capital, debt capital, mezzanine capital, and grant from the government. In the study, the author emphasized that there is no ideal debt equity ratio for such projects. In fact, according to the study, D/E ratio in Indian road projects tends to be within the range of 50:50 to 80:20; the more usual value being around 70:30. Debt servicing terms should thereby planned with prudence and pragmatism with due considerations to be given to aspects, such as tenure of the debt, interest rate, moratorium and repayment period. These factors are vital, as cash flow (liquidity) problems may occur if repayment starts early, or it is too short.

(Thomas, 2009) stated that there is huge requirement of leverage for infrastructure projects toll roads, urban sector projects, and airports leverage levels are 60-70%. Leverage can go up to 80-90% in projects involving payment for services by government authorities in road projects over the project life. (BRAV, 2009) exploring data from firms operating in the UK, the study emphasized that private firms rely less on equity financing, which results in higher debt ratios in comparison to public firms. (Estache et al., 2007) believed that PPP projects in transport are being funded by taking less equity and more in the form of debt. Increased usage of debt in projects results in increased risk profile of the investment. Providing guarantee structures by government can facilitate access to financial markets for the transport projects making them more bankable. (Silva et al., 2004) stated that developing countries equity is getting replaced by debt in the financing of utilities and transport services. The study suggested that leasing arrangements would possibly entail lesser requirements to buy assets; thus, curtailment of debt requirement for creating infrastructure.

(Maniar, 2013) stressed that viability gap funding is being used by the Indian government to provide grant to certain socially desirable projects, which otherwise may not be commercially viable to developers. However, the author has also stressed that there have been quality issues in projects, where viability grant of 40% of the capital cost of the project has taken up by developers; this may have been due to the lesser stake of the developer in the particular project. (Drike & Sinha's, 2003) paper drawing experience of highways projects in Indiana State in the US explained various modes of resource raising done with the help of the Federal government, which resulted in speedier development of highways. (Tiong, 1995) study emphasized for a typical BOT project equity that should be between 20 to 30 per cent. In fact, according to the author, the level of equity should be determined by the risk inherent in the project in terms of project cost, revenue possibilities, and credit rating of the promoters, along with the strength of bank support secured by the promoters. (Chaudhari et al., 2014) highlighted that in India, raising long term debt for road projects is challenging, since corporate bond market is not liquid and vibrant. (Chao & Saha, 2015) state that in India public sector banks are most active lenders in the country's infrastructure sector with PPP financing coming from both public and the private sector with public sources in some cases financing (a) upfront capital cost through grants or viability gap funding; (b) state owned enterprises investing in equity, while private sector financing equity (including equity financed by corporate debt) or project finance debt. The authors further highlighted the importance of public sector financial institutions for funding projects under the PPP model.

(Tandon et al., 2016) studied the profitability valuations of banks, and emphasized on the large value of equity multiplier suggesting large amount of debt financing in comparison to the stakeholder's equity. (Orgeldinger, 2006) state that PPP projects typically involves project finance assistance, wherein there is usually no recourse on the sponsor's balance sheet if the project faces any financial, operational, administrative, and regulatory challenges. Project performance, both in terms of technical and economic is the core of project finance. (Walsh et al., 2011) in their study, cited the experience of countries, such as Brazil, China, Chile, and Korea to explain various channels of financing for infrastructure, ranging from government-backed institutions, banking channels, capital markets and assistance from multilateral

financial institutions for infrastructure development without compromising on fiscal and external stability. The authors have stressed on the need for development of capital markets so that resources could be raised for infrastructure development. (Shaik & Narain, 2011) carried out a comparative analysis of Private Participation in Infrastructure (PPI), among BRICS nations. As resources for development of infrastructure, the authors identified government employees' pension fund.

(De'au, 2011) has discussed the need to attract long term funds for investments in infrastructure by way of having appropriate regulations, active involvement of institutional investors like pension funds, insurance companies and mutual funds etc. Infrastructure investments being long term in nature, the author further stressed on the need to have long term policy planning to provide stable policy framework and stable regulatory environment for creation of long-term infrastructure assets by using long-term funds. (Curtain & Betts, 2017) believed that maximum risks under PPP should not be transferred to the private party; rather one should optimize risk allocation between government and the private sector, along with the parties best able to manage the risk. (kalidindi & Singh, 2009) studied both BOT (Toll) and BOT (Annuity) models being used for the road development in India. Under the PPP model, the first preference is generally given to BOT (Toll) projects for execution. However, projects where revenue may be a challenge and private players may not be willing to take up the revenue risk BOT (Annuity) is awarded by the government agencies. The study emphasized that the selection of the model is primarily dependent on the risk profile of the projects and financial viability. (Xenidis & Angelides, 2005) explained different types of financial risks that BOT projects experience; and the same need to be considered while taking up BOT mode of implementation of projects. This study further classified risks based on the project's lifecycle phase, where these risks can potentially occur and sources for each risk. (Priya & Jesintha, 2011) identified multiple projects being taken up are either BOT/ BOOT type models (either toll or annuity payments) or close variants. The study identified road and the port sectors attracting maximum amount of project investments.

(Malini, 1999) studied municipal bridge projects on BOT basis, whereby the author put across a case for certain percentage of grant for development of a bridge by the

municipalities and revenue from toll to make the construction of bridge a viable option. (Ng et al., 2010) used the Monte Carlo simulation method to explain the impact of change in construction cost, operating cost, tariff changes due to various factors on revenue generated. Notably, this method could be used to calculate NPV and rate of return on equity. (Songer et al., 1997) explained various variables, such as (a) number of toll transactions; (b) average annual toll rates; (c) annual operating expenses; (d) construction costs; (e) construction duration and (f) interest rates; and (g) inflation, as some of the factors that can influence project risks and potential cash flows which PPP projects are expected to generate.

(Tiong, 1990) studied major risks in BOT projects; they include financing, coupled with techno- political risks. The author emphasized on the need to provide securities by the government in order to make projects attractive and credit worthy. The study stressed upon the need for a sponsor of BOT project to (a) identify the key risks; (b) evaluate the acceptability of each risk; and (c) allocate the risks to different parties involved. On identification of the risks, the study stressed on the need for a project sponsor to look into the process of insuring, controlling and apportioning risks according to the party's willingness to bear such risks. (Christine, 2005) stated that the greatest risk for toll road projects is revenue risk that results from traffic volume volatility. (Agrawal et al., (2011) to encourage private investment into infrastructure, suggested the need for proper policy and regulatory framework, coupled with removal of fiscal barriers and professional inefficiencies. The authors stressed on the constraints being faced in PPP projects in terms of limited exit options, limited mezzanine financing, limited use of take out financing and underdeveloped corporate bond markets.

(Gunnigan & Rajput, 2010) believed that efficient PPP model concession agreement should cover all possible causes of later adjustments with minimum possible room for renegotiation. A major finding of the paper is that maximum PPPs in Europe and India are coming up in road sector projects. (S & G, 2012) study analyzed the evolution of Model Concession Agreement (MCA) in India from initially being simply non-standardized concession agreement in mid-nineties. Evolution of MCA in the present form has facilitated standardization of agreements, thus attracting private

investors into road projects. (Chaudhuri, 2009) discussed salient features of the concession agreements being used for developing road projects in the PPP mode in India. The study explained various security stipulations put in concession agreements for road projects, specifically in the form of charges on mortgage of immovable properties, hypothecation of movable assets, charges on cash flows and pledge of shareholding etc.

(Pustylnick, 2012) emphasized on putting necessary covenants in the agreement to ensure that projects facing financial distress can be structured, so that they can meet the objectives for which, they were developed at the first place. According to the study, the best way to restructure project facing financial constraint is to restructure debt in such a way that repayment liabilities should start only when the project is having sufficient cash flows to service debt. (Hill, 2011) has studied the successful development of PPP toll projects in road sector in Chile. The author attributes the success of road projects in Chile due to strong regulatory factors, such as laws directly concerning concessions and general laws concerning investors and investments. According to the author, in Chile, bidding from the lowest cost point has moved to least present value of revenue bidding, which entails winner demanding least amount of money from the concessionaire. Notably, in this case, the concession period ends at the point when the bidder gets the desired level of revenue from the project.

(Blanc-Brude et al., 2009) believed that PPP roads are 24% more expensive to build than roads being built through the traditional method. The main reasons attributed for the higher cost of PPP projects is in terms of (a) pricing of construction risk; (b) incentive to invest more in the construction phase with a view of lowering subsequent operations and maintenance costs; and finally, (c) recouping of higher transaction costs in PPP projects. (Meduri & Annamalai, 2013) state that PPP road projects have higher project costs than public sector projects. The authors established that unit cost is lower for PPP projects than public sector projects, since PPP road projects are larger in size, and they can take advantage of economies of scale, leading to lower unit project cost. (Chinyere & Xu, 2012) stated that PPP projects do not have any economic reason to be desired for infrastructure development in comparison to the asset created through public resources. In fact, according to the study, preference for

PPP should be based on its ability to help in gaining competence and know-how for bundling construction, maintenance and operations, and accountability and not due to the expected financial advantage in taking projects under PPP.

(Nallathiga et al., 2017) believed that the success of road projects is influenced by factors of traffic assessment, bid criteria/ financial attraction of the project to investors and failures are result of force majeure and maintenance cost over runs. (Dolla and Laishram, 2019) central government bodies in the Indian context are typically well experienced in executing PPP projects in case of transportation infrastructure. (Zhu & Chua, 2018) believed that a project's financial structure, economic and political environment, shareholders' credibility, financial market, legal system, public sector's reliability, regulatory framework, EPC contractor's creditability, and financial flexibility are all important for successful completion of PPP projects in China.

(Mangu et al., 2021) stated that in India toll-based PPP projects in comparison to annuity projects are longer in tenure and are implemented in better developed states. Annuity based projects were identified having higher debt- equity ratio. (Kudtarkar, 2020) believed that developers often do not show keen interest in PPP contracts, primarily due to failure in contract and risk management for majority of operational projects that impact financial returns, especially for private developers in India. (Sinha & Jha, 2021) absence of developed market for financing, inadequate institutional capacity, lack of personnel having domain knowledge along with absence of legislation to govern the execution of PPP road projects were identified as key constraints impacting financing of road projects under PPP. (Mohammedshakil & Gundaliya, 2020) while negative factors in Indian PPP in road projects were identified as lengthy delays in negotiation, lack of clarity in government objectives and evolution criteria. (Deep et al., 2022) complexity of the sub-contractor's performance, frequent modification in alignment, project design, gaps in the safety norms impact development of highway projects.

(Mihaela, 2017) firm performance can be explained with quantitative and qualitative factors with profitability, shareholder value and economic value being important aspects to assess the firm performance. (Herciu et al., 2010) authors used Du Pont

analysis by calculating Return on Sales (ROS), Return on Asset (ROA) and Return on Equity (ROE) of twenty top most profitable companies in the world for measuring efficiency of the firms. The study highlighted that the company with the highest absolute profit may not necessarily have higher ROE. (Sheela & Karthikeyan, 2012) The DU Pont analysis has also been used to study the financial performance of pharmaceutical industry using ROE and ROA. Further ROI has been used to analyze which has been arrived at by Asset Turnover (Operating Income X Total Assets) and Profit Margin (EBIT X Operating Income). The authors concluded both ROE and ROI as most comprehensive measure of profitability of firm. (Bhagyalakshmi & Saraswathi, 2019) Herein, the authors studied automobile companies' performance by DU Pont analysis for measuring ROE. Net profit to turnover i.e., Net Profit Margins demonstrates how beneficial the company is after meeting its all expenses accordingly the higher ratio being beneficial. Turnover to total assets suggesting Asset Turnover Ratio measuring company's efficiency in utilizing its assets with higher ratio signifying better performance. Total assets to equity being Equity Multiplier explaining level of debt financing to acquire asset with higher ratio demonstrating that the company is relying on higher debt.

Holistically in the literature review, this study found that various facets of PPP risks across sectors have been discussed and explained with possible mitigants being proposed. Role of various factors that can enable growth and development of PPP have also been explained in details. Based on the review, the present study attempts to scrutinize the performance of road projects and the challenges experienced in the development of road sector under the PPP model. Notably, the DU Pont analysis has been highlighted in the literature review for analyzing financial performance across various industries. However, there doesn't seem to have been any study that explored its relation to financial performance of road projects under PPP, especially within the Indian context. Thus, this study attempts to delve into the research gap within this area, and thereby examine the financial performance of road projects under the PPP model with the help of Du Pont analysis within the Indian context. Based on the review of literature, the theoretical background of the study and hypotheses development follow suit in the next chapter.

CHAPTER 3

RESEARCH GAP/PROBLEM DEFINITION

3. Research Gap /Problem Definition

Research Gap:

Infrastructure development is imperative for sustaining growth in emerging economies like India, whereby development of roads is an important element. Therefore, creation of a robust road network entails huge investments. PPP thereby plays a crucial role in ensuring infusion of funds, because often there are constraints on the availability of public finances for creating national infrastructure assets (Agrawal et al., 2011). PPP contractual agreements must necessarily factor in all the concerns that could impact projects (Mwesigwa et al., 2020).

Owing to its demography and huge populous, public finances in India are often under pressure, and there is urgency to deliver infrastructure projects efficiently to meet the growing aspirations of the people. Private sector initiative in creation of infrastructure helps in execution projects at a faster pace (Benkovic' et al., 2010). Unit costs are lower for PPP projects than public sector projects since PPP road projects are larger in size, and they can take advantage of economies of scale, which effectively leads lower unit project cost (Meduri & Annamalai, 2013). Notably, the efficiency factor gains in PPP projects come in, only when all the stakeholders support each other (Vinogradov & Shadrina, 2018)

To provide impetus to the development of road infrastructure, the private sector is being increasingly employed to achieve part of the larger infrastructure development targets in India. Participation of private sector in execution of projects is based on the objective to earn risk adjusted returns for the capital employed. It is important to carefully study traffic levels being anticipated and the possible impact vehicular traffic hold on the viability of the project (Carpintero & Barcham, 2012). Literature emphasizes on PPP projects being executed world-wide for infrastructure development (Adeoye & Islam, 2019; Guasch et al., 2014; Malone, 2005; Carpintero & Barcham, 2012; Izaguirre & kulkarni, 2011; Hill, 2011; Sachs et al., 2007; Shaik &

Narain, 2011; Connolly & Wall, 2011; Cheung & Chan, 2009; Eisenkopf & Knorr, 2006; and Vives et al., 2006).

The various elements of risks and mitigations have been studied for PPP projects in detail i.e., (Blanc Brude & Strange, 2007; Grimsey & Lewis, 2002; Alexandersson & Hulte'n, 2007; Pathak, 2011; and Blanc-Brude & Strange, 2007). Drawing from the experiences in Chile the authors assessed the management of risk in solicited and unsolicited PPP projects, vis-a-vis their sustainability (Castelblanco et al. (2020).

PPP projects under road development has attracted the attention of various scholars globally, including in India especially on risks, possible mitigations, viability, nature of contracts performance of these projects (e.g. Brown, 2005; English, 2006; Gunnigan & Rajput, 2010; Priya & Jesintha ,2011; Fisher & Babbar, 1996; Estache et al., 2000; kalidindi & Singh, 2009; Hill, 2011; Carpintero & Barcham, 2012; S & G, 2012; Datta, 2012; Maniar, 2013; Chaudhuri, 2009; Blanc-Brude et al., 2009; Meduri & Annamalai, 2013; Chaudhari et al., 2014; Christine, 2005).

Research in the Indian perspective has focused on the challenges in PPP contracts due to failure in contract and risk management of operational projects that go on to impact the financial returns for private developers (Kudtarkar,2020). Absence of developed market for financing, constraints in institutional capacity, lack of personnel with domain expertise along with the absence of legislation to govern execution of PPP road projects (Sinha & Jha, 2021). Challenges in the Indian PPP road projects were identified as lengthy delays in negotiation, ambiguous government objectives and evolution criteria (Mohammedshakil & Gundaliya, 2020). Performance of highway projects is impacted by the frequent changes in alignment, project design and ambiguities in specifications (Deep et al., 2022).

The success of road development projects is influenced by factors of traffic assessment, bid criteria/ financial attraction of the project to investors and failures to meet them are result of force majeure, besides maintenance cost over runs (Nallathiga et al., 2017). However, studies on the financial performance of road development projects being implemented under PPP are scant. This study thereby attempts to assess the financial performance of SPVs in executing road development projects under BOT Toll and BOT Annuity model.

Problem Definition

In India, BOT Toll and BOT Annuity based variants have been extensively used in past for development of road projects. Toll based roads are facilitated by the government's ability to give financial cushion to developers by various means such as by providing equity and debt guarantees, exchange rate guarantees, subsidy, subordinate loans, minimum traffic and revenue guarantee, shadow toll, concession extension, revenue enhancement and change in regulatory obligations (Estache et al., 2000). Annuity based projects on the other hand, have defined revenue streams that do require government intervention in terms of policy-based enablers to make the model successful. Though both the benefits and challenges in taking up infrastructure development by using the PPP model has been well researched world over, there are limited studies on road infrastructure development in PPP mode in India with reference to the SPVs / firms that actually execute such projects. In late 2000s, India launched an aggressive program of PPP particularly in road development awarding over 300 highways under the PPP with many of them being supported by viability gap funding (Guasch et al., 2014). This study focuses on a) private sector participation in Indian road sector development under PPP model; b) performance of the SPVs /Firms executing such projects; and c) study of concession tenures and its influence on the nature of the model.

A performance analysis of existing firms and ongoing projects under road sector in PPP mode is required not only to further enrich the existing body of knowledge but also enable creation of conducive policy and regulatory environment for firms to execute these projects efficiently and effectively. This study will attempt to address the research gap by way of analysis of the financial performance of the SPVs executing such projects and carry out the empirical study policy level and implementation challenges in development of road sector under PPP in India.

3.1 Significance & Scope of the Study:

While road projects in India are largely developed in the BOT mode, it is important to understand the level of risk that these PPP projects face; for the same, there is a need for a thorough analysis of such risks (Maniar H. M., 2010). Thus, this study largely

attempts to identify policy level challenges in executing PPP projects. The study is significant in terms of reviewing private firms' performance, as they are the ones, who effectuate the PPP projects, albeit under different PPP models (i.e., BOT Toll, BOT Annuity along with empirical study of the impact of new initiatives under PPP, such as Hybrid Annuity, TOT model taken by the government).

The study is important for the corporate and policy makers, as it would possibly help them analyze the financial performance of PPP projects. Importantly, information / data on the challenges in executing road projects have been drawn from government bodies, annual reports of corporates executing road projects, reports by credit rating agencies etc.

Specifically, the assessment of financial performance (i.e., financial statement of SPVs) has been done with the help of Du Pont analysis. This analysis method has been used in past for assessing financial performance in various industries i.e., (Sheela & Karthikeyan, 2012), and (Herciu, Ogorean, & Belascu, 2010). Notably, the Due Pont components provide insight into the operating characteristic of a firm (Soliman, 2008) . Concession tenures of BOT Toll and Annuity mode were studied to understand their influence on the type of model used in PPP. Data for concession tenures were collated from annual reports of firms executing the projects, coupled with information provided in the public domain by relevant government agencies. It may be noted herein that the study of concession tenures is significant as it can greatly influence the returns generated by the developers from PPP projects.

CHAPTER 4

CONCEPTUAL & THEORETICAL BACKGROUND

4. Conceptual & Theoretical Background

PPP has an important role to play in infrastructure development (Haldea, 2013). As mentioned thus far, there are various challenges and opportunities under the PPP model in the transport sector (Alexandersson & Hultén, 2007). Some of the main benefits motivating states to take up the PPP model could be (a) limited resources at the disposal of the states; (b) creation of infrastructure in an efficient manner; (c) ability to bring forward planned capital expenditure; (d) ability to ensure on-going maintenance of facilities to a particular standard; and (e) ability to gain VFM for the government (Malone, 2005).

Project equity should be between 20 to 30 per cent for BOT (Tiong R. L., 1995). Unit costs are lower for PPP projects than public sector projects since PPP road projects are larger in size and they can take advantage of economies of scale leading to lower unit project cost (Meduri & Annamalai, 2013). In PPP idiosyncratic risks such as construction, cost overruns or delays are primarily mitigated by contractual agreements (Blanc- Brude & Strange, 2007).

(Carpintero & Barcham, 2012) emphasized on the need to carefully study traffic levels anticipated, and the possible impact vehicular traffic holds on the viability of a project. For instance, variables such as (a) number of toll transactions; (b) average annual toll rates; (c) annual operating expenses; (d) construction cost; (e) construction duration and (f) interest rates; and (g) inflation, are just some of the factors that influence project risk and potential cash flows, which the project is expected to generate (Songer et al., 1997). Moreover, design complexity, financial structure and government policies are three common factors that go on to affect risks across time, cost, and operational performance in PPP projects (DOLOI, 2012). Notably, selection of the model is primarily dependent on the risk profile of the projects and financial viability (kalidindi & Singh, 2009).

In order to have robust private financing of toll roads, it is important that countries, where these projects are coming up have stable economic and political environment,

coupled with local capital market, which by itself is capable of providing long- term funds (Fisher & Babbar, 1996). Countries that are economically stable and have quality of both regulations and governance are more suited for PPP projects (Sharma, 2012). PPP in developing countries have challenges in terms of institutional corruption, poor risk management and the complex nature of PPP and developed economy have strengths in terms of clarity on risk allocation among the stakeholders, economically viable projects, political and public support, transparent procurement (Adeoye & Islam, 2019).

Toll roads can be facilitated by government's ability to provide financial cushion to the developers by various means such as providing equity guarantees, debt guarantees, exchange rate guarantees, subsidy, subordinate loans, minimum traffic & revenue guarantee, shadow toll, concession extension, revenue enhancement and change in regulatory obligations (Estache et al., 2000). In order to sustain the interest of the developer in high-risk public infrastructure projects minimum traffic growth (MTG) need to be provided to the developers (Brandao & Saraiva, 2008). If a private player knows that it can fall back on guarantees to reduce project risk, it would become less efficient in managing risks (Wibowo, 2004). Notably, political risks can also impact the performance of PPP (Sachs et al., 2007).

It is important to understand the performance of PPP in states and review the performance and identify the enablers for carrying out infrastructure projects (Mahalingam, 2008). However, while recognizing the importance of private initiative in transportation sector PPPs are not always the panacea for infrastructure development (Cheung & Chan, 2009). While PPP projects are being taken up it is important to know whether these projects are Value for Money (VFM) (English, 2006), (Grimsey & Lewis, 2002), (Li et al., 2001). Reasons for the projects being implemented through PPP in India have been qualitative with little information on whether the projects have been VFM for concerned authorities (Singh K. P., 2011).

It is important to study financial performance of project vehicles for analyzing the justification of interest shown by the private participants (Priya & Jesintha, 2011). DU Pont analysis can be used for measuring financial performance of the SPVs executing

road projects under PPP. Three ratios used in the DU Pont analysis include a) Net profit to turnover ratio i.e., Net Profit Margins demonstrates profitability of the company with higher ratio being beneficial. b) Asset Turnover Ratio i.e., turnover to total assets that measures company's efficiency in utilizing its assets with higher ratio signifying better performance. c) Equity Multiplier i.e., Total assets to equity that measures level of debt financing to acquire assets with higher ratio demonstrating that the company is relying on higher debt to finance its operations (Bhagyalakshmi & Saraswathi, 2019).

It is important to study the kind of return that these PPP projects have generated for BOT Toll and BOT Annuity models. Literature reviews in the past have conducted extensive research on various risks and performance challenges in the PPP models across sectors, both for India and world at large. However financial performance of the road projects across models has not been studied. Accordingly, the hypotheses below help in channelizing our thought process in terms of carrying out a comparative analysis of the types of PPP Models, vis a vis their impact on the financial performance of firms engaged in road infrastructure development in India.

H1 Financial performance of PPP projects is not affected by the type of model used to execute the projects under road infrastructure development.

To study this hypothesis, returns generated by the firms by way of Du Pont model have been analyzed to understand whether BOT Toll or BOT Annuity models have any differentiation in terms of financial performance of these firms in executing such projects.

In our literature review section, this study highlighted about the importance of concession tenures in the success of PPP, whereby the contract period is the most important determinant (Kulkarni, 2009). Concession tenures can have important influence on the financial performance of road projects as seen from the experience of Chile (Hill, 2011). In India toll-based PPP projects in comparison to annuity projects are longer (Mangu et al., 2021). Accordingly, the present study forms the next hypothesis to validate whether BOT -Toll and BOT Annuity models do have any influence on the concession tenure.

H2 PPP mode of road infrastructure development the concession tenure of the project is influenced by the type of PPP model.

To study this hypothesis, concession period of the sample 189 BOT projects (Toll-150 & Annuity-39) have been analyzed. Analysis of the parameters i.e., highest, lowest, average concession period and tenure of the maximum PPP projects on BOT Toll and BOT Annuity model, has been carried to understand the influence of the concession period, on the type of the PPP model.

CHAPTER 5

PUBLIC PRIVATE PARTNERSHIP MODELS

5. Public Private Partnership Models:

Today, India offers the world's largest market for PPPs (Kelkar, 2015). Some of the advantages of PPP are improved service quality, lower project costs, risk sharing, faster construction, and better budget utilization. Some of the disadvantages include high capital costs, complicated contracts and hold ups, reduced flexibility with long-term contracts and project delays (Alexandersson & Hulten, 2007).

PPP models are used in various industries to ensure efficient allocation of risk among the parties concerned. Some of the models of PPP defined by Infrastructure Development Department, Government of Karnataka (Govt of Karnataka infrastructure development department) are discussed and mentioned in **Annexure I**.

5.1 PPP Models used in Indian Road Sector:

One of the areas where PPP models are extensively used in India is 'development of road infrastructure'; some of the common modalities include BOT (Toll) and BOT (Annuity), along with their variants such as DBFOT, BOOT, and BOT (Hybrid Annuity Model). Besides, TOT (Toll-Operate-Transfer) model is also used for monetization of the road assets by government bodies; while OMT (operate maintenance and transfer) involves concessionaire maintaining the facility and charges toll on the asset. Notably, the models being used are based on the information available with India's Ministry of Road Transport & Highways. A brief description of all these models follows:

1) BOT (Toll) Model:

In this model, the concessionaire meets the construction cost, along with the expenditure on annual maintenance. The concessionaire recovers the cost of construction, maintenance, and the return on investment out of the toll collection over the concession period. Further, to increase the viability of the projects on commercial terms provision for capital grant to the extent of 40% of the project cost is also provided in select cases. In case of financially robust road projects, there is a

provision of negative grant, in which case, a project is generally awarded to that concessionaire who gives the highest money upfront for the project being awarded. Notably, BOT toll projects are also awarded under revenue share basis.

Advantages

BOT-Toll model for creation of road assets has beneficial impact on infrastructure development, as enumerated below:

- a) **Speedier Implementation:** implementation of BOT (Toll) model gives momentum to a project; this is because, the developer gets an incentive in ensuring that assets get completed in time, and revenues continue to flow on account of the assets being developed.
- b) **Public finances are not strained:** since the project is developed by the private agencies it does not create any strain on public finances; normally, this is the case when the government awards EPC contracts for asset creation, whereby at the end of the contract period, BOT (Toll) assets are transferred to the state.
- c) **Better quality of asset creation:** in this model, toll collection on the asset is done by the developer for a longer period of time (e.g. ranging from 15-30 years of concession tenure). Therefore, it is in the developer's interest to create a durable asset, where operational and maintenance costs are minimized within this tenure.

Disadvantages

BOT-Toll model does help in creating assets, without any support required for budgetary allocation from public institutions; however, they do have their own set of challenges as mentioned below:

- a) **Higher cost of development:** due to the nature of project where the developer must take financing and execution risk, the cost of development is on the higher side. On the other hand, the cost of capital available for the developer for financing of the project is expected to be higher than the cost at which sovereign can borrow from the market.
- b) **Revenue risk for the developer:** revenue risk for the developer is high since the project must generate sufficient return so that the developer can take care of

financing and the execution cost. Any shortfall in demand estimation may go on to impact project profitability for the developer.

2 BOT (Annuity) Model:

In this model, the concessionaire is required to meet the entire construction cost (no grant is paid to the client) and the expenditure on annual maintenance. The concessionaire recovers the investment out of the annuities payable by the client. Finally, in this model, the selection of successful bidder is made based on the least annuity quoted for a fixed concession period.

Advantage

BOT-Annuity model is primarily used to create road assets, wherein the developers are not comfortable for bidding under the toll structure due to the expectations of lower vehicular traffic. Some of the benefits of the annuity based model are enumerated below:

- a) **Faster implementation:** in this model, the process of asset creation is fast, since it is in the interest of the developer to start receiving annuities from the public agency or state after the completion of the construction.
- b) **Creation of assets without upfront capital outlay from public finances:** since the initial cost of development of the project is to be borne by the developer, and the state is supposed to pay the developer in the form of annuities, albeit in a staggered manner, there is no sudden jump in outlay from the government for executing the project, owing to which, the creation of infrastructure can go on unhindered despite challenges in public finances.
- c) **Quality of asset creation:** since the developer would get his returns over a long tenure it is in his interest to create the best quality asset that he possibly can, which effectively ensures lower operational and maintenance cost for him.

Disadvantages

The challenges on the other hand are enlisted below:

- a) **Higher cost of development:** due to the nature of project where the developer must take financing risks, the initial cost of development is generally on the higher side, especially when you compare it to EPC contracts.

- b) Increase in future liabilities for the state: since payment of annuities is to be done over a period ranging from 15-30 years, BOT (Annuity) projects tend to increase the state liabilities on the future date, especially if multiple annuity-based projects are awarded.
- c) Risks for the concessionaire / developer: since payments from the awarding agencies of the project are to be received over a period of 15-30 years, the projects are prone to the risks i.e., political, regulatory, financial insolvency of the awarding agencies etc.

DBFOT (Design Build Finance Operate & Transfer) Model:

In this model, the public agency provides its requirement in terms of infrastructure to be created to the concessionaire. Thus, right from the stage of project design the concessionaire is involved in all stages of development till the time its concession period ends, and the asset gets transferred to the public agency. Notably, this model is applied in case of both Toll and Annuity based projects, as it is a variant of BOT (Toll) and BOT (Annuity) models.

BOT (Toll + Annuity Model):

In this model, the developer is given right to collect toll, and is provided with annuity by the awarding agency. This model is primarily used at places, where toll on its own may not compensate for the project cost and desired return on investment from the project. In this model annuity will effectively become the floor amount for the developer. This model can help in attracting funds for those projects where toll collection is not expected to generate desired return for the developers.

The Indian state of Madhya Pradesh's government for instance has awarded projects on BOT Toll plus Annuity basis, wherein the concessionaire besides getting authority to collect toll, also receives some annuity from the awarding agency (Govt. of M P, India).

Advantages

BOT (Toll + Annuity) is an important model within PPP with lower stress on public finances, primarily because, some part of the cost is recovered through toll. Some of the benefits of the model are enumerated below:

- a) **Faster Implementation:** the project developer has an inherent interest to complete the project within the time-lines to start generating revenues.
- b) **No requirement of upfront budgetary resources for the asset creation:** since the road assets under this model can be created without any upfront capital outlay from public finances, it is extremely beneficial for the State. Notably, this model allows road stretches to be developed, wherein the standalone ability of the project to generate toll revenue is restricted. The annuity provided by the State acts as added incentive to the project developers apart from the right to collect toll during the concession period.
- c) **Quality of asset creation:** As the developer is expected to generate toll and receive annuity from the project it is an important motivation for him to create a quality road asset.

Disadvantages

BOT (Toll + Annuity) model while has a mix of toll and annuity structure does have its own set of challenges, specifically in standalone toll and annuity models. They are enlisted below:

- a) **Higher cost of development:** as cost of raising resources for the developer are more than the sovereign State, and the project must generate return for the developer, the cost of development of the project correspondingly is expected to be high.
- b) **Increase in future liabilities for the state:** there is an increase in future liabilities for the state, as the payment of annuities is to be done over a period.
- c) **Payment of Toll and Annuity:** since the projects are commercially unviable, it results in payment of annuity by the awarding agency, and at the same time the users must bear the toll charges for using the road stretch.

Operate Maintain & Transfer Model (OMT):

“OMT is used exclusively for maintenance of the existing infrastructure wherein contractor has right to collect toll for the operation and maintenance work for the contracted stretch of road” (National Highways Authority of India).

Advantages

By and large, the OMT model is beneficial for maintaining road assets under PPP with the following advantages enumerated below:

- a) Maintenance of assets without outlays from public finances: in this model, the maintenance cost is incurred by the concessionaire without any additional burden on public finances. The capital outlays in terms of the maintenance of the road are borne by the concessionaire.
- b) Lower cost to the concessionaire: this model does not require large capital expenditure by the concessionaire. The expenditure that is to be incurred is mostly operating in nature for upkeep.

Disadvantages

The disadvantage of this model is enlisted below:

Higher cost for commuters: owing to the structuring of this model, the primary disadvantage is that the public/ commuter has to pay up higher fees/ tolls for using a road stretch; this is as a fee on assets, which actually has been funded from the tax payer's money.

Hybrid Annuity Model (HAM):

In this model all clearances, land acquisition, projection of traffic flow and collection of tolls is taken care by the government. In view of the major project risk addressed by the awarding agency the expected internal rate of return is in the range of 12-14%. In this model, 40% of the Bid Project Cost (BPC) is to be provided by NHAI in phases as per the physical progress of the project construction; while the remaining 60 % of the project cost is provided by NHAI through annuity payments during the operational period of the project. In fact, NHAI also provides return on the 60 % portion at bank rate +3 %. Further, NHAI also provides funds to the concessionaire for Operations & Maintenance (O&M) cost as per the bid, which in turn, is adjusted with annual inflation (Ministry of Road Transport & Highways, 2015).

According to a study by CRISIL (India's credit rating agency) HAM projects are primarily focussed with few players, as the road projects under PPP have faced challenges in the past, under other models i.e. BOT (Toll) and BOT (Annuity). Lender's focus on promoter comfort is resulting in concentration of HAM projects among 7-8 players. Moreover, it may be noted that the competition level is high for EPC projects, moderate for HAM projects, and low for BOT projects (Agrawal P, 2019). However in the recent past, there has been some relaxation in the bid eligibility criteria for national highways projects by government agencies, which has effectively enable mid-sized players to start bidding for HAM projects, enhancing thereby the competitive intensity (Crisil 2023).

Advantages

HAM projects have been introduced to mitigate the challenges faced by the regular toll and annuity based models with key benefits enumerated below:

- a) **Faster Implementation:** the HAM model's awarding agencies takes care of the various clearances required, including land acquisition for the project.
- b) **Lower capital outlay for the developer:** since the awarding agency shares the project development cost, right at the development stage, the developer's capital outlay is far less, reducing thereby the need for large bank finances.
- c) **Low commercial risk:** once project run through this model become commercially operational, it has negligible operational risks.
- d) **Facilitation of regulatory approvals by the awarding agencies:** this model is expected to give impetus to road development projects at large, as delays in terms of various approvals required are taken care by the awarding agencies.

Disadvantages

HAM is certainly beneficial from the developer's perspective; however, it does have its own disadvantages:

- a) It has the potential to put pressure on government finances, as multiple stretches of road projects require equity commitment besides providing annuity by the awarding agency.

- b) Discourages implementation of projects on regular toll and annuity models: this model comparatively requires lower capital allocation from the developer's perspective, and therefore, at times, tends to discourage developers in bidding for regular toll and annuity based models.

Toll-Operate-Transfer (TOT) model

TOT model involves asset monetization, wherein upfront money from the bidders is taken by the awarding agency; subsequently, the bidder is allowed to collect toll for recovery of his investment made over a period. This model can attract long-term global funds, such as pension, insurance, sovereign, and endowment funds etc. The resources generated by this model can be deployed to create new road assets, creating thereby a chain of asset cycle within the road sector. Moreover, in this model, road projects developed by government agencies is generally on EPC basis, or BOT projects that have completed their concession period, and could be given on long-term lease to operators with a freedom to collect toll on such road stretches. The TOT model can help in raising resources for the government to take up new road projects, where private funding is not viable/ available. Under the first monetization phase of road sector, the Indian government bid out nine highway projects with a total length of about 700 km with concession right to collect toll for thirty years in TOT model. The money received by the government was about USD\$1.5 billion from the concessionaire (Arora, 2018). Besides, in the past, the government has also been able to raise resources by way of selling of road assets under TOT model to investors. However, some of the TOT bundles could not be sold due to low bids with mismatch between the expectations of government and the amounts investors were ready to pay for the road stretches (Crisil 2023). The TOT model does have the potential to create investment opportunities for entrepreneurs, who are not interested in project execution risks, but are attracted nevertheless towards long-term return generating ability of such road stretches.

Advantages

This model has primarily been introduced for monetization of the existing road assets by the government with some of the salient benefits being:

- a) Resource mobilization for government: the model facilitates generation of resources for the government to invest in other road projects, where road stretch development under PPP is not possible due to various complexities. The resources generated by the TOT model frees up the risk capital for newer projects.
- b) Attracts long-term capital: this model has been successful in attracting long-term capital from international insurance, pension, sovereign wealth funds, apart from private investors.
- c) No execution risk: concessionaire of this model does not face any execution related challenge for the project, as the road stretches are completed and operational.

Disadvantages

The disadvantages on the other hand, are primarily in terms of cost to the users:

- a) Increase in transportation cost: TOT model does result in an increased transportation cost for users of the road stretches, which were initially funded with tax payer's money.
- b) Revenue risk: revenue risk of the road projects under the model rests with the concessionaire of the project. Accordingly, the assessment of the potential toll collection becomes critical for the concessionaire while bidding for road stretches under TOT model.

Infrastructure Investment Trust (InvIT):

Apart from the PPP models mentioned above, in order to facilitate channelization of funds towards infrastructure projects, the Indian government has allowed setting up of an Infrastructure Investment Trust (InvIT) that has tax efficient pass-through status for PPPs and other infrastructure projects. InvIT primarily invests in completed revenue generating projects with 20% of the investment in under construction projects (Crisil 2023).

This structure is expected to provide long-term funds for infrastructure projects including road projects (Press Information Bureau, Government of India, 2014). InvIT

is expected to release project equity and help in deleveraging the developer by way of reduction in debt, while enhancing the developer's ability to take up new projects for development. Road projects being developed under PPP in India have started attracting long-term pension, insurance, and sovereign wealth funds. Even global institutional investors, such as Singapore Soverign fund GIC, Brookfield, KK, and AIIB have invested in InvIT structures in India; and most of the InvIT structures are backed by road assets earning attractive returns (Das, 2019).

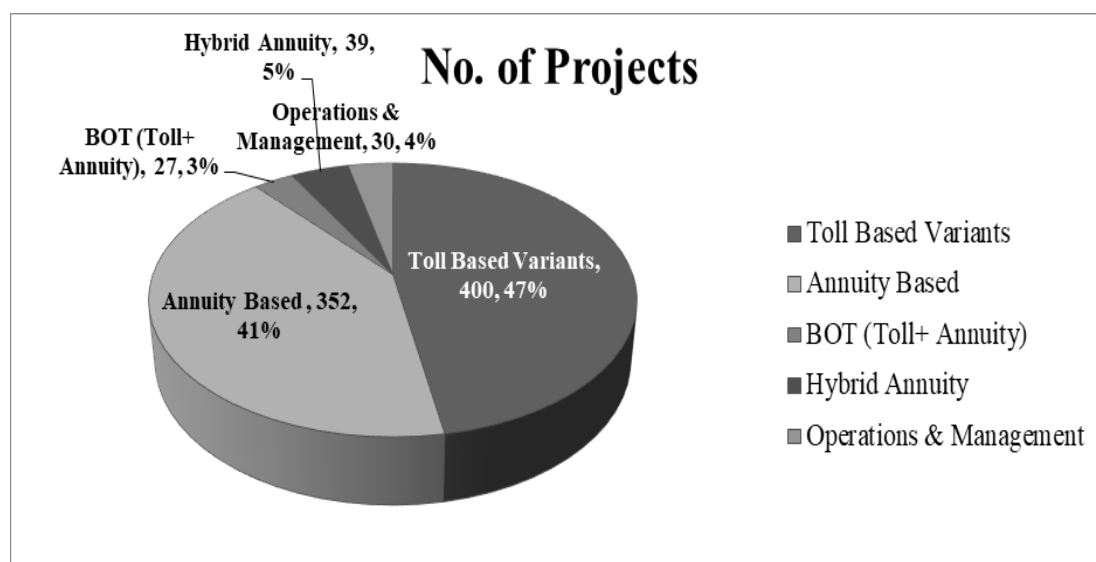
It may be mentioned that in the recent past, many developers have used InvIT structure to raise resources from the existing road stretches developed by them. Major players like IRB, L&T IDPL and oriental group have been able to list their InvITs (Crisil 2023). Recently major PE player KKR has also used its existing InvIT structure to acquire toll road assets of Navayuga Udupi Tollway (Dhanjal.S 2023).

PPP in India being an evolving subject, it is expected in future that new models will be developed based on requirements to channelize resources for developing infrastructure in general and road sector in particular. The Indian government needs to explore all models available for developing road infrastructure, especially since the country has huge demand and requirement of road development with each region of the country exhibiting different socio-economic characteristics.

5.2. PPP Models: Policy & Issues:

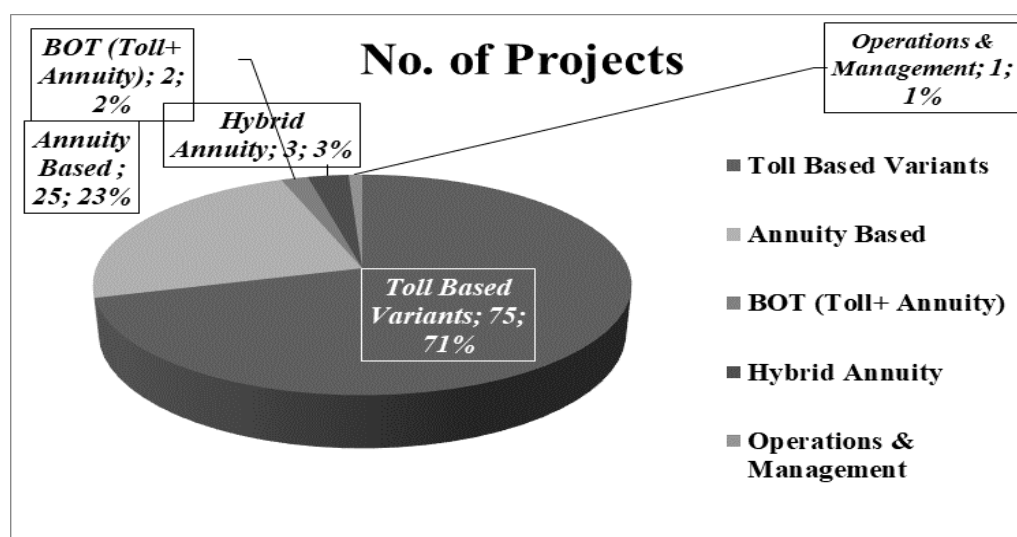
As discussed earlier, PPP models are extensively used in India across several infrastructure sectors, such as roads, ports, airports, railways, tourism, urban development, healthcare, and education etc. PPPs in infrastructure presents an important structure to speed up the overall infrastructure development initiative in India (Kelkar, 2015).

A brief detail of the PPP projects across models (i.e.,848) in the road sector, with most being toll based are enlisted below:

Figure: 5.1 PPP projects under operations and completed stage

Source: Infrastructureindia.gov.in, 2020 (As on 22.09.2020)

PPP projects awarded within the country have predominately been toll based with requirement of state funding being negligible. Total number of 106 projects across models was under construction with most projects being toll based as highlighted below:

Figure: 5.2 PPP road projects under construction

Source: Infrastructureindia.gov.in, 2020 (As on 22.09.2020)

Majority of the projects under construction are toll based, as highest number of projects in the past were awarded under this model. It is important that the projects facing execution risks due to various regulatory and promoter specific issues are

resolved. Further, it may be mentioned that Hybrid Annuity based projects have less chances of facing project related regulatory delays, as most of the approvals required are in place before bidding of these projects. However, the hybrid annuity model does not have a long history. This model has been operational since the year 2016. The major reason for introducing hybrid annuity model has been the lackluster performance of annuity and toll model projects.

Toll + Annuity model of projects have been awarded, albeit limitedly; it is primarily used when on a standalone basis, the projects are not capable of generating sufficient cash flows over the concession period to provide adequate returns to the project developers. Besides, Operations & Management model also has been used in a limited measure by the awarding agencies to take care of the regular operations and maintenance of the road asset.

There are multiple risks in PPP projects that stake holders face, such as procurers, sponsor, and lenders (Grimsey & Lewis, 2002). Road projects carried under PPP require enablers to ensure timely delivery of the assets and challenges in the projects are addressed by the policy interventions. Constraints in execution of transport projects could be due to political, bureaucratic, regulatory, financial, and methodological reasons (Menendez, 1998). Legal framework, consistency in policy guidelines and supportive regulatory environment is of utmost importance for the risk capital to come into road projects under PPP. Moreover, developers of road projects under PPP are required to be provided with stable regulatory environment to take long-term view of the projects. Road projects under PPP must take long-term cash flows projections as a basis for generating risk adjusted returns. Macro risks of the project should be borne by public agencies, and meso-risk (project engineering) should be borne by the private sector; micro risks on the other hand, should be shared by public and private agencies together (Li et al., 2001).

In this section, we discuss various important factors that play a critical role in the success of projects on PPP mode in India. Notably, some of them do require policy level interventions to make this mode of delivery a success. (Koul et al., 2022) examined credit rating reports, along with financial performance of SPVs identified

promoter related challenges, revenue, land acquisition impacting the performance of the SPVs executing road projects under PPP. In this study attempt is made to examine various challenges faced by road projects under PPP with the help of information available in the public domain from government bodies, studies of multilateral development institutions like World Bank, ADB, annual reports of corporates executing road projects, reports by credit rating agencies etc.

Stable Macro economic environment:

To have robust road development under the PPP model, it is important to have benign macroeconomic environment. Stability of macro environment in terms of growth, interest rates, and inflation can help in making projection of both revenue and expenses predictable. Moreover, stability in macro environment facilitates road developers in ascertaining the viability of a project. Notably, the borrowing cost is one of the key factors that may impact the potential benefits to be derived from a road project for the developer, especially as most components of the project funding are in the form of debt (Kapali, 2013) .

Promoter and equity related challenges:

It is important for the awarding agency to factor in the credentials of the promoters, their track record and the equity contribution being proposed by them for a project. Notably, for any project to be a success, the developer/concessionaire should have enough financial stakes in it. If projects are primarily debt driven, it increases the project's risk profile. PPP in transport is funded by taking less equity and more in the form of debt, which in turn, increases the risk profile of the investment (Estache et al., 2007). Prospective lenders of the project are also not comfortable with the situation, wherein equity contribution within a project is minimal. Importantly, higher the level of equity within a project better is its chances of implementation without facing financial challenges.

Furthermore, equity could be available to the firm, which is executing project on the basis of the SPV structure from its parent i.e., sponsors of the project. Many a times, company's resort to borrowing on their balance sheet, which then are transferred to the SPV as an equity. Additionally, it may be noted that to use borrowing as a means

to provide equity to the SPV results in highly leveraged capital structure of the parent. Due to a highly leveraged structure, the sponsor's ability to support the SPV in terms of future funding gets restricted (Ghosh et al., 2012). It is important that SPVs are promoted by financially strong promoters, who can manage cost over-runs in projects, which could happen due to multiple reasons.

Substitution of Promoters:

Mitigation of promoter related risk is important for project development to carry on at a brisk pace. At times, promoters / developers are not able to complete the projects due to issues such as financial strength and technical competence or other reasons. In such a situation, there is a provision to substitute promoters in the concession agreements executed by NHAI. However, this option is seldom explored as this option entails considerable haircut, which lenders have been reluctant to take. It is important that lenders are adequately compensated for the expected loss due to substitution by awarding agencies. Robust substitution framework can thereby mitigate to a great extent developer/ promoter related execution risks for timely completion of projects.

Avoidance of aggressive bidding for projects:

PPP in the road sector has witnessed aggressive bidding from developers in the past. This situation resulted in developers overestimating the revenue potential of the project, and underestimated regulatory challenges in terms of land acquisition, environmental clearances etc. This situation resulted in aggressive premium payments committed to the awarding agencies. In fact, in some cases, there were negative grant given by the developer to succeed in getting a project. Furthermore, slowing economic growth also resulted in projected revenue estimations of the developers going haywire, resulting in turn in the project viability becoming questionable.

It is imperative for project awarding agencies to look at other aspects apart from solely focusing at the commercial benefits being generated. This is primarily to ascertain the financial strength of the developer, vis a vis his ability to execute project and meet commitments. In fact, some kind of metrics may be evolved, wherein all financial and qualitative aspects of the bidder could be captured, and the bidder who

scores the highest may be awarded the project. This again is imperative, since in the past, there have been bidding with highest premium amount for projects, and have backed out at a later stage (Jaipuria & Narayan, 2014). As a matter of fact, in a few instances, NHAI was also forced to defer the revenue premium payable by the developer.

Land Acquisition Challenges:

Infrastructure projects in general and road projects in particular face land acquisition challenges. As discussed thus far, road projects have faced issues in terms of timely availability of land to complete the work resulting in delayed implementation. The unencumbered land for the project needs to be provided by the state before a project is awarded to ensure viability of the same in terms of the costs involved. Delayed execution of project, results in potential loss to the executor of the project in terms of costing, and deprives the economic benefits, which a project can provide to the society in general.

Difficulties in procurement of land for more than the prescribed period of time on a stretch should be descope from the project, while the rest of the activity should be allowed to be completed, and left over work could be done on cash-contract basis, provided land or required clearances are in place (Kelkar, 2015).

Environmental Challenges:

Environmental approvals for developing a road stretch have also been a cause of concern. Inordinate delays in obtaining approval from the environment perspective have slowed the progress of developing several road stretches. Usually, a developer has to move around in the system to obtain the requisite approvals. Speedier clearances on environmental ground from the regulatory agencies would facilitate PPP development. It is important before awarding of the project that approvals are in place so that the developer's role is restricted towards creation of the asset only.

Inadequate traffic estimations:

Toll based road projects developed under PPP in the past have faced challenges in terms of optimistic projection of the project. Such projects, where toll collections

were lower than the estimates have faced issues in terms of debt servicing and providing adequate returns to the developers of the projects.

Design Changes at the time of implementation of the projects:

Due to gaps in the development of quality Detailed Project Report (DPR)s, projects face modifications need, such as a requirement to provide over-bridge or under-bridge to the local population at the time of implementation resulting in delays, along with both cost and time over-runs. Besides, the soil quality may also vary resulting in changes in composition of the material to be used for developing the road stretch. These issues, if not highlighted at the time of DPR preparation, does result in several difficulties for the road developer executing the project, and hampering project completion thereby, along with financial viability.

DPRs based on which road projects are developed need to be made robust. Quality preparation of DPRs covering all facets of road project development, including requirement of shifting of utilities, right to way, over bridges, under bridges, land acquisition/ environmental challenges should be built in to ensure that developers bidding for the project have clear understanding of issues that need to be resolved for the development of the projects. Moreover, the DPR should cover all the physical, technical aspects of the project in order to avoid surprises at the time of execution. As per a study by McKinsey & Company, nodal agencies focus on design and engineering excellence is less, and there is lack of rigor in DPRs, resulting in omission of aspects, such as service lanes, removal of physical structures and time lag (1.5 to 2.5 years) between DPR and tendering process with over estimating scope of the project and underestimating cost of the project (Gupta et al., 2009).

There needs to be a mechanism to give mandate for DPR preparation, based on the quality of the agency apart from remuneration quoted by them. This would help in reducing the element of unexpected surprises at the time of execution of the project that impacts pace of development of the road stretch, along with finances required for the project. As finances are arranged based on DPRs, scope for getting additional funding to meet major project execution challenges becomes uphill task for the developer after achieving financial closure of the project.

Right of way on the project site:

At times, it has been seen that project stretches need to negotiate the problems of railway over bridge, forest areas, etc. This requires co-ordination with railway ministry, environment / state ministries respectively to clear the project site for the road projects. Such issues should be resolved before handing over project to the developer by the concerned awarding agency in order to reduce delays in project development.

Shifting of Utilities:

Project sites also face problem of shifting of utilities such as power cables, transformers, communication networks etc. Shifting of utilities from the project site could some time turn into a high-cost proposition and result in delays in construction work. For this purpose, co-ordination with various state agencies is involved. This also causes delays in the project completion due to non-shifting of utilities in a timely manner. The responsibility for shifting of utilities should be coordinated/ carried by the awarding agency being a government body can facilitate early resolution. It is important that such issues are resolved preferable before awarding of the project.

Single Interface for the projects:

To have timely completion of road projects, it is important to have a single interface for various approvals required for environmental concerns, utility shifting, right to ways etc. Further modifications required include certain design changes owing to factors observed during project executions should be addressed by authorities in speedier manner to have timely implementation of the project.

Resistance to payment of Tolls:

In certain road stretches, there is resistance to pay for the toll. This kind of situation also impacts the revenue generating capacity of the road stretch. This can be taken care by having better law and order, which again is a state subject and not in the hands of the developers of the stretch. However, it is important for the government to give entrepreneurs confidence that their investment made is safe, and that they would be allowed to collect toll during the concession period without any hindrances.

Allowing renegotiation of the contract:

A renegotiation of PPP contracts involves changes in the original contractual terms and conditions, as opposed to an adjustment in the payments (or tariff) that takes place under defined mechanism in the contract (Guasch et al., 2014). Provision for renegotiation is required to ensure that any challenges faced during implementation or commercialization of the project can be re-worked upon (Das, 2013). PPP projects typically have a tenure of 15-30 years (Guasch et al., 2014), during such a long period, unforeseen circumstances, which are not in the control of developers may occur. For such contingencies, scope for renegotiation should be present in the agreement. Countries like Chile has a successful development record of road development under PPP; it allows for renegotiation of contracts in economic downtrend (Carpintero & Barcham, 2012).

In India, renegotiations have not been allowed by the government for several years, despite of requests by the developers for renegotiations possibly due to over-aggressive biddings in the projects (Makovsek et al., 2015). A contract agreement should have certain parameters based on which, contracts could be renegotiated. Since there could arise a situation wherein factors, which were not envisaged at the time of signing of the agreement may put question mark on the economics of the project itself. To meet such eventuality, it is important that the project could be renegotiated in the interest of all the stakeholders concerned.

Decision to renegotiation of concession agreement should be based on 1) complete clarity on the renegotiated estimated long term costs, risks and potential benefits, 2) comparative analysis of the financial position of government at the time of signing of concession agreement, and 3) comparison with the existing fiscal space of the government prior to the renegotiation (Kelkar, 2015). Renegotiation entails change in project terms, which in turn, results in the possibility of being seen as not fair and transparent due to which, project awarding authorities are not keen to renegotiate in India. Considering the tenure of concession agreements, the project agreements should have clauses based on which, concession agreements could be renegotiated.

Lack of dedicated institution for funding of road sector:

India lacks dedicated financial institutions that can fund long-term road projects. This situation results in excessive reliance on bank lending. Banks are not comfortable lending for long duration due to potential asset liability mismatches. In view of large requirements of funding road infrastructure in India, it is critical that financial institutions are developed, so that they can understand the problems being faced in the sector. Further, it may be mentioned for operational road projects, financing is easier to arrange as construction risks are mitigated in the projects. Greenfield projects at the construction stage face difficulty in arranging finances due to higher risks for lenders. Dedicated road funding agency can play vital role in the development of road sector.

Challenges in Financial closure of the road projects:

In the past, due to various constraints faced by the road projects, lenders have become averse to financing them. This has resulted in a situation where financial closure of the road projects has become a challenge. Further, road projects that are financed by lenders in consortium due to large credit exposure involved makes decision making in terms of disbursement of the funds a slow process. Timely availability of the finances is thereby key for executing such projects.

Avoiding development of competing roads:

It is important that development of competing roads is avoided. At the time of initiation of the project, if there is no provision for competing road in the calculation of the bidders, then the same should be avoided since competing road can result in the project revenue anticipated by the developer going haywire. Competing roads should only be allowed if there is a strong case for it in terms of more than projected revenue anticipation which may not hinder the desired returns of the existing developer. Initiating competing roads will result in reluctance on part of the bidders to take up projects due to uncertainties and risk of competing project getting developed which will in-turn impact the financial viability of the project.

Compensation to developers for delays not attributable to them:

The developer should be compensated for the delays, which are not attributable to them. Presently NHAI compensate the concessionaire for project delays that are not attributable

to them for BOT projects; for BOT (Toll), it allows extension of concession period for projects languishing during the construction period due to the causes not attributable to the concessionaire. In case of BOT (Annuity) projects, payment of compensatory annuities is being done to the concessionaire for delays not attributable to them. (Press Information Bureau, Government of India, 2015). These measures, while being beneficial will not compensate developer completely in case projects getting stuck mid way for long time and he is forced to make payments to the lenders when cashflows of the project are not getting generated. It is important that monetary compensation for the cost of funds borrowed for the project also be factored for the delayed period. This will ensure developers financial commitments to lenders get compensated.

Developed bond market for financing:

Raising long-term finance is critical for the road projects. Projects under PPP in the transport sector are funded by more of debt and less of equity (Estache et al., 2007). Debt component in road projects is major part of the funding requiring long tenure financing. Due to absence of well-developed corporate bond market in India major funding is provided by commercial Banks. Banks typically have short-term deposits, whereas infrastructure funding does require long term resources, thus resulting in typical asset liability mismatch. Setting up of National Pension Scheme (NPS) is expected to provide long term funds available for the infrastructure development in India (Walsh et al., 2011). Pension funds being long-term in nature can act as important resource base for ensuring long-term savings getting into creation of infrastructure assets.

PPPs risk profile and consequent deepening of bond market can be improved for the investors by providing partial recourse to credible third-party institutions, which can be implemented through a partial credit guarantee or cash flow support mechanism (Kelkar, 2015). Partial Credit Enhancement (PCE) is expected to provide better credit rating for the bonds which will allow them to raise debt from the Pension, Private equity, Sovereign wealth, and Insurance funds. PCE by reputed domestic financial institutions or multilateral institutions such as World Bank, ADB, Japanese International Credit Agency (JICA) can help in drawing higher notch credit rating thus making such bonds attractive for investment purposes. This measure is expected to deepen the corporate bond market also.

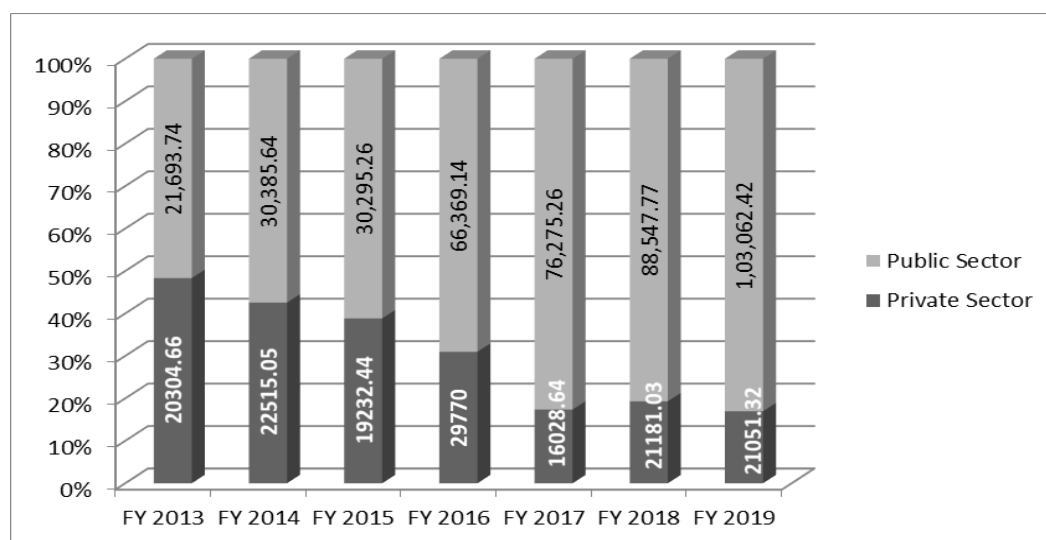
In India public sector banks are most active lenders in the country's infrastructure sector (Chao & Saha, 2015). Presently there is possibly an over-reliance on bank funding for road development under PPP mode in India with banks having to bear high execution level risk. The awarding agencies, including NHAI should take steps to mitigate problems that come up at the time of execution, in order to give confidence to private developers and lenders to take up new road projects under PPP. In the absence of interest shown by lenders and developers under PPP, the only mode available for development with NHAI is EPC, which requires upfront funding for the projects. EPC mode of execution becomes difficult when creation of large number of road stretches is to be carried due to budgetary resource constraints.

In the recent past, due to lackluster response of PPP road projects the awarding agencies i.e., NHAI has been seeking flexibility to award projects under EPC mode instead of exploring PPP mechanism (Saluja, 2020). EPC mode is being preferred for development as private investor sentiments remain dull for projects to be awarded on BOT basis (Saluja, 2019). Presently EPC dominates awarding for NHAI with 60% of road projects awarded in FY 19 and 40% being HAM projects (Agrawal P, 2019). Both these structures of road construction requires major funding by the State. EPC mode will require complete funding during construction phase whereas in case of HAM model initial funding being 40 per cent in construction phases and balance 60 % in a staggered manner over the concession period.

It may be mentioned that the awarding agencies and the relevant government bodies have to address the challenges highlighted above to help PPP in road sector to become a default option for development. Accordingly policy and regulatory issues require continuous improvement to make ppp road development a success in India.

5.3 Industry Overview: Road Infrastructure Development in India

To emphasize on the role of private sector, details of investment in highways by both public and private sectors from 2012-13 to 2018-19 is mentioned below:

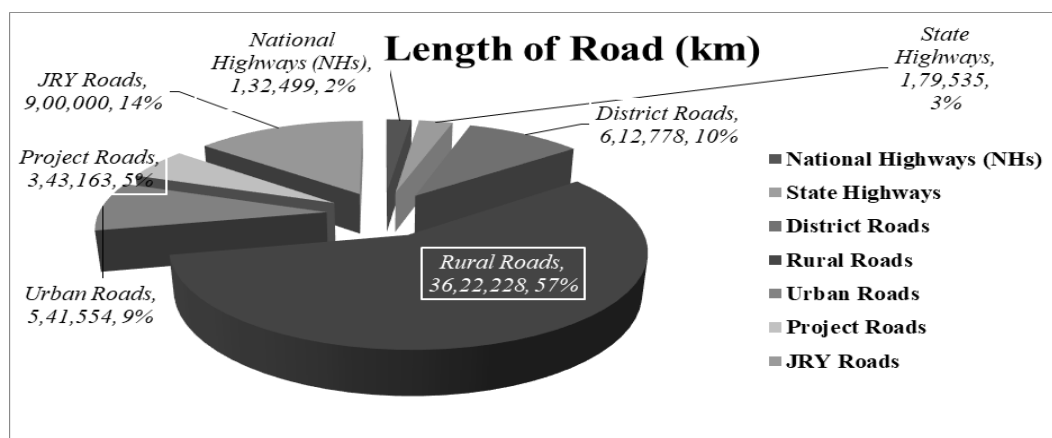
Figure: 5.3 Investment in highways (Rs in crores)

Source: Basic Road Statistics of India , Gov. of India, 2018-19

From the statistics, while private sector investment has shown years of higher and lower growth, which could be explained by the challenges faced in the development of road sector under PPP. However, it may be mentioned that public investment has kept pace to ensure higher investment in the development of highways.

Past trends of road sector in India:

The total length of road network in India as on 31st March 2019 was 63.31 lakh km which has grown from 3.99 lakh kms as on 31st March 1951. The different category of road lengths developed during this period is mentioned below:

Figure: 5.4 Length of Road Network

Source: Basic Road Statistics of India , Gov. of India, 2018-19

Latest data available length of national highways is 1,40,995 Km (Annual Report 2021-22) suggesting continued growth and development of national highways in India. Most Indian roads are rural roads that can be upgraded in the coming years to district / state roads. PPP is expected to play an important role in developing such road stretches. Over the years it has been seen that the India road network has considerably improved as highlighted in the table below:

Table: 5.1 Trend in Indian Road Network

Year	Length of Roads (Thousand Km)*	Length of National Highways (Thousand Km)	Length of State Highways (Thousand km)
1951	399.94	19.81	NA
1961	524.47	23.79	NA
1971	914.97	23.83	56.76
1981	1485.42	31.67	94.35
1991	2327.36	33.65	127.31
2001	3373.52	57.73	132.10
2011	4676.83	70.93	163.89
2014	5402.48	91.28	170.81
2015	5472.14	97.99	167.10
2016	5603.29	101.11	176.16
2017	5897.67	114.15	175.03
2018	6215.79	126.35	186.90
2019	6331.75	132.49	179.53

*(includes other road stretches pertaining to districts, rural roads etc)

Source: Basic Road Statistics of India , Gov. of India, 2018-19

From the statistics above, it can be seen that there has been continuous growth of road sector development in India over past decades.

Development of Road infrastructure in India:

The private sector financing on a systematic basis for the road sector in India happened with the launch of the National Highways Development Project (NHDP) in 1998 (Asian Development Bank, 2015). National Highways Authority of India (NHAI) is involved in the implementation of the national highways program in India under various phases under NHDP. The NHAI was formed by the act of parliament in the year 1988. The authority was operationalized in the year 1995 with focused development of national highways (National Highway Authority of India). Till date seven phases have already been approved for development by the government of India under NHDP.

Table 5.2 Phases approved for development of national highways in India

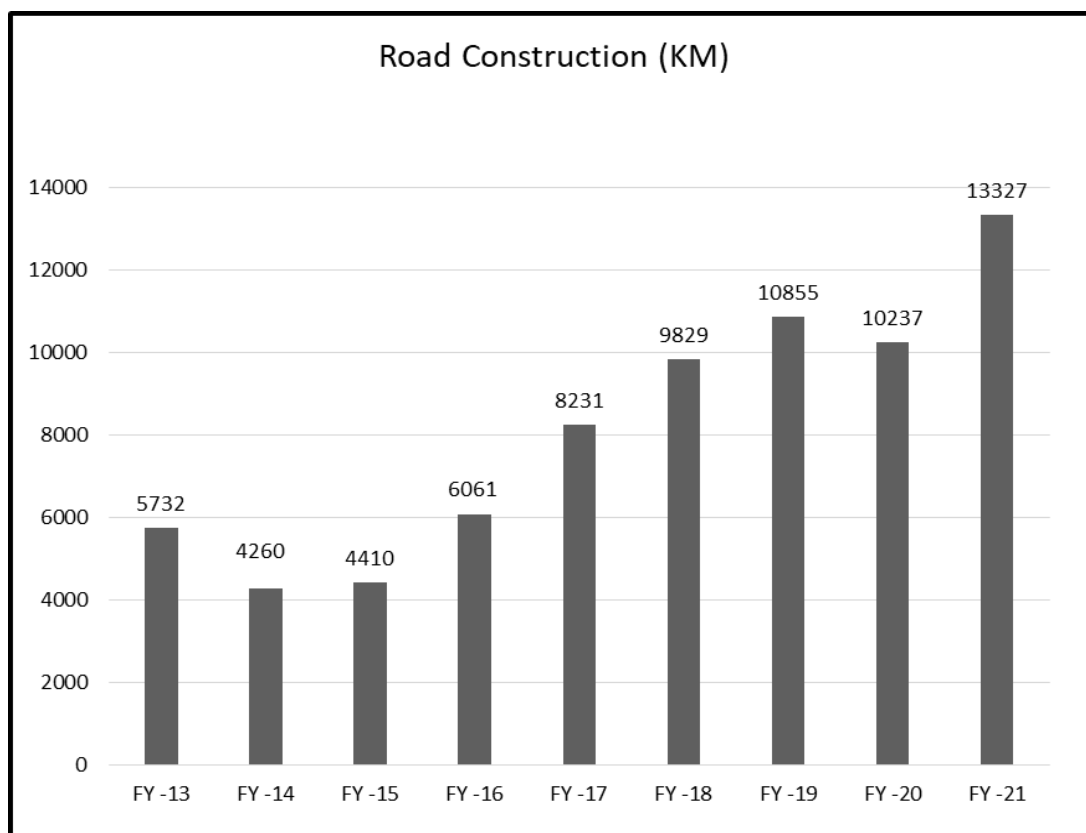
Phases	Length	Approval Year
Phase I	Four laning of 6359 km	2000
Phase II	Four laning of 6702 km including port connectivity	2003
Phase III	Upgradation of 12,109 km	2007
Phase IV	Upgradation /strengthening of 20,000 km of national highways to 2/4 lane with paved shoulders of EPC/BOT (Toll/ Annuity)	2008
Phase V	Six laning of 6,500 km	2006
Phase VI	Construction of 1000 km of expressways with	2006
Phase VII	Construction of ring roads, bypasses, grade separators, flyovers, elevated roads and tunnels.	2007

Source: National Highways Authority of India

Further to accelerate the road development across the country government has initiated projects under Bharatmala which will also subsume the NHDP projects of ten thousand kilometers. Bharatmal envisages development of about 26000 km length of economic corridors involving development of Ring roads/ bypass and elevated corridors to decongest and enhance logistic efficiency across cities approved on 26.10.2017 by the government. The funding of the project is to come from collection of cess on petrol & diesel, monetization of road assets under TOT model, budgetary

support and private sector investment (Bharatmala Phase I). National highways have witnessed steady growth in the construction and awarding of road projects in past few years as could be seen from the figures below:

Figure 5.5 National highways construction carried



Source: Annual Report 2021-22

The increased level of construction of national highways is visible with year-on-year progress being carried out from FY 16 onwards. The total length of national highways has been enhanced to about 1,40,995 Km in 2021-22. (Annual Report 2021-22).

PPP road development is used by both the state and central government to develop various important stretches. NHAI is a nodal central government agency involved in the national highway development program through which, most of the road projects have been awarded under PPP. The resource base for NHAI to undertake national highway development comes primarily through fuel cess, budgetary support, project revenues (plough back of funds from toll collection, negative grant, and revenue

sharing and market borrowings (ICRA, 2017). Central Road Fund (CRF) funded primarily through levy on diesel and petrol has been constituted by the Government of India, to develop road-rail bridges and rural roads (Asian Development Bank, 2015).

Road projects earlier were awarded under waterfall mechanism by NHAI. As per the recommendation of B.K. Chaturvedi committee on NHDP (National Highway Development Programme) for road development first preference was to be given to BOT (Toll), Second BOT (Annuity) and third to EPC type of development of road projects. However, when response for BOT (Toll) was not encouraging than other option of BOT (Annuity) was explored. In case BOT (Annuity) was also not getting favorable response or the equity IRR expected by the developer being more than 18%, than EPC was explored. Only in case of in- hospitable areas or where there is problem of law and order or security risks, equity IRR of upto 21% has been accepted from the developers (Ministry of Road transport and Highways, Govt of India, 2009).

However subsequently over a period, a lot of flexibilities were introduced, resulting in awarding of project on PPP mode or as an EPC contract depending on the requirement at the time of awarding of projects. This has been done since road project developers under PPP faced various challenges resulting in lower interest for the project development under PPP. Challenges emanated through delays in approval, change in law, cost overrun, land acquisitions, compensation and enforceability of contracts, financial closure of projects, tariff adjustment and environment risk (Maniar H. , 2010). Notably, in EPC, resources have to be provided for the development of roads by the State. (Pathak, 2011) has suggested that the greenfield projects should be developed by government agencies, and the same should be run under PPP model once the assets are created. As in case of commercially operational assets, private participants would be ready to take up such projects at lower returns since the project development risks are mitigated.

PPP road development by States:

States have an important role to develop road infrastructure which does not fall under national highways. Central government takes care of the national highway's development with the help of government agency i.e., NHAI. For development of other road infrastructure state has to take major initiative.

At the state level, development of PPP is impacted by institutional factors, such as lack of legislation, absence of policies, frameworks, and capacity in promoting and implementing PPP (Mahalingam, 2008). Despite the challenges, various state governments are taking up development of road infrastructure with the help of PPP. To develop better road network having budgetary constraints makes PPP a viable option to develop road infrastructure. States like Maharashtra (World Bank Report 2006), Gujarat (Gujarat State Road Development Corporation Ltd), Madhya Pradesh (Madhya Pradesh Road Development Corporation), Rajasthan (Planning Rajasthan Government, 2014) & (Rajasthan State Road Development and Construction Corporation Ltd) and Uttar Pradesh (Progress of Road upgradation on PPP basis- UP Govt), have been taking up road projects development in PPP mode for the road stretch falling under state road network. Involvement of PPP in development of state roads is expected to strengthen the road infrastructure going forward.

As per the study carried by rating agency Crisil top nine states account for ~70% of total investments in state roads & bridges taking into account the capex done in the sector for last five years with states in the order from top being Uttar Pradesh, Maharashtra, Karnataka, Tamil Nadu, Odisha, Bihar, Madhya Pradesh, Chhattisgarh, Rajasthan (Agrawal P, 2019). It is important that the central government should facilitate capacity building among States to create bankable PPP road projects in order to help States in speedier development of road infrastructure.

Model Concession Agreement (MCA):

MCA is the most critical document of the PPP, which gives contractual shape to development of PPP with scope of responsibilities highlighted in the same for the parties concerned. The erstwhile Planning Commission developed the first version of the MCA for highways in 2006 to standardize documents and processes for the PPP in the country. The standardization of MCA helped in ensuring uniformity, transparency, and quality in the development highway road projects under PPP. Subsequently different versions of MCAs have been developed for different PPP modes like BOT (Toll), BOT (Annuity) and OMT.

MCAs being standardized document facilitate commonality in the road developmental conditions for all the developers. PPP model concession agreements are expected to cover all possible clauses to minimize room for renegotiation (Gunnigan & Rajput, 2010). Private financing of toll roads has challenges in terms of difficulty in developing standard concession models, improving legal and policy framework (Fisher & Babbar, 1996). Concession agreements should be clearly defining the roles and responsibilities of the stakeholders.

Some of the clauses of the concession agreements signed by the awarding agency i.e., NHAI in case of national highways road projects and developer of the PPP under BOT (Toll) and BOT (Annuity) models are covered in **Annexure II** suggesting various risks and responsibilities of the parties concerned. However, it may be mentioned that rational for allocation of risks can only be undertaken in sector and project-specific contexts (Kelkar, 2015). In order to have a better legal and robust project structures for road projects, it is important that the projects undertaken should cover project specific challenges, which is not possible in a common concession agreement. It is a possibility that tailor made project related concession agreement may result in extra time taken for finalisation of the agreements. However implementation of project specific concession agreements for road project will help in allocating risks among the various stake holders based on their competencies and projects specific needs in a prudent manner. It is important to have renegotiation clauses in MCAs to mitigate unforeseen challenges.

Financing options for road sector:

It is important to provide long-term resources for developing road assets since they have a long gestation period. Road projects typically have tenure of 15-30 years; accordingly, they can generate revenue to pay off the debts in the longer time frame. Institutions, which can provide long-term resources should be encouraged to fund these projects. Institutions, such as Pension funds and Insurance funds only invest in the project at the stage where revenue is visible due to credit rating constraints in India. Therefore, role of banks becomes pivotal as risk capital provider for the road projects at the initial stages since they have the skill set to appraise the viability of the projects and analyze the potential cash generating

ability of the road project. India's public sector banks are the most active lenders in the country's infrastructure sector (Chao & Saha, 2015). However, banks also face asset liability mismatches due to short tenure of their funds. Deepening of bond market can go a long way in generating resources for road projects.

NHAI, the nodal agency for funding road projects is funded by budgetary allocation from the government, collection of cess on petrol and diesel, loans and assistance from international funding agencies, market borrowings, leveraging of future toll revenues and private sector participation under BOT model (Finance Mechanism, NHAI). NHAI has also been raising money for funding road project by issuing long-term tax-free bonds.

Resources raising for developing road sector in India is carried out through various institutions / structures other than regular banking channels. Role of National Investment and Infrastructure Fund (NIIF), India Infrastructure Finance Corporation Ltd (IIFCL), apart from the multilateral financial institutions such as World Bank, ADB, JICA is critical in this endeavor. Further lately Sovereign wealth funds, Pension and Private equity funds have also started investing in Indian road sector under PPP model. Private sector is expected to invest only when they are expecting commensurate returns to be generated for the risk taken. Investor friendly approach and removal of policy impediments is very important for the PPP to grow.

Due to economic size and growth potential of the country PPP does present a great opportunity for investment in various sectors of the economy including the road sector, especially with a large market size and customers' higher purchasing power being crucial determinants of PPPs (Hammami et al., 2006). To achieve the true potential of PPP, various stakeholders including government, developers, financiers and public at large need to support it. PPP projects face construction / implementation risk, market risk, finance risk, operations risk, maintenance risk and legal risk (Singh 2011). PPP financing is impacted by Legal, political risk, fiscal space, macroeconomic environment, institutional capacity, willingness to pay, tariff sustainability, scale of the project and the location of the project (Vives

et al., 2006). It is important that policy level interventions are carried out to address the challenges faced by the PPP development and make it self-sustaining economic model of road asset development.

PPP requires policy consistencies and flexibility in renegotiation of the contracts in case of unanticipated changes in the environment in which projects are being executed. Clear contract terms specifying obligations of the parties in the contract with a need for independent agency to arbitrate or adjudicate between government agencies and concessionaries/ contractors (Anant & Singh, 2009). Infrastructure assets typically span over 20-30 years and developers often loses bargaining power related to tariff and other matters in case there are abrupt changes in the economic and policy environment which are beyond their control for which they should be protected against “Obsolescing Bargain” (Kelkar, 2015).

In India financing of infrastructure has been provided by banks in absence of strong corporate bond market. A large proportion of lending, however, is on the corporate balance sheet, and in case of project finance SPVs requirement is of longer tenure loans. (Asian Development Bank, 2015). The regulatory system initially failed to differentiate between infrastructure and industrial financing. The equity investments were made by the contractors rather than infrastructure developers. The appetite to fund infrastructure projects was minimal (Asian Development Bank, 2015). The contractors major interest is in the creation of the project rather than holding on to the asset for the life cycle of the project. It is important that infrastructure development in the road sector is able to attract developers with long term perspective as they are better placed in attracting longer tenure sources to finance projects.

Firms executing road Projects:

PPP road development in India is carried mostly by those firms which were earlier doing infrastructure development on contract basis with the awarding agency. Since government recognized obvious benefits of taking up road project development in PPP mode, Private developers took up the opportunity by forming SPVs to carry out road development. In SPV route standalone cash flows of the project are of vital importance to sustain the project (Srivastava & Kumar, 2010). PPP model helped

contractor firm's continuity of construction business albeit with risk of commercially managing the asset for long period.

SPV structure is expected to protect balance sheet of parent from any negative bearings on account of failures of the project itself. However, this may not hold good since SPV structure could also result in risk of the project impacting the balance sheet of the parent company since there is a relationship between originator the "parent" and SPV the "developer" of the project. This could arise due to need of originator to fund initial equity in the form of investments out of its own resources as a capital in the proposed SPV. Secondly, originator /parent may raise borrowings on the strength of its balance sheet to fund equity of the SPV. The SPVs are primarily funded by commercial banks for road development, thus exposing them to the performance risk of these projects.

In SPV structure project developers are usually awarding the execution contract to their parent construction firms on EPC basis. This ensures that all the benefits to be drawn from the project are retained within the group. This mechanism is susceptible to pitfalls as EPC is generating revenue from the construction done for the project developed by its own SPV. EPC may end up getting liberal payment terms wherein SPVs own revenue earning capacity may face challenges, or vice versa. Necessity of giving execution contract to its parent may entail higher cost or deficiency in execution of the project than what could have been procured from outside agency on competitive terms.

In the past, road projects awarded to firms under PPP mode witnessed lot of competition among players. Due to competitive intensity among the players bidding for the projects witnessed negative grants being received by the government for awarding road projects. Awarding agencies also gave positive grants for road project to make them commercially viable. The concessionaire bidding minimum grant requirement or viability gap funding was awarded the project. Besides grants there has been revenue share between the contractor and procurer on the toll being collected. Contractor committing maximum revenue share were awarded project by the public agency.

CHAPTER 6

PROFILE OF THE FIRMS EXECUTING ROAD PROJECTS IN SPV MODE

6. Profile of the firms executing road projects in SPV mode

Various corporates work on road sector development under the PPP scheme. However, it is important to mention that most of them execute the PPP projects through their subsidiaries that act as a project vehicle to execute the projects. According to a publication of Niti Ayog “Data shows over 70 per cent of the projects awarded in the highway sector are with 30-40 development companies (NITI AAYOG).

Road Projects under the SPV mode are primarily developed by corporates that are into construction activities; while most of these corporates are Indian. In some cases, foreign firms are also involved. In this section, the present study enlists the major players, along with their brief background in terms of projects being executed or completed by them. It may be mentioned that many of the SPVs faced challenges in executing their projects under the PPP model. Some of them include delays in approval, change in law, cost overruns, land acquisition, compensation and enforceability of contracts, construction schedule, financial closing, tariff adjustment and environment risk (Maniar, 2010). Projects that get delayed with these kinds of challenges correspondingly cause other difficulties for project developers and lenders (i.e., commercial banks in India). Furthermore, it may be noted that leverage is usually very high in PPP projects, owing to which, banks typically have claim on the majority of the firm and share significant responsibility along with the equity investor in the project (Blanc-Brude & Strange, 2007). Besides, project risk and potential cash flows are impacted by (a) number of toll transactions (b) average annual toll rates (c) annual operating expenses (d) construction cost (e) construction duration and (f) interest rates, (g) inflation (Songer et al., 1997).

Generally, projects are funded with less of equity and more debt, due to which, attaining key project parameters became critical for SPVs to remain out of stress.

Higher usage of debt in projects results in increased risk profile of the investment. Nevertheless, herein the government may look to step into facilitate these projects by way of better regulation and enactment of necessary legislations (Estache et al., 2007). In the case of a BOT project, the equity should be between 20 to 30 per cent, and the equity requirement should be determined by the risk inherent in the project in terms of project costs, revenue possibilities, and credit rating of promoters, along with the strength of bank support secured by the promoters (Tiong R. L., 1990). Some projects do need to be restructured by the lenders, as they are not able to repay their liabilities or servicing of interest. The best way to restructure project that face financial constraints is to restructure debt in such a way that repayment liabilities start only when the project has sufficient cash flows to service debt (Pustynnick, 2012).

Despite of these challenges in the PPP structure, it has been one of the preferred modes of delivery due to its efficient execution. Moreover, unit costs are lower as opposed to public sector projects, since PPP projects are generally larger in size, and they can take advantage of economies of scale leading to lower unit project cost (Meduri & Annamalai, 2013).

Notably, PPP road projects in India are awarded with varying concession periods and lengths. The SPVs formed by corporates have been awarded projects with differentiated concession period in BOT (Toll) and BOT (Annuity) model. Some of the corporates involved in this endeavor include IVRCL infrastructures & Projects Ltd, Ramky Infrastrcture Ltd, Hindustan Construction Company Ltd, Madhucon Projects Ltd (MPL), Gayatri Projects Ltd (GPL), Welspun Enterprises Ltd, KNR Constructions Ltd, Navayuga Engg Company Ltd, JMC Projects India Ltd, Essel Infra projects Ltd, PNC Infratech Ltd, Simplex Infrastructure Projects Ltd, Soma Enterprises Ltd, GVK, Bharat Road network Ltd, G R Infra. Apart from the above, some of the major players involved are mentioned below in brief along with particulars of some of the SPVs promoted by them:

Larsen & Toubro Ltd (L&T):

L&T is a major conglomerate that has been active in developing road projects under the PPP mode. L&T was incorporated in the year 1946 as a private ltd

company, and was later converted into public limited company in the year 1950. L&T being a conglomerate does have interests in various industries, such as engineering, design and construction of infrastructure, buildings, handling projects covering civil, mechanical, electrical and instrumentation engineering disciplines, while undertaking defense equipment manufacturing and developing power plants. Apart from its role in infrastructure development, it has presence through its subsidiaries into software development, financial services etc. L&T is one of the major players in road projects development under PPP mode. Some of the major projects taken up by L&T under the PPP model in the road sector are executed the SPVs detailed below. Some of the SPVs detailed below have been part of the present study for the analysis purposes.

Table: 6.1 SPVs of Larsen & Toubro

SPV /Road Stretch	BOT Model	Concession Period (years)
L&T Chennai Tada Tollway Ltd	BOT (Toll)	15
L&T Samakhiali Gandhidham Tollway Ltd	BOT (Toll)	24
L&T Panipat Elevated Corridor Ltd	BOT (Toll)	20
L&T Krishnagiri Thopur Toll Road Ltd	BOT (Toll)	20
L&T Western Andhra Tollways Ltd	BOT(Toll)	20
L&T Vadodara Bharuch Tollway Ltd	BOT (Toll)	15
L&T Interstate Road Corridor Ltd	BOT (Annuity)	15
L&T Transportation Infrastructure Ltd	BOT (Toll)	30
L&T Krishnagiri Walajahpet Tollway Ltd	BOT (Toll)	30
L&T Devihalli Hassan Tollway Ltd	BOT (Toll)	30
L&T Halol Shamlaji Tollway Ltd	BOT (Toll)	20
L&T Ahmedabad Maliya Tollway Ltd	BOT (Toll)	32
PNG Tollway Ltd	DBFOT (Toll)	20
L&T East-West Tollway Ltd	DBFOT (Toll)	19

Sources: Capitaline, Annual Reports- Larsen &Toubro & L & T IDPL Infrastructure Projects Development Company in India, 2014.

L&T sponsored IndInfravit Trust backed by Canada Pension Plan Investment Board (CPPIB) plans to raise about Rs 1600 Cr through domestic bond sale to fund purchase of nine operational road assets of Sadhbav Infrastructure project with assets to be acquired by mix of cash and units of InvIT with Sadhbav expected to hold up to 10% units in IndInfravit(Das,2020). Raising of resources through InvIT structure is expected to deleverage the balance sheets of the developers and provide risk capital for future projects.

IRB Infrastructure Developers Ltd (IRB):

Promoted by Virendra Mhaiskar, IRB was incorporated in the year 1998. IRB has been in the execution of road projects under the PPP mode since 1998. IRB has a wide portfolio of projects in the road sector for development. Some of the projects developed by SPVs sponsored by IRB have been taken up for our present study. Below mentioned are details of the SPV's sponsored by IRB that executed road sector projects under PPP mode.

Table: 6.2 SPVs IRB Infrastructure Developers Ltd

SPV /Road Stretch	BOT Model	Concession Period (years)
Ideal Road Builders Pvt Ltd	BOT	18.6 years
IDAA Infrastructure Pvt Ltd	BOT(Toll)	15
Mhaiskar Infrastructue Pvt Ltd	BOT(Toll)	15
Aryan Toll Road Pvt Ltd	BOT(Toll)	16
IRB Surat Dahisar Tollway Pvt Ltd	BOT (Toll)	12
IRB Kolhapur Integrated Road Development Company Pvt Ltd	BOT (Toll)	30
IRB Pathankot Amritsar Toll Road Pvt Ltd	DBFOT (Toll)	20
IRB Talegaon Amravati Tollway Pvt Ltd	BOT(Toll)	22
IRB Jaipur Deoli Tollway Pvt Ltd	BOT(Toll)	25
IRB Goa Tollway Pvt Ltd	BOT(Toll)	30
IRB Tumkur Chitradurga Tollway Pvt Ltd	DBFOT (Toll)	26
IRB Ahmedabad Vadodara Super Express Tollway Pvt Ltd	BOT (Toll)	25
IRB Westcoast Tollway Pvt Ltd	DBFOT(Toll)	28
Yedeshi Aurangabad Tollway Pvt Ltd	BOT (Toll)	26
Solapur Yedeshi Tollway Pvt Ltd	DBFOT(Toll)	29
Kaithal Tollway Pvt Ltd	BOT(Toll)	27

Source: Capitaline, & IRB Infrastructure Developers Ltd, 2015

IRB has been one of the initial players in India that raised money through InvIT structure. IRB is expected to pre-pay bank loans after its private infrastructure trust (InvIT) received about Rs 3800 Cr from Singapore based GIC, a sovereign fund for nine SPVs that were revenue generating assets, helping in the process, the company to reduce its interest costs by Rs 300-350 Cr, and thereby use the proceeds of Rs 3000 Cr to pre-pay loans and balance for funding construction of projects (Das, 2020). IRB is an active player in execution of projects under Hybrid Annuity model with three projects awarded to the group (Agrawal P., 2019).

IL&FS Transportation Network Ltd (ITNL):

The Company was incorporated in the year 2000; it has been a developer, operator, and facilitator of surface transportation infrastructure projects, responsible for taking projects right from the conceptualization stage through commissioning to operations and maintenance. The company has been promoted by Infrastructure Leasing and financial Services Ltd (IL&FS). ITNL has been one of the major players in the PPP road projects developed in India. The company has faced financial difficulties due to various reasons including stressed financial position of the parent company i.e., IL&FS. To meet its financial obligations towards its lenders, some of the road projects of the company have been sold, while some are in the pipeline to be sold. Major road SPVs promoted by the company in India are detailed below:

Table: 6.3 SPVs of IL&FS Transportation Network Ltd

SPV /Road Stretch	PPP Model	Concession Period (years)
Jorabat Shillong Expressway Ltd	DBFOT (Annuity)	20
Warora Chandrapur Ballapur Toll Road Company Ltd	DBFOT(Toll)	30
Thiruvananthapuram Road Development Company Ltd	BOT (Annuity)	17.5
N.A.M Expressway Ltd	BOT (Toll)	24
Gujarat Road Infrastructure Company Ltd	BOOT (Toll)	30
ITNL Road Infrastructure Development Company Ltd	DBFOT(Toll)	11
West Gujarat Expressway Ltd	BOT(Annuity)	20

SPV /Road Stretch	PPP Model	Concession Period (years)
Hazaribagh Ranchi Expressway Ltd	BOT(Annuity)	18
Pune Sholapur Road Development Company Ltd	DBFOT(Toll)	20
Moradabad Bareilly Expressway Ltd	DBFOT(Toll)	25
Jharkhand Road Projects Implementation Company Ltd	BOT (Annuity)	17.5
Chenani Nashri Tunnelway Ltd	DBFOT (Annuity)	20
North Karnataka Expressway Ltd	BOT (Annuity)	17.5
Kiratpur Ner Chowk Expressway Ltd	DBFOT(Toll)	28
Baleshwar Kharagpur Expressway Ltd	DBFOT(Toll)	24
Sikar Bikaner Highway Ltd	DBFOT(Toll)	25
Khed Sinnar Expressway Ltd	DBFOT(Toll)	20
Barwa Adda Expressway Ltd	DBFOT(Toll)	20
Andhra pradesh Expressway Ltd	BOT (Annuity)	20

Source: Annual Reports - IL&FS Transportation Networks Ltd, Capitaline & CMIE

The Committee of Creditor constituted for the company has put fourteen operating road assets under block. Further it has approved sale of Chenani-Nashri Tunnel to Cube Highways having a debt of Rs 5454 Cr with lenders taking haircut of 27% , Pune Sholapur Road to Italy headquartered Autostrade having debt of Rs 1925 Cr with haircut of 27% and Jorabat Shillong Expressway with debt of Rs 1406 Cr with a hair cut of 27%. Other projects, where bidder have been finalised include Jharkhand Infrastructure Implementation Company and Hazaribagh Ranchi Expressway. The remaining nine assets are to be sold via infrastructure investment trusts (InvITs), wherein IL&FS subsidiary IL&FS Transportation Networks would own 15% of the units as sponsor, while remaining 85% would be allotted to other IL&FS group companies, which in turn, would allot them to lenders as per their exposure (Shukla, 2020). These measures are expected to significantly reduce the debt of the parent company IL&FS.

GMR Infrastructure Ltd (GMR):

GMR is into various infrastructure domains, such as development of Airports, Power, road projects etc. GMR was incorporated in 1996 with the name Varalakshmi Vasavi Power Projects Ltd in the state of Andhra Pradesh. GMR has been executing road projects under the PPP mode, whereby it acts as a holding company for the projects being taken up under infrastructure development by SPV mechanism. Road SPVs of the company are detailed below:

Table: 6.4 SPVs of GMR Infrastructure Ltd

SPV /Road Stretch	BOT Model	Concession Period (years)
GMR Tambaram Tindivanam Expressways Ltd	BOT (Annuity)	15
GMR Tuni Anakapalli Expressways Ltd	BOT (Annuity)	17.5
GMR Ambala Chandigarh Expressways Pvt Ltd	BOT (Toll)	20
GMR Pochanpalli Expressways Ltd	BOT (Annuity)	20
GMR Hyderabad Vijawada Expressways Pvt Ltd	BOT (Toll)	25
GMR Chennai Outer Ring Road Pvt Ltd	BOT (Annuity)	20

Source: Annual Reports- GMR Infrastructure Ltd, NHAI, & Capitaline

Ashoka Buildcon Ltd (ABL):

ABL is engaged in the development of road projects under BOT models, including Hybrid Annuity and EPC mode. Prior to the 1997 fiscal, ABL was solely into engineering and construction of residential, commercial, industrial, and institutional buildings. In 1997, the company entered the business of developing toll roads and toll bridges on a BOT basis. In the year 2006 IDFC PE acquired an equity stake in the company making it the single largest shareholder with 18.18% equity stake in the company. BOT projects being developed by the company are either directly developed by the company or developed through subsidiaries/ associates and joint ventures (Capitaline). Major projects executed by the SPVs of the company are detailed below:

Table: 6.5 SPVs of Ashoka Buildcon Ltd

SPV /Road Stretch	BOT Model	Concession Period (years)
Viva Highways Ltd	BOT (Toll)	15
Ashoka DSC-Katni Bypass Road	BOT (Toll)	12
Ashoka Highways (Bhandara) Ltd	BOT (Toll)	20
Ashoka Highways (Durg) Ltd	BOT (Toll)	20
Ashoka Belgaum-Dharwad Tollway Ltd	BOT (Toll)	30
Ashoka Sambalpur Baragarh Tollways Ltd	BOT (Toll)	30
Pimpalgaon –Nasik-Gonde	DBFOT (Toll)	20
Jaora Nayagaon	BOT (Toll)	25
Ashoka Dhankuni-Kharagpur Tollway Ltd	BOT (Toll)	25

Source: Annual Reports - Ashoka Buildcon Ltd & Ashoka Buildcon Ltd, 2015

ABL is an active player in executing projects under Hybrid Annuity model with eight projects being awarded to the group (Agrawal P. , 2019).

Reliance Infrastructure Ltd (RIIL):

RIIL was incorporated in the year 1929 with the name Bombay Suburban Electric Supply Ltd (BSES). In 2003, the Reliance group (i.e., Reliance Energy Ltd), acquired the management and control of the company. Five years later, the name of the company was changed from Reliance Energy Ltd to Reliance Infrastructure Ltd, as the company's focus shifted to various infrastructure development sectors i.e., roads, highways, metro rails, airports etc. SPVs of Reliance infrastructure in PPP mode under road sector are detailed below; some of them have also been taken up for performance analysis of PPP models.

Table: 6.6 SPVs of Reliance Infrastructure Ltd

SPV /Road Stretch	BOT Model	Concession Period (years)
DS Toll Road Ltd (DSTL)	BOT(Toll)	20
NK Toll Road Ltd (NKTL)	BOT(Toll)	20
SU Toll Road Private Ltd (SUTL)	BOT(Toll)	25
TD Toll Road Private Ltd (TDTL)	BOT(Toll)	30
GF Toll Road Private Ltd (GFTL)	BOT(Toll)	17
TK Toll Road Private Ltd (TKTL)	BOT(Toll)	30
KM Toll Road Private Ltd (KMTL)	BOT(Toll)	25
PS Toll Road Private Ltd (PSTL)	BOT(Toll)	24
HK Toll Road Private Ltd (HKTL)	BOT(Toll)	24
DA Toll Road Private Ltd (DATL)	BOT(Toll)	26
JR Toll road Private Ltd (JRTL)	BOT(Toll)	18

Source: Capitaline & Annual Reports- Reliance Infrastructure Ltd

Gammon India Ltd (GIL):

GIL was incorporated in the year 1922. The company is into civil engineering projects with expertise in roads, flyovers, and bridges. GIL has varied interests in the infrastructure space. It has been developing road projects under PPP models. GIL SPVs executing projects under PPP mode are detailed below. A few of the projects have been taken in present study for performance analysis.

Table: 6.7: SPVs of Gammon India Ltd

SPV /Road Stretch	BOT Model	Concession Period (years)
Andhra Expressway Ltd	Annuity	17. 6 years
Cochin Bridge infrastructure company Ltd	BOT(Toll)	19. 9 years
Kosi Bridge infrastructure company Ltd*	BOT(Annuity)	20
Mumbai Nasik Expressway Ltd	BOT(Toll)	20
Patna Buxar Highway Ltd	BOT(Toll)	20
Patna Highway Projects Ltd	BOT(Annuity)	15
Rajahmundry Expressway Ltd	BOT(Annuity)	17. 5 years
Sidhi Singrauli Road Project Ltd	BOT(Toll)	30
Yamunanagar Panchkula Highway Pvt Ltd	BOT(Toll)	22
Gorakhpur Infrastrcture company ltd	BOT (Annuity)	20

Source: Capitaline , Annual Reports- Gammon India Ltd , Care Ratings, 2015

GIL entered into an agreement with a consortium led by Brookfield asset management to sell some of its road assets. The company proposed to sell six road projects and three power projects to Brookfield asset management. (Projectstoday.com, 2016). This kind of sale was possible due to easier exit norms being approved by the government to allow sales of road assets. Relaxing of exit norms for existing developers has helped in the release of risk capital for future projects, so that corporates can effectively look to reduce leverage in the balance sheet.

Sadhbav Engineering Ltd (SEL):

SEL was incorporated as private company in year 1988. The company has presence in roads and highways, irrigation, and mining sectors. The company through its subsidiary i.e., Sadhbav Infrastructure Projects Ltd (SIPL) is one of the largest BOT players in India. SEL is an active player in execution of projects under Hybrid Annuity model with twelve projects awarded to the group (Agrawal P. , 2019). A few of the projects executed by the SPVs of the company under PPP mode are part of the present study on performance of PPP models.

Table: 6.8 SPVs of Sadhbav Engineering Ltd

SPV /Road Stretch	BOT Model	Concession Period (years)
Nagpur Seoni Expressway Ltd	BOT (Annuity)	20
Ahmedabad Ring Road Infrastructure Ltd	BOT (Toll)	20
Aurangabad Jalna Tollway Ltd	BOT (Toll)	23.5
Rohtak Panipat Tollway Ltd	BOT(Toll)	25
Hyderabad Yadgiri Tollway Pvt Ltd	DBFOT(Toll)	23
Bijapur Hungund Tollway Pvt Ltd	DBFOT(Toll)	20
Shreenathji Udaipur Tollway Pvt Ltd	DBFOT(Toll)	27
Solapur Bijapur Tollway Pvt LTd	BOT (Toll)	20
Bhilwara Rajsamand Tollway Pvt Ltd	DBFOT(Toll)	30
Rohtak Hissar Tollway Pvt Ltd	BOT (Toll)	22
Dhule Palasner Tollway Ltd	BOT (Toll)	18
Mumbai Nasik Expressway Ltd	BOT (Toll)	22.4
Mysore-Bellary Highway Pvt Ltd	DBFOMT(Annuity)	10

Source: Annual Reports- Sadhbav Engineering Ltd

SEL has been deliverageing itself by selling road projects to InvIT structure. Referring to a report of CLSA brokerage, the sale of road projects to L&T InvIT would deleverage company's consolidated balance sheet and release growth capital to fund new projects (Lochab, 2019).

KMC constructions Ltd:

KMC construction Ltd is involved in developing various infrastructure projects, including construction of road projects. The company has also developed road projects under joint venture with other infrastructure companies. Some of the SPVs developed projects of the company under PPP model are mentioned below:

Table: 6.9 SPVs of KMC constructions Ltd

SPV /Road stretch	BOT Model	Concession Period (years)
Thrissur to Angamali (KMC Construction Ltd –SREI JV) – M/s Guruvayoor Infrastructure Pvt Ltd	BOT(Toll)	20
Bara to Orai (NCC-KMC Consortium) M/s O B Infrastructure Ltd	BOT (Annuity)	17.5
Nellore – Chilkaluripet (KMC-BSCPL Consortium)- M/s Simhapuri Expressway Ltd	BOT (Toll)	30
Aurangabad - Barwa Adda – M/s Aurangabad Barwa Adda Expressway Ltd.	BOT (Toll)	30
Kannur Vengalem Kuttipuram M/s South Malabar Expressway Pvt Ltd	DBFOT (Toll)	22
Kudapa-Mydukur-kurnool (KMC Construction Ltd –IVRCL Consortium) – Rayalseema Expressway Pvt Ltd	BOT (Toll)	30
Vadakkancherry-Thrissure section (KMC Constructions Ltd –CR18G Consortium) - Thrissur Expressway Pvt Ltd	DBFOT (Toll)	20

Source: KMC Constructions Ltd

Oriental Structural Engineers Pvt, Ltd (OSEPL):

OSEPL is into EPC contracts and execution of BOT road development projects under the PPP model. The firm was established more than 4 decades ago. Some of the road projects executed by the SPVs of the company are mentioned below:

Table: 6.10 SPVs of Oriental Structural Engineers Pvt, Ltd

SPV /Road stretch	BOT Model	Concession Period (years)
Agra Bharatpur (NH -2)- Oriental Pathways (Agra) Pvt Ltd	BOT (Toll)	20
Indore Khalghat (NH-3) Oriental Pathways (Indore) Pvt Ltd	BOT (Toll)	20
Kondali Talegaon (NH-6) Oriental Pathways (Nagpur) Pvt Ltd	BOT (Toll)	20
Nagpur Bypass (NH-7)	BOT (Toll)	20
Nagpur Betul (NH-69)	BOT (Annuity)	20
Etawah Chakeri	BOT (Toll)	16

Source: Annual Reports -Oriental Structural Engineers Private Ltd

In the recent past, OSEPL has raised resources through InvIT structure. The Oriental InvIT consisting of five highways i.e. Nagpur Bypasss, Indore-Khalghat (NH3), Etawah- Chakeri (Kanpur), Hungund- Hospet (NH-13) and Nagpur-Betul highways with length of 2804 lane kms having combined revenue of about Rs 1700 Cr. In the 2019 fiscal, it got additional investments from the Asian Infrastructure Investment Bank (AIIB), Germany's DEG and International Finance Corporation (Balakrishnan, 2019). This goes to show that the players of Indian road sectors have been attracting financial resources even from global investors.

Dilip Buildcon Ltd (DBL)

Dilip Buildcon was initially set up as a proprietorship company in the year 1989 as Dilip Builders, which was subsequently reconstituted as a private Ltd, company in 2006, and a public limited company in 2017. The company has been into construction of road projects under both EPC and BOT models. Apart from road projects, it carries out various works on EPC basis, such as development of bridges, buildings,

dams, canals, water supply and mining. The company has in the past sold twenty four road projects to the investors (Crisil, 2020). DBL is an active player in execution of road projects under Hybrid Annuity model with eighteen projects awarded to the group (Agrawal P. , 2019).

Table: 6.11 SPVs of DiliP Buildcon Ltd

SPV /Road stretch	BOT Model	Concession Period (years)
Yavatmal – Wardha	Hybrid Annuity	17.5
Wardha-Butibori	Hybrid Annuity	17.5
Mahagaon- Yavatmal	Hybrid Annuity	17.5
Lucknow-Sultanpur	Hybrid Annuity	17.5
Kalmath-Zarap	Hybrid Annuity	17.5
Chandikhol-Bhadrak	Hybrid Annuity	17.5
Bangalore-Nidagatta	Hybrid Annuity	17.5
Anandapuram-Pendurthi- Anakapalli	Hybrid Annuity	17.5
Jalpa Devi Tollways Ltd	DBFOT-Toll	26

Source: Dilip Buildcon Ltd, 2020 & Annual Reports – Dilip Buildcon Ltd.

Cube Highways:

It is a Singapore-based company that, invests in road and highway projects, along with other select infrastructure sectors in India. Shareholders of the company include leading international investors, consisting of I Squared Capital, a wholly-owned subsidiary of the Abu Dhabi Investment Authority, International Finance Corporation, and a consortium of Japanese investors that include Mitsubishi Corporation, Japan Overseas Infrastructure Investment Corporation for Transport and Urban Development, East Nippon Expressway Company Ltd., and Japan Expressway Company International Ltd. Some of the SPVs of the company have executed PPP road projects as detailed below:

Table: 6.12: SPVs of Cube Highways

SPV /Road stretch	BOT Model	Concession Period (years)
Jaipur Mahua Tollway Ltd	BOT -Toll	25
Mahua Bharatpur Expressways Ltd	BOT -Toll	25
Western UP Tollway Ltd	BOT -Toll	20
Andhra Pradesh Expressway Ltd	BOT-Annuity	20
Narketpally Addanki Medarametala Expressway Ltd	BOT -Toll	24

Source: Cube Highways

The company is looking to acquire more projects on TOT and Hybrid Annuity models apart from regular BOT projects. In fact, the company has baged as third TOT bundle for Rs 5011 crore in government's third round of road monetization programme (Saluja, 2019).

From the above details of the corporate players involved and the interest shown by international investors in India's development initiatives, we can say affirm that the PPP model of development is indeed well entrenched. There have been many corporates in the past, who have sold their stakes in operational road assets to reduce the levels of leverage. Reduced leverage in turn, is expected to help developers of road projects to free up equity/ capital for deployment to other projects. From the buyers' perspective, completed projects become attractive assets, as execution risk is mitigated, and they get a toehold into revenue generating assets. Pension funds and Insurance funds are key players for such assets, wherein there is a visibility of cash flows in the long term. Stake sale in PPP road project is a win – win situation for all the stake holders.

However, it may be mentioned that majority of the developers taking up PPP road projects have been EPC developers with the primary motive to get contracts to construct road projects for their EPC companies. The attraction to get EPC business has been an important factor apart from viability of SPVs promoted by them for executing projects under PPP. Notably, EPC revenue comes to the parent by default for the road development mandate obtained by the SPVs promoted by it. Higher

number of PPP projects results in larger order books for the EPC business and consequently improved stock valuation in case they are listed in the stock market. In order to get more EPC business, developers at times, may under-bid resulting in delayed development and execution of PPP projects due to financial constraints.

It is important that firms that execute projects under the SPV mode should not aggressively bid for projects. They should carry out conservative assessment of the profitability, and have realistic expectations from projects. On the other hand, lenders to the PPP project should also not over-fund them, as it could result in a situation in which, there is overall stress in road projects. Developers carrying out EPC business of the road stretch have an added incentive to generate returns at the EPC level, overlooking in the process, the long-term financial viability of the road stretch. In turn, this might result in a situation whereby at the EPC level, money is made; however, servicing financial commitments towards the lenders at the SPV level becomes difficult. This may primarily occur due to optimistic projections taken at the project development stage not materializing.

Large numbers of projects at SPV level are facing challenges due to policy and developer related issues, resulting in a situation that developers of road projects are looking for better terms for development under the PPP model. The Hybrid Annuity model being offered by NHAI for developing road projects has been seen as a step in this direction to make these projects more attractive. However, it has been seen that even HAM projects face difficulties in getting financial closures, as banks at times are reluctant to fund, especially because the developers do not have strength in their balance sheets (Naidu, 2019). Thus, while awarding projects, agencies should ascertain the financial capability of the firm / SPV undertaking such projects with probably higher requirement of net worth. It has been seen at times that developers have not been able to complete the projects in time bound manner even in cases of hybrid annuity model, where part of the cash flows come from awarding agencies to developers during the construction period of the project. There is also a possibility of diversion of funds by project developers to other projects. It is thereby important that the projects are adequately ring-fenced to ensure avoiding such instances.

It is extremely important to encourage new category of developers into road development projects under the PPP model, specifically those that do not own EPC business. Such developers can take up projects by hiring the most efficient EPC player for construction of road project. New class of developers can also take a long-term view of the road projects, without looking solely at short-term benefits in terms of getting EPC business for the parent company. The project awarding agency can initiate this by keeping a few projects 'reserved', to be bid by standalone developers, as their revenue matrix would differ from players, who are actually undertaking the EPC business.

Additionally, development of newer ecosystem would give rise to competition for existing developers. Besides, the structure of standalone PPP developers without EPC interest would help in getting new set of investors, who will possibly be ready to take up projects with long-term business perspective. Such measures could go on to create a differentiated road infrastructure development ecosystem. In India, development of road projects under the PPP model is certainly a necessity, looking at the nation's larger requirement of road infrastructure. Therefore, creating a new class of road infrastructure developer may further help in making the development of road projects much more robust with wider execution options for the policy makers.

6.1 Firm Performance Measures:

For a micro level analysis of performance of a firm, the study attempts to analyze some key financial indicators of firms/ SPVs involved. We measure the firm's performance based on ROE (Return on Equity), which explains the benefit that is derived by shareholders of the company. Since the company is created for benefiting shareholders, the ROE benchmark is ideal to understand the value being created by the business. The present study compute ROE with the help of Du Pont analysis, which effectively measures it using company's net profit margin, asset turnover ratio and asset to equity ratio (Equity Multiplier). Notably, as road projects are capex intensive, parameters like assets, turnover, equity, and profit can be studied in detail with the help of DuPont analysis. Importantly, all the above financial parameters can significantly influence the ROE. The DuPont model has been widely used in different financial contexts, like capital markets (Soliman, 2008), earnings management (Jansen et al., 2012), forecasting (Fairfield & Yohn, 2001) and profitability analysis (Penman, 2009).

Return on Equity: The present study attempts to analyze financial performance with the DuPont model for select SPVs executing PPP road projects under BOT (Toll) and BOT (Annuity) modes, albeit based on secondary data. The DuPont model based on Return on equity (ROE) leads to the following factorial model

$$\text{ROE} = \frac{\text{Net Profit}}{\text{Turnover}} \times \frac{\text{Total Assets}}{\text{Equity}}$$

i.e., Net Profit Margin (NPM), Asset Turnover Ratio (ATR) and Equity Multiplier (EM) (Circiumaru et al., 2010).

In the DuPont analysis, for measuring ROE, net profit to turnover i.e. NPM demonstrates how beneficial a company actually is after it meets all expenses, and accordingly a higher ratio is beneficial, Turnover to total assets ATR measuring the company's efficiency in utilizing its assets with higher ratio signifies better performance; while Total assets to equity is EM, explaining in the process, the level of debt financing to acquire asset with higher ratio show that the company does rely on higher quantum of debt (Bhagyalakshmi & Saraswathi, 2019).

The various components of Du Pont calculation, i.e., Net Profit Margin, Asset Turnover Ratio and Asset to Equity Ratios are considered while generating ROE. The ratios facilitating generation of return by way of DU Pont analysis are explained below:

Net Profit Margin (NPM): Net Profit Margin measures the relationship between net profits and sales of a firm.

$$\text{Net profit ratio} = \frac{\text{Earnings after taxes (EAT)}}{\text{Sales}}$$

(Khan & Jain, 2007)

Asset Turnover Ratio (ATO): It measures the efficiency of a firm in managing and utilizing its assets. Higher the turnover ratio, the more efficient is management and utilization of the assets, On the other hand, low turnover ratios are indicative of underutilization of available resources, and presence of idle capacity.

$$\text{Asset Turnover ratio} = \frac{\text{Sales}}{\text{Average total assets}^*} \quad \text{II}$$

(Khan & Jain, 2007)

*Total Assets from financial statements instead of average total assets has been taken for study

Asset to Equity Ratio (AE): This ratio measures the proportion of assets to the equity of the company; it helps in measuring equity multiplier for the firm. Higher ratio of assets to equity signifies that the operations are more debt funded.

$$\text{Asset to equity ratio:} = \frac{\text{Asset}}{\text{Equity}} \quad \text{III}$$

(Khan & Jain, 2007)

CHAPTER 7

RESEARCH DESIGN & METHODOLOGY

7. Research Design & Methodology:

The research broadly focused on studying PPP Models in India's Road Infrastructure Development. As learned thus far, selection of the PPP model is primarily dependent on the project's risk profile and financial viability (kalidindi & Singh, 2009). The research design included extensive review of literature, critical appraisal of public policy governing PPP road development models in general, and particularly in the Indian context, along with the conceptual and theoretical background, specifically in terms of various risks/ challenges, albeit at a macro level.

We observe that PPP projects can help in risk mitigation, as risks could be taken up by the partners based on their expertise. Primarily, there are three types of risks involved, i.e., macro, meso and micro; macro risk could be handled by public institutions, meso risks by the contractor, and the micro risks can be handled jointly by both public and private players (Li et al., 2001). Further, to examine the issues involved in road development under PPP, the study has relied on the information available in public domain by way of research articles, various reports issued by Indian government agencies, including the Ministry of Road Transport and Highways, and the Ministry of Finance, coupled with reports of multilateral development institutions i.e., World bank and ADB as well as annual financial reports of SPVs that execute the road projects under PPP. Besides, this study also analyzed various reports by credit rating agencies i.e., CARE, ICRA, FITCH and CRISIL to understand and appreciate the issues faced.

Financial performance of SPVs executing PPP projects under BOT– Toll and Annuity were also looked into with the help of annual financial reports of corporates that have been responsible for executing the road projects. Further, this study analyzed the concession period of the road PPP projects in order to assess the influence of the type of PPP model on the concession period. In the following sections, the present study discusses the objectives of the study.

7.1 Discussion on objectives of the study :

First objective was to study the policies, regulatory framework, and the contribution of PPP projects in road infrastructure sector development. Following are some of the key points that have emerged based on the extensive review of literature:

PPP has seen the highest participation in road infrastructural development in India and the world at large. This model of road development has witnessed several challenges in India due to land acquisition problems, environmental clearances, past excesses in the form of aggressive bidding by developers when economy was growing at a faster pace, lack of equity, financial constraints, as well as difficulties in executing the projects.

All the above has resulted in a situation wherein developers are not enthusiastic to take up new road projects. In fact, in certain cases, optimistic projection of demand for vehicular traffic anticipated at the time of bidding for the projects has consequently turned haywire with slowing economic activities. It may be mentioned that traditional project management strategies also had their own drawbacks, as they have not been flexible, especially at the stage of project construction (Lenferink et al., 2013). This has resulted in increased project risks for developers. Notably, while introduction of the Hybrid Annuity Model (HAM) was expected to mitigate risks on the developer in terms of availability of project site for development without land acquisition and environmental challenges along with revenue risk being taken care by the government / awarding agencies; however in reality, even HAM projects have not been able to secure financial closures as lenders to road projects have been extremely reluctant to fund, owing to several developers not having the necessary strength in their balance sheets (Naidu, 2019).

Systematic risks are correlated across projects and cannot be eliminated by risk pooling and can be better borne by public sector (Quiggin, 1996). In PPP projects, systematic factors cannot be mitigated by managerial interventions, like alternate modes of transportation, economic scenario, political and economic uncertainties, any force majeure, slack industrial development in surrounding areas, hindrances in land acquisition, diversion of traffic to alternate routes (Koul et al., 2021). Policy level interventions may influence parameters like hindrances in land acquisitions, various

project related clearances, development of alternate mode of transport. Financially strong promoters and the ability to substitute road projects without substantial hair cut for lenders could possibly help in kick starting projects stuck due to financial challenges faced by developers.

While the government and awarding agencies have been trying to overcome the issues faced by developers, however to ensure continued growth of road construction, most projects are presently being awarded under the EPC mode. In EPC mode, road projects are being entirely funded by government agencies and subsequently the same are expected to be monetized (Saluja, 2020). Once the road stretch is completed under EPC mode, it is expected to be monetized by way of TOT model. Herein, it is pertinent to mention that EPC mode of development of road projects is also carried by companies who are also developing road projects through their subsidiaries in PPP mode. Therefore, it is important that a proper mix of PPP and EPC is attained, considering the requirement of efficient road infrastructure and constraints in government finances. Moreover, it is also expected that the EPC mode of development would help developers in generating profits, which in turn, would act as a risk capital for the development of road projects through PPP mode.

In the past, various policy changes have been addressed by the government in terms of easier exit norms for SPVs, awarding of projects under the HAM to address land acquisition and environmental challenges faced by the projects, monetizing of road projects under TOT model and introducing tax efficient InvIT structures to raise resources for road development. One-time investments have been made by NHAI in stalled projects stuck at the later stage due to non-availability of funds. It may be noted here that authorities awarding the road projects under PPP should not treat PPPs only as an off-balance sheet funding method but as an important enabler to provide reliable infrastructure to its citizens. PPPs should not be used as first delivery mechanism without checking its suitability for a particular project (Kelkar, 2015). Continuous efforts are required from the side of policy makers to keep this sector attractive for investment by private players.

In the following section, this study encompasses the second and third objectives of the study i.e., *To undertake a comparative analysis of BOT (Toll) & BOT (Annuity) PPP*

models and their impact on the financial performance of the firms engaged in the road infrastructure development projects in India and to analyze the influence of the concession tenure on the type of PPP models will be studied by way of framing of hypotheses.

7.2 Hypotheses:

The literature review has highlighted about PPP models being extensively used by various countries to create world class infrastructure across sectors. In India, lot of interest has been shown by institutional investors and pension funds in road projects. It is thereby important to study whether the type of model has any influence on the financial performance of road projects getting executed under PPP. Accordingly, based on literature review and the gaps identified therein, BOT Toll and BOT Annuity models with the following hypotheses have been tested.

H 1 Financial performance of PPP projects is not affected by the type of model used to execute projects under road infrastructure development.

In India, major road projects by the government have been awarded under BOT Toll and BOT Annuity model in the past. Extant literature emphasized upon the fact that there has been extensive research on various risks and performance challenges in the PPP models across sectors in India and world at large. However, financial performance of road projects across the models has not been studied to the best of my understanding. Accordingly, to study above hypotheses, the present study conducts a comparative analysis of the types of PPP models, vis a vis their impact on the financial performance of firms engaged in road infrastructure development projects in India.

Specifically, to study the above hypothesis, returns generated by way of Du Pont model were analyzed to understand whether BOT Toll or BOT Annuity models do have any differentiation in terms of financial performance of firms executing such projects. Our observations suggest that project on BOT (Toll) and BOT (Annuity) variants have faced profitability challenges for developers executing these road projects. For example: some of the BOT (Toll) projects in our study have shown losses that may be attributed to the revenue generation in projects not being sufficient to take care of the costs incurred in the projects. Even BOT (Annuity) projects have also shown losses despite of visibility of revenue at the time of execution of the road

project. Challenges in profitability for annuity projects can have a possible explanation of costs worked at the time of conception of the project not being in line with the execution.

It was observed that annuity projects generated lower positive return than the toll-based projects. At the same time, negative ROE in toll-based projects was more than the annuity mode of projects. For instance, some of the toll projects have shown high ROE percentage in twenties and one project in thirties. However, there were 9 toll projects with negative returns, and 27 projects showed negative net worth suggesting continuous losses. It may be pertinent to note here that while annuity projects have cash flow visibility, despite 3 projects had negative net worth, suggesting continuous losses; while 6 projects generated negative returns with only 7 projects showing positive return out of the initial sample of 16 annuity projects.

The Du Pont analysis suggests that the PPP model has not been of help in generating adequate returns for developers across BOT Toll and BOT Annuity models. This, confirms the hypotheses that mentioned that PPP models in road infrastructure development does not affect the financial performance of firms executing these projects. Notably, both PPP models have been impacted by poor performance in various projects.

Concession tenures of BOT Toll and Annuity model were studied to examine their influence on the selection of PPP model if any. Concession tenures can greatly influence the returns being generated by the developers from the PPP projects. Study of concession tenures of BOT -Toll and BOT Annuity models has been done for the hypothesis framed below.

H2 PPP mode of road infrastructure development the concession tenure of the project is influenced by the type of PPP model.

The present study analyzed the average concession tenure of BOT (Toll) being 22.57 years in comparison to annuity projects of 18.09 year, which suggests that BOT (Toll) projects have a higher concession period to provide upside to the developers for taking toll collection risk. Maximum projects concession tenure in the sample period

was 20 years for both BOT (Toll) and BOT (Annuity) based projects. Lowest concession period for toll projects was 11 year and 10 years for annuity projects. Maximum tenure of the concession was 32 years for toll projects.

In case of the Chilean experience on the concession tenure the traffic related challenges for BOT Toll- based projects have been addressed by awarding projects based on the least present value of toll revenue (LPVR). Bidders expecting the least amount for the concession period is awarded road project with concession tenure ending on attaining the winning bid amount with maximum concession tenure of 50 years (Hill, 2011). Higher concession period for BOT(Toll) projects could be explained by the fact that the purely toll projects are expected to bear the larger commercial risk, and accordingly have larger concession periods to mitigate unforeseen changes in revenue flows from the toll collection and incentivize the developers in taking risk for developing project in toll model.

Annuity concession tenure is dependent on the period for which annuity paying agency wants to elongate the repayment of its liabilities in terms of annuity installments to be given to developers. Annuity paying agency is usually the government or promoted institutions, specifically in the Indian context. Thus, fixation of the concession tenure must take the interest of the developer into account. Since the developer would like to get its investments back along with financial returns on the shortest tenure. Excessively large concession period may result in a situation wherein the annuity projects may not attract developers. Accordingly awarding agencies need to maintain balance between annuity servicing liability and developer's desire for shortest payback period.

Based on the sample data examined on the concession tenure of BOT Toll and Annuity model has found that the type of PPP model does influence the concession tenure, and thereby supports the hypotheses (H2). Based on the hypothesis study, the sum up as follows:

- a) Despite fixed revenue streams in case of annuity, financial performance of PPP road projects has still not been positive for all SPVs. While some of the toll-based projects exhibited strong performance, most seem not to have generated

sufficient positive ROE for developers, resulting thereby in lesser interest from project developers to take up the projects on a PPP model of BOT Toll and Annuity. The hypothesis holds good on “financial performance of PPP projects is not affected by the type of model used to execute the projects under road infrastructure development”. Notably, both types of models in the study have presented positive as well as negative returns.

- b) Average concession period of BOT (Toll) was found to be more than the BOT(Annuity) model, which could be explained, as toll projects have no certainty of cash flows. Accordingly, higher tenure projects are expected to compensate for volatility in the revenue streams. Moreover, annuity projects have a defined cashflows, where the concession tenure was found to be on lower side. Accordingly, the hypothesis holds good for “PPP mode of road infrastructure development the concession tenure of a project is influenced by the type of the specific PPP model chosen.

7.3 Data for the Study and Data Collection:

The study has been primarily based on secondary data related to firm performance indicators. The study primarily focused on subsidiaries (firms) of the main company, as most projects under PPP are being executed by them. The present study conducted an analysis based on the financials available of these subsidiary companies, the details of which, are provided in the annual reports of the corporate per se, under Section 212 of the companies Act, 1956 (Ministry of Corporate Affairs). Accordingly, financial information available in the annual reports of the main corporate about financial performance of their subsidiaries i.e., SPV was used for analysis. Notably, the possibility of taking consolidated balance sheet of the corporate as a source of analysis was not feasible, as in most of the cases many companies have often been engaged in different commercial activities therefore having multiple revenue streams. Accordingly, this study looks to analyze the financial performance of project vehicles i.e., SPVs / firms carrying out these road projects using BOT (Toll) and BOT (Annuity) models under PPP. Participation of private sector in execution of projects is based on the objective to earn risk adjusted returns for the capital employed and creation of public utility infrastructure.

The present study attempted to incorporate financial data of PPP road projects executed in India for which, relevant data for the minimum time series of five years was taken for analysis. The financial data from year 2010 up to the year 2019 has been considered with maximum number of years available on time series being 10 years.

Data of SPVs belonging to 12 corporates, having multiple road projects under execution were analyzed. A total of 83 PPP road projects (both toll and annuity-based) were initially taken for analysis. However, for the final analysis 47 projects (BOT-Toll 34 and BOT -Annuity 13) were studied to examine the performance of the road projects based on DU Pont model. Reasons for the outliers in the projects are explained below:

Data Outliers

The primary reasons for excluding 36 projects with (BOT-Toll 27 and BOT-Annuity 3) was that they had negative net worth in some financial years, while 6 toll- based projects were treated as outlier due to high variation in performance. Notably, projects that showed negative net worth indicates significant weakness in the financial profile within the sample period. Negative net worth results in equity capital of such SPVs getting eroded primarily due to losses in the Profit & Loss (P&L) statements. Accordingly, with negative net worth Du Pont analysis is not feasible, as the ratio of asset/equity cannot be derived due to negative equity.

Table: 7.1 Projects showing negative net worth in some years due to incurring of losses

Period (years)	No of Projects	Toll based	Annuity based
10	8	8	0
9	5	3	2
8	2	2	0
7	5	5	0
6	5	5	0
5	5	4	1
Total	30	27	3

Source: Based on author's examination of data

The number of projects showing negative net worth i.e., 36 % of the project sample of 83 suggests that the PPP model has not been generating adequate returns for the developers of such projects, highlighting thereby the financial challenges faced by these road projects.

7.4 Data Analysis Techniques:

The DuPont model has been widely used in financial analysis in various sectors to assess performance (Penman, 2009), (Fairfield & Yohn, 2001), (Soliman, 2008) (Jansen et al., 2012), (Bhagyalakshmi & Saraswathi, 2019), (Circiumaru et al., 2010), (Sheela & Karthikeyan, 2012), (Herciu et al., 2010), The present study, used the DuPont model to analyze the financial performance of BOT (toll and annuity) projects executed by SPVs. Only those SPVs were taken for the sample, which satisfied non-missing value criteria for the period. Importantly, financial year closing values were used to calculate different ratios involved in computation of ROE by using the Du Pont model. Further, to examine the performance over the study period, averages of NPM, ATO and EM for BOT (toll) and BOT (annuity) projects were considered.

Financial data was collected from FY 2010 to FY 2019 for 83 SPVs operating in PPP road projects with the existing financial data available, ranging from 10 years to minimum 5 years. For studying the financial performance of SPVs executing road projects in India anonymity of the SPVs has been maintained. Financials of 83 road projects were initially taken for analysis purposes. Financial analysis of 47 road projects i.e., 34 toll and 13 annuity based for various times series was carried out as explained below:

Table: 7.2 Projects having positive net worth taken for analysis purposes

Period (years)	No of Projects	Toll based*	Annuity based
10	13	9	4
9	8	6	2
8	4	2	2
7	4	4	0
6	5	4	1
5	13	9	4
Total	47	34	13

Source: Based on author's examination of data

* Six projects were taken as outliers due to high variation in their performance hence not take for analysis.

DU Pont average returns generated of 47 projects with 34 toll- based and thirteen 13 annuity- based models for the period for which, data set was available; they were studied for average NPM, ATR and AER. Besides, this study employed panel data to study the average Du Pont returns generated by SPVs, executing the road projects in India. Notably, the firms' financial performance has been analyzed in the past with the help of panel data (JABA et al., 2017), (Albulescu et al., 2018).

Empirical Results & Discussion

BOT Annuity:

The panel of returns generated by the BOT (annuity) model, covering variance of BOT model of projects is mentioned below along with the analysis of returns generated.

Table: 7.3 Panel Analysis for BOT (Annuity)

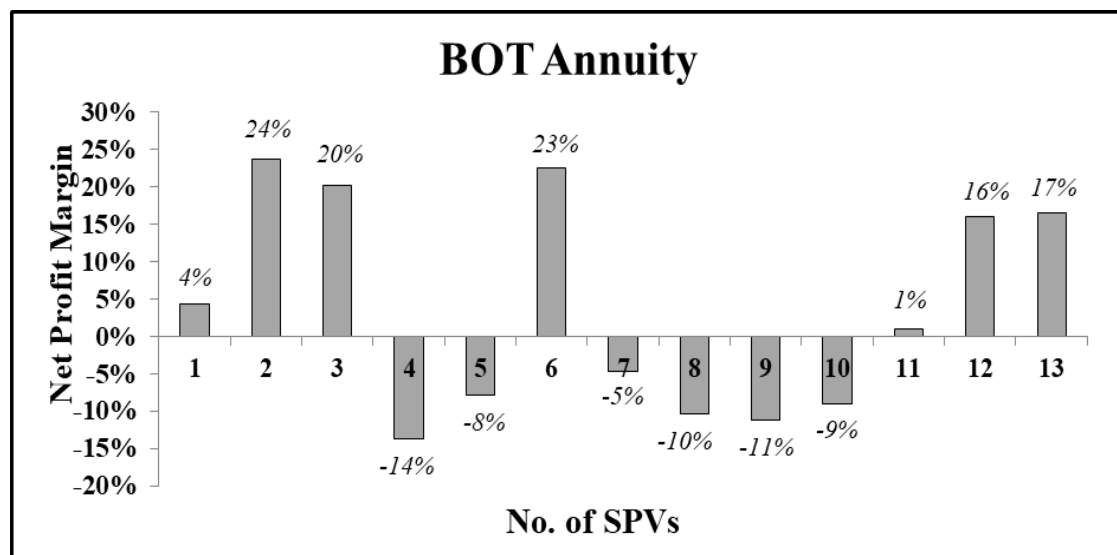
Panel : A			Bot Annuity (Average Returns)			
S.No	Time Series (years)	Firm	NPM	ATR	AER	ROE
1	10	SPV 1	0.0437	0.1298	3.7912	0.0112
2	10	SPV2	0.2365	0.1552	3.0743	0.1113
3	10	SPV 3	0.2019	0.1680	3.7317	0.1104
4	10	SPV 4	-0.1370	0.1540	5.4640	-0.0887
5	9	SPV 5	-0.0783	0.3044	7.4826	-0.0578
6	9	SPV 6	0.2255	0.1359	3.1343	0.0896
7	8	SPV 7	-0.0461	0.3008	8.1174	-0.0915
8	8	SPV 8	-0.1030	0.1283	6.2878	-0.0061
9	6	SPV 9	-0.1120	0.1292	9.3857	-0.1183
10	5	SPV 10	-0.0897	0.1508	23.6211	-0.3478
11	5	SPV 11	0.0069	0.1904	2.4008	0.0060
12	5	SPV 12	0.1612	0.2412	2.9966	0.1103
13	5	SPV 13	0.1659	0.2358	3.0500	0.1097

Source: Based on author's examination of data

Net Profit Margin (NPM)

Net profit to turnover refers to how beneficial a company is after meeting all its expenses accordingly the higher ratio is beneficial (Bhagyalakshmi & Saraswathi, 2019). It was observed that despite cash flow certainty in annuity projects, some of the projects showed negative average returns. It was interesting to note out of the sample of 13 projects, an average NPM in six projects was negative ranging from (-5%) for SPV 7 to (-14%), SPV 11 showing 0.0069% average return for the sample period. SPV2 and SPV3 had NPM of 24% and 20% respectively showed highest ROE of 11%. SPV 6 had NPM of 23%; however, ROE in the case was found to be at lower level of 9%. *The analysis of annuity projects highlighted that the developers' comfort in annuity project of defined revenue streams has not allowed them to have positive NPM. Possible explanation for the same could be high projects cost more than what was anticipated at the time of bidding for the projects, thus, underlying aggressive bidding for the annuity projects.*

Figure: 7.1 BOT Annuity - NPM



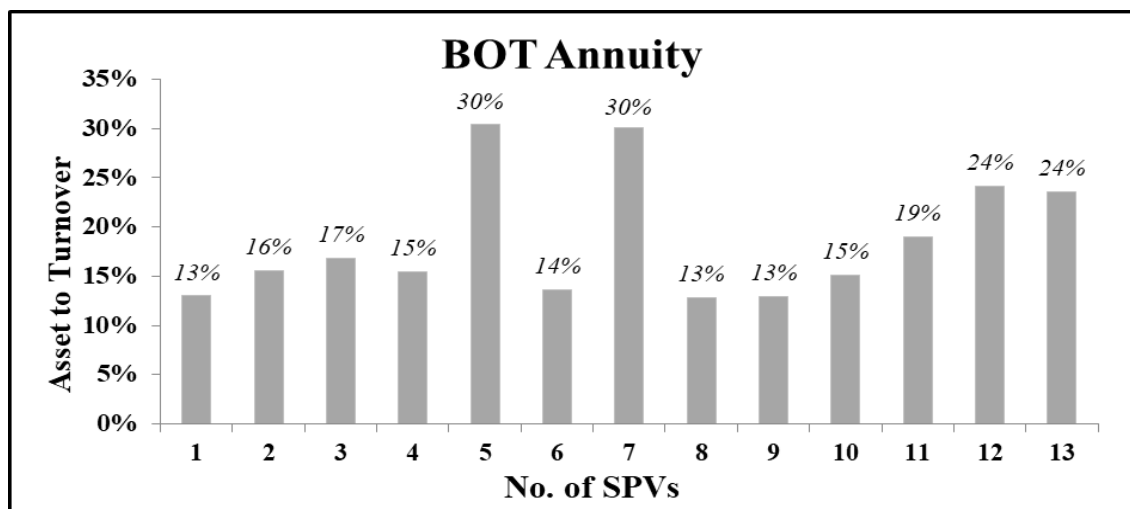
Source: Based on author's examination of data

Asset Turnover Ratio (ATR)

Road projects are capital intensive, as they involve large investments in asset creation. Average ATR in BOT (annuity) ranged from 13% to 30%. Bhagyalakshmi & Saraswathi, (2019) stated that turnover to total assets ATR measuring a company's

efficiency in utilizing its assets with higher ratio signifies better performance. Two of the projects in the study showed ATR at the level of 30% signifying better utilization of the underlying assets. Herein, it may be noted that projects showing average ATR of 30% did have a negative ROE of (-6%) and (-9%) respectively, highlighting in the process the fact that even with higher ATR, it may not be necessary that ROE generated will be positive. Four annuity Projects i.e., SPV2, SPV3, SPV12, & SPV 13 showed highest ROE of 11% had ATR 16% for SPV 2, 17% for SPV3, and 24% for SPV 12 and SPV 13 respectively. Specifically, SPV 10 showing maximum negative return of (-35%) had ATR of 15%. *From the analysis seen higher ATR on its own did not have positive influence on the ROE.*

Figure: 7.2 BOT Annuity - ATR



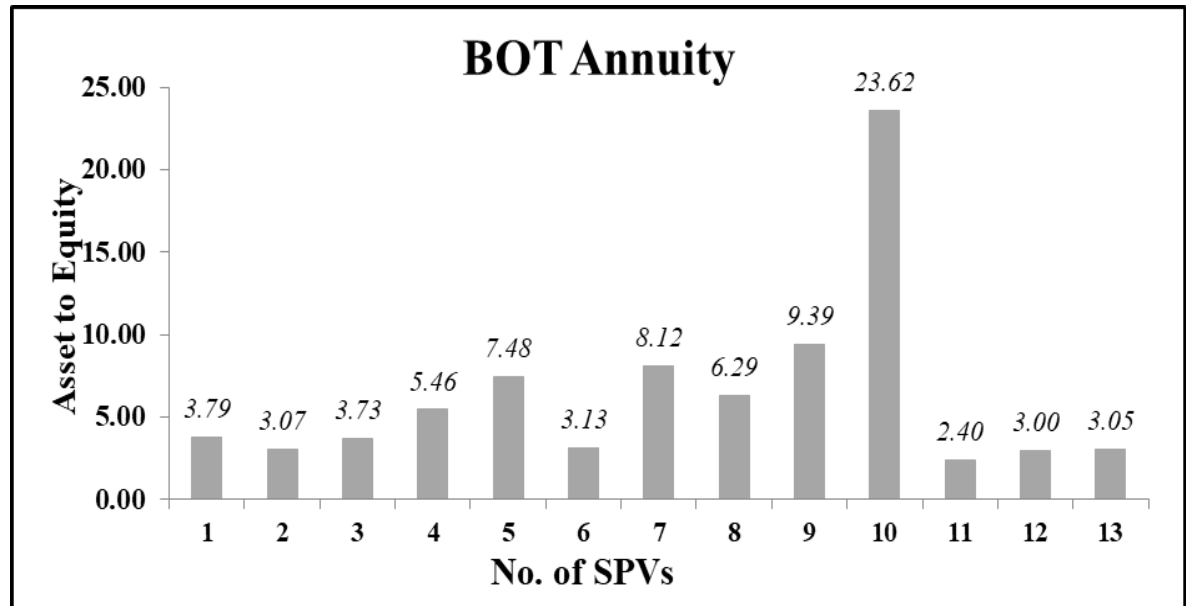
Source: Based on author's examination of data

Asset to Equity Ratio (AER)

Total assets to equity ratio are Equity Multiplier (EM) explains the level of debt financing to acquire asset with higher ratio, demonstrating in turn, that the company is relying on higher debt (Bhagyalakshmi & Saraswathi, 2019). EM being at a higher level indicates higher debt in comparison to stakeholder's equity (Tandon et al., 2016). In our case, average EM of BOT (annuity) projects ranged from 3 to 23.62. SPV10 showed highest equity multiplier of 23.62 times, whereas other twelve projects were in single digit range. Higher EM suggested lower scope of retained earnings, and the projects showing lower profitability. Accordingly, projects that

showed highest EM, also had the highest negative ROE of (-35%). Thus, higher AER also highlights losses in the firm's operations thus depleting its equity/ reserves resulting in higher EM. Average EM over the sample period has been depicted below:

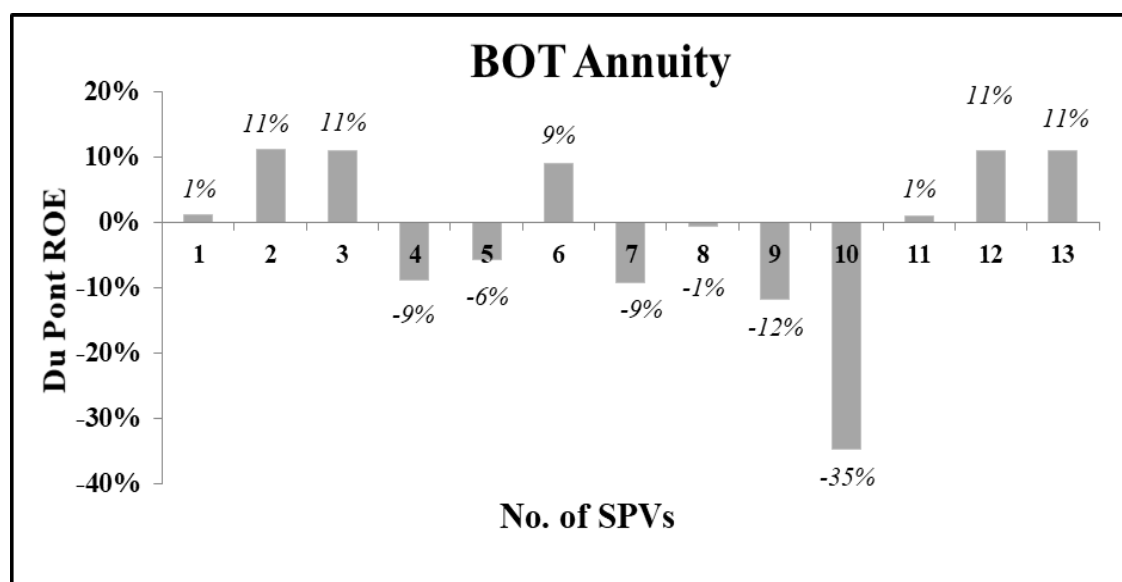
Figure: 7.3 BOT Annuity - AER



Source: Based on author's examination of data

Return on Equity (ROE)

BOT (annuity) projects average ROEs ranged from positive 11% to negative (-35%), especially given that ROE is indeed an important indicator for measuring firm performance (Sheela & Karthikeyan, 2012). Out of thirteen annuity-based projects, seven projects showed positive returns ranging from 1% to 11%. Six projects showed negative returns in the range of (-1%) to (-35%). SPV 2, SPV 3, SPV 12 & SPV 13 showed highest ROE of 11% had NPM of 24%, 20%, 16% and 17% respectively. ATR at 16% for SPV2, 17% for SPV 3 and 24% for SPV 12 and SPV 13, AER was at comfortable level of 3.07, 3.73, 2.99 and 3.05 times respectively. Additionally, it may be mentioned that data analysis of both SPV 2 and SPV 3 was done on ten years' time series. Analysis of annuity projects has shown positive ROE has been a challenge to high number of projects. *These results underline developers are having little interest for PPP road projects on annuity basis also due to subdued returns being generated by these projects.*

Figure: 7.4 BOT Annuity - ROE

Source: Based on author's examination of data

Discussion:

Analysis of BOT annuity projects in terms of the ROE generated by these projects highlights the challenges they faced in generating returns for developers. Four BOT annuity projects generated highest return of 11% among the sample of projects as seen from the analysis above. The present study identified out of sixteen BOT annuity projects including 3 projects having negative net worth, while only 7 projects could generate absolute average positive ROE, as summarized in the table below:

Table: 7.4 Analysis of BOT -Annuity

S.No.	Financial Position	Projects
1	Negative Net-worth some years of operations	3
3	Negative ROE	6
4	Absolute Positive ROE	7
Total		16

Source: Based on author's examination of data

The negative net worth getting generated in 3 annuity-based projects indicates weak financial profile of the project due to losses being incurred by them. The negative returns generated by these projects despite defined revenue stream highlights the

aggressive bidding in the projects, owing to which, positive returns are not getting generated. Annuity projects are bid-based, primarily on the minimum internal rate of return (IRR); a plausible reason could be an escalation in the project cost not being anticipated at the time of project bidding. Accordingly, if the bidder's cost calculations do not come up as planned, there is a possibility of the project generating negative or low returns for developers. Further, maintenance of project cost if more than anticipated and not fully reimbursed by the project awardee can further lead to losses for the SPVs.

Other possible explanation for weak performance could be projects bid aggressively by the corporates through their SPVs to award EPC contract to their in-house company in order to generate cash flows from the development of the project. Secondly, projects awarded helps the corporate involved to show higher order book consequently better valuation if the company is listed in the stock market. The EPC part of the project is rewarding for the corporates in the near term, which may result in ignoring PPP costing that has a long tenure in terms of pay back from investments. However, this aspect needs to be further researched in future studies in this sector.

Further, projects have been studied for concession period, ranging from 5-10 years; whereas the concession period for annuity projects may range in 15-20 years; thus, all returns getting generated could not be taken in the study due to lack of availability of data for tenure of the concession period, indicating thereby a limitation of the present study. With increasing availability of data for the concession period over a concession tenure, the study could be carried to see the returns being made from such projects and whether the present position of weak returns also holds for the total tenure of the concession period.

BOT Toll:

The panel of returns generated by BOT (toll) model for 40 projects is mentioned below along with the analysis of returns generated. It may be mentioned that six projects appearing s.no i.e., 4, 17, 19, 21, 28, 31, showed extreme variation primarily on negative parameters of NPM, AER and ROE, on account of steep changes in capital, turnover. Notably, these 6 projects have not been put under graphical

representation while analyzing returns generated by the project and treated as outliers. Accordingly, 34 SPVs on toll model have been taken for final analysis.

Table: 7.5 Panel Analysis for BOT (Toll)

Panel: B		BOT Toll			(Average Returns)	
S.No	Time Series (years)	Firm	NPM	ATR	AER	ROE
1	10	SPV 1	0.0779	0.2233	4.0371	0.0529
2	10	SPV 2	0.3667	0.3406	4.0572	0.3667
3	10	SPV 3	0.1094	0.1531	1.3597	0.0237
4	10	SPV	-1.6484	0.1180	1.3946	0.0937
5	10	SPV 4	0.6458	0.1101	1.6832	0.1206
6	10	SPV 5	0.5197	0.1159	1.6272	0.0986
7	10	SPV 6	0.2481	0.2698	2.1941	0.1520
8	10	SPV 7	0.4467	0.2502	1.5371	0.1919
9	10	SPV 8	0.5082	0.1256	2.1949	0.1268
10	10	SPV 9	0.0803	0.2110	14.1928	0.3026
11	9	SPV 10	0.0085	0.3546	3.5271	0.0169
12	9	SPV 11	0.0146	0.2549	3.0161	0.0289
13	9	SPV 12	0.0416	0.1533	1.3460	0.0787
14	9	SPV 13	0.0301	0.1056	19.8201	0.2513
15	9	SPV 14	-0.6131	0.1184	6.1897	-0.4347
16	9	SPV 15	0.1881	0.6256	1.3130	0.1236
17	8	SPV	-20.2840	0.0133	94.5169	-0.8024
18	8	SPV 16	-0.4647	0.0723	6.6319	-0.3229
19	8	SPV	-0.1704	0.1613	52.2056	-2.6261
20	8	SPV 17	0.0564	0.1425	5.6898	0.0546
21	7	SPV	-0.2242	0.0317	75.1177	-1.4517
22	7	SPV 18	-0.0927	0.0498	23.2875	-0.3335

Panel: B		BOT Toll			(Average Returns)	
S.No	Time Series (years)	Firm	NPM	ATR	AER	ROE
23	7	SPV 19	-0.0286	0.0432	11.5206	-0.0333
24	7	SPV 20	0.0624	0.4197	3.6384	0.0617
25	7	SPV 21	0.2617	0.1621	1.6060	0.1118
26	6	SPV 22	-0.0768	0.0558	19.9543	-0.1208
27	6	SPV 23	0.1229	0.1427	3.0186	0.0493
28	6	SPV	-1.0596	0.0255	119.1481	-0.4214
29	6	SPV 24	-0.2661	0.3172	5.4934	-0.1450
30	6	SPV 25	0.1514	0.3158	2.1486	0.0692
31	5	SPV	-1.2296	0.0475	7.0363	-0.3741
32	5	SPV 26	0.0827	0.0075	11.0821	0.0064
33	5	SPV 27	0.0116	0.0143	9.7355	0.0046
34	5	SPV 28	-0.0697	0.0409	14.3468	-0.1177
35	5	SPV 29	0.2174	0.2236	3.3422	0.1105
36	5	SPV 30	-0.1483	0.1535	7.6726	-0.1277
37	5	SPV 31	0.0984	0.4639	4.4537	0.1876
38	5	SPV 32	0.1120	0.4825	6.5969	0.2298
39	5	SPV 33	-0.2976	0.0816	3.8241	-0.0808
40	5	SPV 34	0.5643	0.2805	1.1303	0.1674

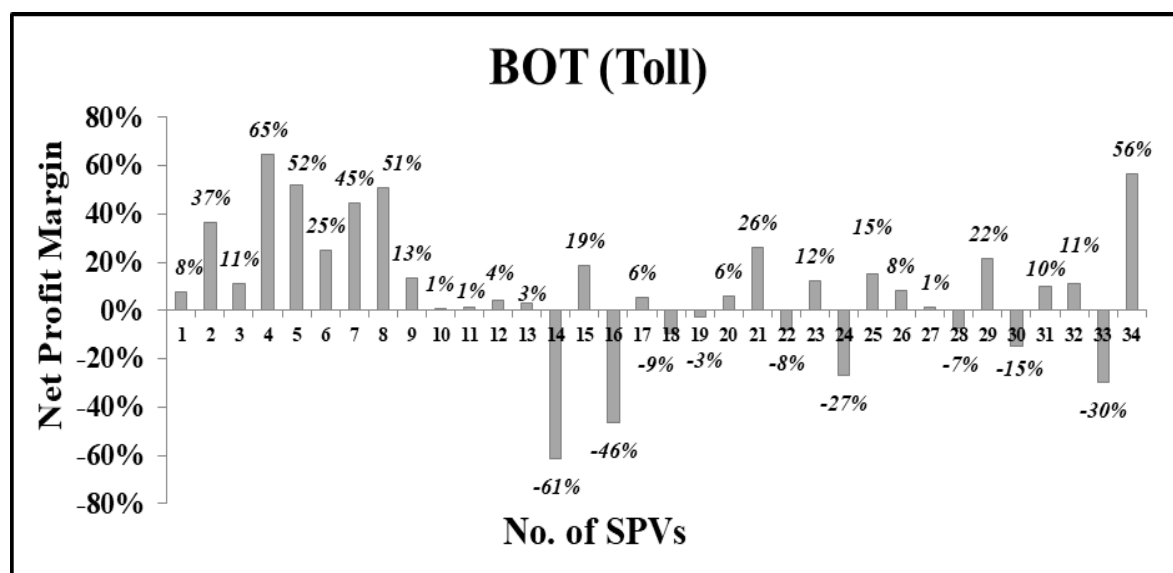
Source: Based on author's examination of data

Net Profit Margin (NPM)

NPM measures the relationship between net profits and sales of a firm (Khan & Jain, 2007). An examination of NPM of BOT (toll) highlights that projects do have potential to generate high NPM; however, at the same time, they are prone to higher negative returns. NPM measures return generated by company's assets representing difference between revenue and expenditure (Ramu & Satyanarayana, 2019). Twenty-five projects showed absolute average positive NPM with highest 65% for SPV 4.

Average ROE generated by SPV 4 was 12%. Nine projects showed average NPM being negative with highest negative NPM at (-61%) for SPV 14. Significant variation in profit margins in toll projects is primarily due to dependence on toll collections, which in turn, are influenced by factors such as demand environment, policy interventions, alternate routes for traffic etc.

Figure: 7.5 BOT Toll- NPM

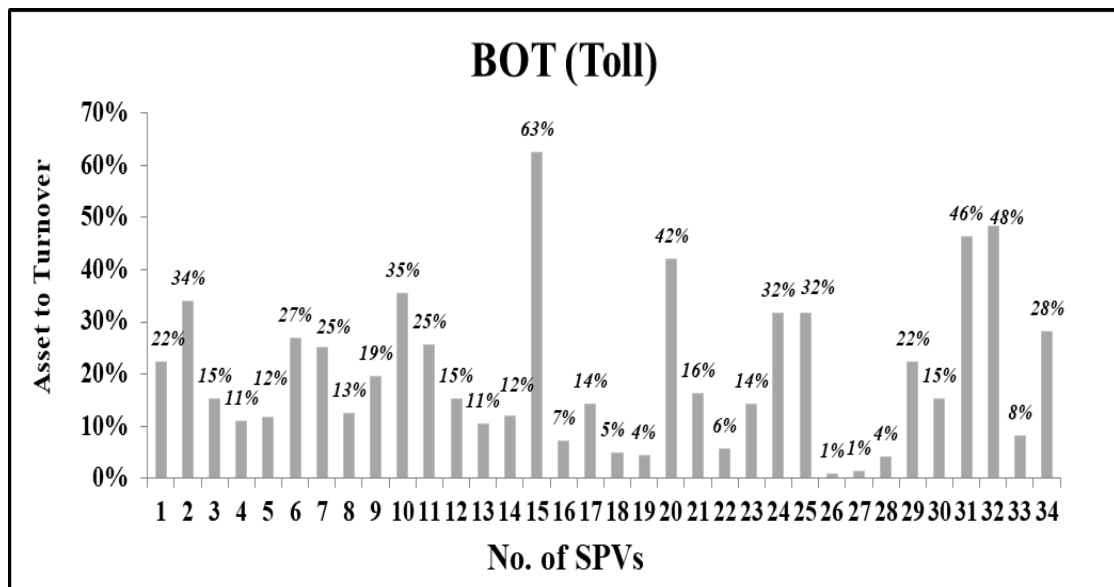


Source: Based on author's examination of data

Asset Turnover Ratio (ATR)

Road projects are largely capital intensive, as they involve high level of capital expenditure. Higher ATR indicates the effective use of assets to generate revenue (Tugas, 2012). ATR measures the efficiency of a firm in managing and utilizing its assets; higher the turnover ratio, the more efficient is the management and utilization of the assets (Khan & Jain, 2007). Average ATR ranged from 1% to 63% in case of BOT (toll) projects. Only eight projects showed single digit ATR ranging from 1% to 8%. SPV 15 had highest ATR of 63% with average ROE of the project at 12%. However, it may be mentioned that highest average ROE generated by SPV 2 i.e., 37% had average project ATR of 34%. *Thus, suggesting that highest ATR may not translate into highest ROE and the same results were observed in annuity projects also.*

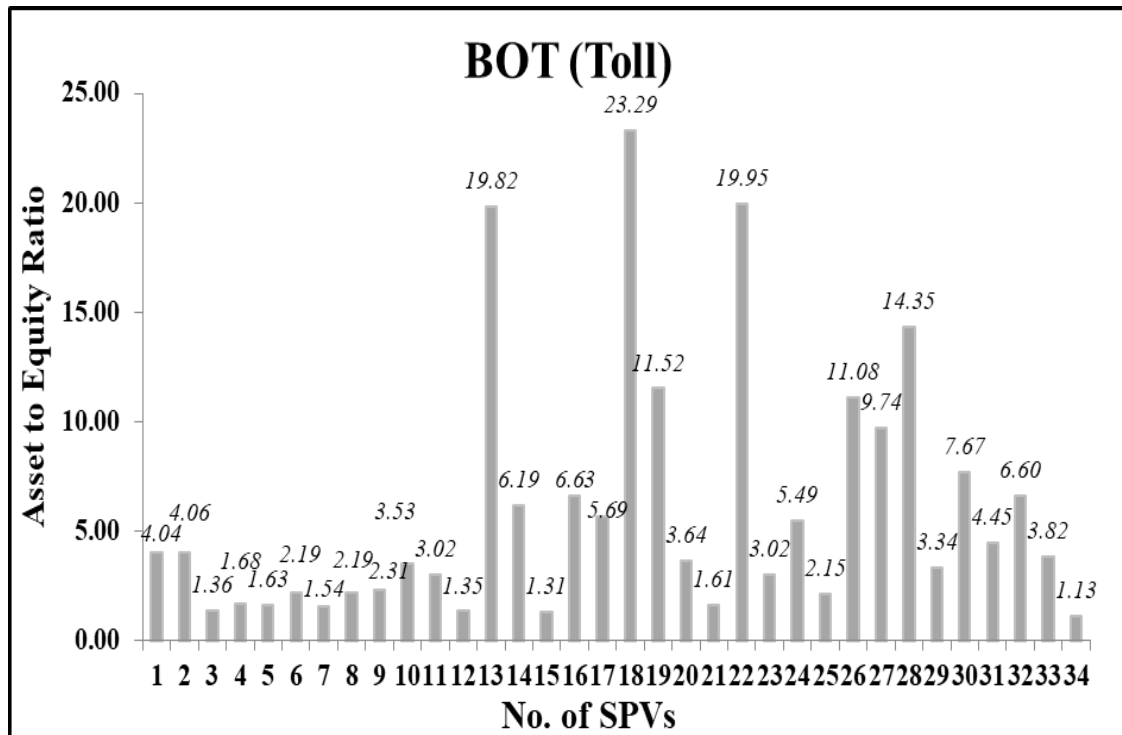
Figure: 7.6 BOT Toll- ATR



Source: Based on author's examination of data

Asset to Equity ratio (AER)

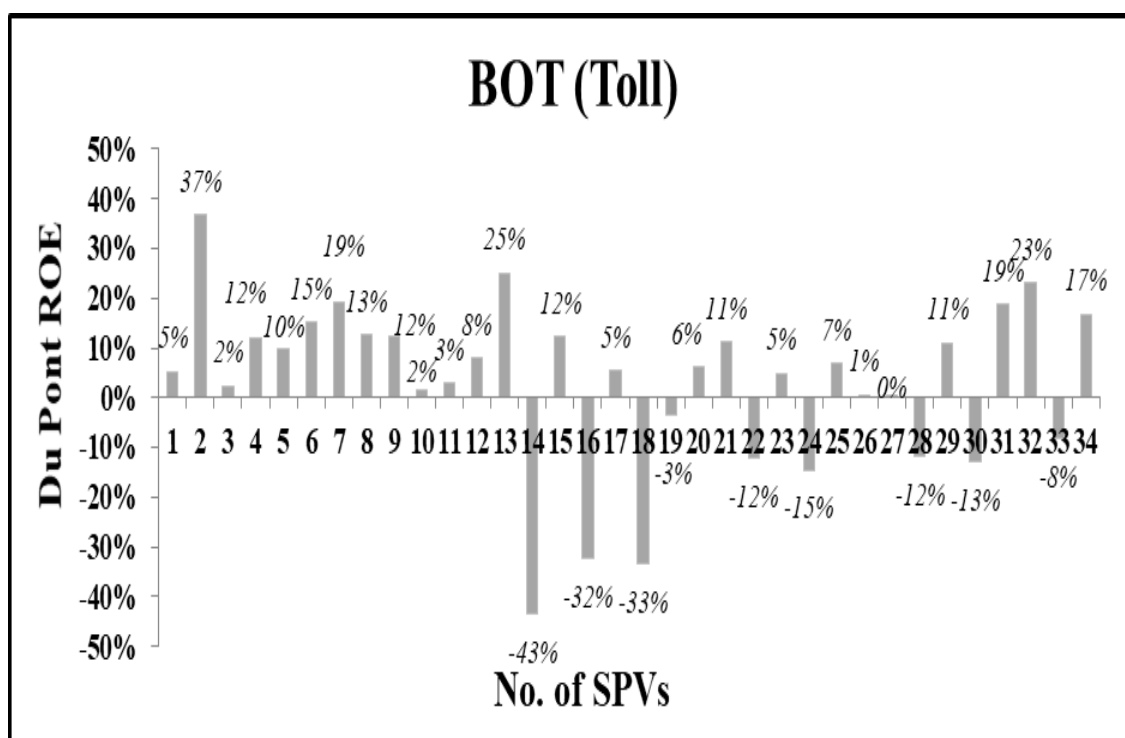
Private firms rely less on equity financing, because higher debt proportion leads to increased risk in an investment (Estache et al., 2007); this results in higher debt ratios (BRAV, 2009). Average AER or EM of BOT (toll) projects ranged from 1.13 to 23.29 times; Notably, most of the projects were in single digits. EM measures the proportion of assets to the company's equity (Khan & Jain, 2007). AER ranged from 1.13 to 23.29; six AER projects was in double digit, ranging from 11.08 to 23.29. Twenty-eight projects showed single digit AER ranging from 1.13 to 9.74 times. Toll-based projects can have low EM, provided there are higher accruals / retained earnings from the profits generated by these projects. Increased profits strengthen reserves of SPVs resulting in lower AER. Higher AER can be attributed to lower level of profits or reserves with the company, resulting in an increased AER ratio. SPV 18 showed highest average AER of 23.29 and ROE in the said case was negative (-33%), confirming thereby higher AER is due to weak ROE of the project. SPV 2 with highest average ROE of 37% had an AER of 4.06; *thus, underlying that increased profitability of the SPV ensure strengthening of reserves and resulting in lower AER.*

Figure: 7.7 BOT Toll- AER

Source: Based on author's examination of data

Return on Equity (ROE)

Average ROE of annuity-based projects was found to be lower than that of toll-based projects for the sample period. Out of the 34 toll projects examined, 25 projects generated positive ROE with maximum ROE of 37% for SPV 2. Two Project SPV 26 and SPV 27 showed positivity at zero decimal level at a range of 0.0064 and 0.0046 respectively. Fourteen ROE projects were in double digit figures, ranging from 10% to 37%. Nine projects generated ROE with negative figures, ranging from negative (-3%) to (-43%). SPV 2 with highest ROE of 37% had strong NPM of 37% with higher ATR ratio at 34% and comfortable AER of 4.06 underlying better financial performance. *As in the case of annuity project, highest returns generated had a data series of ten years; SPV 2 generated the highest return on the toll model. Higher time series shows better results, which may highlight that competitive intensity of the projects in the subsequent years, was more resulting thereby in lower returns for the projects. However, this may require closer examination in future studies with larger data set.*

Figure: 7.8 BOT Toll- ROE

Source: Based on author's examination of data

Discussion

Some of the BOT Toll projects were able to generate high returns, as seen from the analysis above. However, out of 67 BOT Toll projects whose financials were examined initially, only 23 of them could generate absolute average positive ROE as summarized below:

Table: 7.6 Analysis of BOT -Toll

S.No.	Financial Position	Projects
1	Negative Net worth some years of operations	27
2	Outlier	6
3	Negative ROE	9
4	Absolute Positive ROE	23
5	positivity at zero decimal level	2
Total		67

Source: Based on author's examination of data

The negative net worth getting generated in 27 toll-based projects indicates weak financial profile of the project due to losses being incurred by them. This analysis underlines the headwinds in terms of financial performance faced by the road projects under BOT Toll mode in India.

Summary of Financial Analysis of BOT Toll and Annuity Models:

Final analysis was carried out for 47 projects (Toll- 34 and Annuity-13). Out of 34 Toll -based projects, 2 projects i.e., SPV 26 and SPV 27 showed positivity in ROE at zero decimal level, at range (0.0064) and (0.0046); while 9 projects generated ROE with negative figures ranging from (-3%) to (-43%). A total of 23 toll-based projects showed absolute positive ROE, ranging from 1% (SPV 10) to as high as 37% (SPV 2). Further, out of 13 BOT annuity projects, seven could generate absolute average positive ROE with highest ROE of 11% for (SPV 2, SPV 3, SPV 12 and SPV 13). Six projects generated ROE with negative figures ranging from (-1%) for SPV 8 to (-35%) for SPV 10. The financial analysis of SPVs executing projects on both toll and annuity models underlines that the performance of the road projects largely has not been positive for all the projects concerned.

BOT Toll projects profitability in terms of ROE was higher than the BOT Annuity projects at the same time losses in these projects were also more than the Annuity based projects, primarily due to the dependence on toll collection for the revenue generation. Projects under both BOT Toll and BOT Annuity models have faced profitability challenges highlighting the inherent risks faced by these projects.

The possible explanation for the performance challenges were highlighted on the road development under PPP by (Koul et al., 2021) as land acquisition, resourcefulness of developers, estimation of traffic volumes, along with policy issues, project execution & operations and revenue fructification etc.

Furthermore, aggressive bidding of the projects in terms of getting opportunity to get EPC contract awarded to their in-house company in order to generate cash flows from project development could not be ruled out. However, this aspect needs to be further researched in future studies within this sector. According to Niti Ayog “Data shows over 70 per cent of the projects awarded in the highway sector are with 30-40 development companies (NITI AAYOG).

Road projects executed under traditional BOT model have faced execution / viability challenges. Thus, financial ability of the private players to take up projects under traditional BOT models has got constrained. Lenders are extending financial assistance to those projects, where they perceive the promoter to be financially strong and able.

In the present study projects for concession period ranging from 5-10 years were studied; whereas concession period for toll projects generally ranges from 15-30 years. As returns over the concession tenure could not be examined due to these PPP projects not having a long history in India. In the future studies, with increasing availability of the data the returns could be examined over entire concession tenure of the SPV projects.

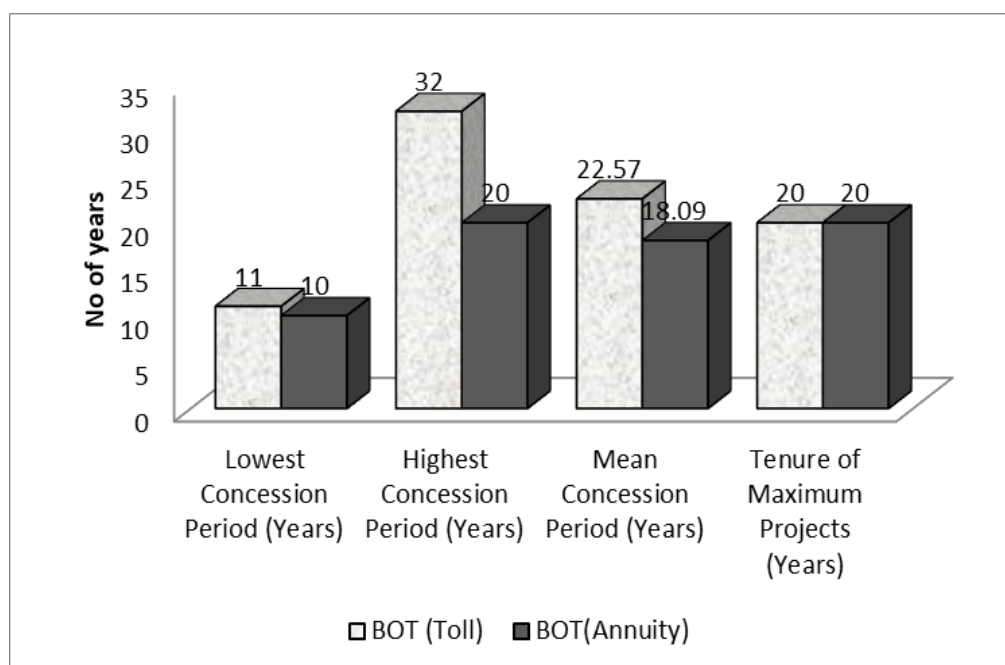
7.5 Analysis of Concession Period of SPVs:

The concession period refers to the tenure for which, the concessionaire has the right to operate the asset. The ideal concession tenure should help the developer to generate commensurate returns for the investments done in the project. Whereas in the case of toll-based projects, returns are dependent on the vehicular traffic, while in annuity-based projects, revenue streams are paid by the awarding agencies i.e., government institutions. Project developers are expected to recover their investment and generate returns during the concession tenure of the project. Notably, the concession period for PPP projects should be higher to compensate for the risk undertaken, as demand estimation is difficult, especially in green-field projects (Vives et al., (2006). Moreover, it may be noted that in India, toll- based PPP projects in comparison to annuity projects are longer (Mangu et al., 2021). Thus, it is important that developers are able to generate adequate returns from PPP projects for them to continue investing. Accordingly, adequate concession tenure is critical for the success of PPP road projects.

Analysis of the concession period has been carried out in the present study to understand the average tenure of concession period in case of BOT (Toll) and BOT (Annuity) model, vis a vis their influence on the selection of type of the PPP model. Data for the concession periods have been taken from the information available on the company and NHAI website. Sample of 189 BOT projects (Toll-

150 & Annuity-39) have been taken to analyze the concession period. This study analyzed concession parameters, such as highest, lowest, average concession Period and tenure of the maximum projects. The comparative analysis of concession period is mentioned below:

Figure: 7.9 Analysis of concession period



Source: Based on author's examination of data

BOT (Toll) Projects:

BOT (Toll), majority of the projects had tenure of 20 years; however, there were substantial number of projects with tenure of thirty years & above. The mean concession period of 22.57 years suggests that the BOT (Toll) projects have higher concession period. The concession tenures were larger than BOT (Annuity), as toll projects are expected to provide upside to the developers for taking toll collection risk. Lowest concession period for toll projects was 11 year and maximum tenure was 32 years.

BOT(Annuity) Projects :

As in the case of BOT Toll projects, annuity projects also had maximum number of projects with concession tenure of 20 years. The average concession period of 18.09

years in annuity projects was less than the toll-based projects. Notably, the lowest concession period for annuity project was 10 years.

Discussion

Concession tenures were observed to be higher in case of toll based projects in comparison to the annuity based projects in the analysis. Higher concession period for BOT (Toll) projects could be explained as toll projects are expected to bear the revenue risk accordingly, they have a larger concession period to mitigate the unforeseen changes in the revenue from toll collection, and incentivize the developers for taking risk of developing project. Annuity concession tenure is influenced by the period for which, the annuity paying agency, which is usually the government institution wants to elongate its liabilities in terms of annuity installments to be paid to the developers.

Further, fixation of the concession tenure also must take into consideration the developer, specifically for annuity projects. This is because the developer would obviously like to get its investments back along with financial returns on the shortest tenure. Excessively large concession periods may result in a situation where annuity projects may not attract developers. Accordingly awarding agencies need to maintain a balance between its financial commitments and the developer's desire for shortest payback period.

7.6 Results and Findings

- a) The study observed that policy and regulatory issues require continuous improvement to make PPP road development a success in India.
- b) The study concludes that the type of PPP models did not impact financial performance, mainly because, both toll and annuity-based SPVs/firms were impacted by negative returns.
- c) The study validates that within the PPP mode of road infrastructure development, the concession tenure of a project is influenced by the type of the PPP model, especially since the concession tenure of the toll-based projects were observed to be higher than the annuity-based projects.

CHAPTER 8

DISCUSSIONS & IMPLICATIONS

8 Discussions & Implications

The study attempted to examine the policy and regulatory framework of PPP projects in the road infrastructure sector in India. Research gap in terms of comparative financial analysis of PPP Models i.e., BOT- Toll and BOT- Annuity in road infrastructure development projects in India along with analysis of their concession tenures has been attempted.

Development of road projects under PPP entails execution of multiple projects in efficient and timely manner, with limited support of the state in terms of financial resources. PPP projects are expected to result in better risk allocation, as the developer and awarding agencies bring in their respective strengths. A private developer for instance, brings in project execution skills, coupled with efficient allocation of resources in order to create the road asset. The awarding agency, which is usually the government body, identifies the road stretch, and is expected to facilitate regulatory clearances (e.g., environmental issues, land acquisition); and this indeed has been a major challenge in India.

Selection of developers with strong execution skills, financial resources coupled with, enablers in terms of facilitation by the awarding agencies in terms of land acquisition, utility shifting, robust DPRs would go a long way in successfully developing PPP projects. Moreover, there would be lesser project related surprises at the time of executing the project. Notably, smooth collection of tolls can help in reviving the interest in traditional form of PPP development under both toll and annuity mode. Additionally, robust substitution framework could mitigate to a considerable extent developer/ promoter related execution risks for timely completion of projects.

India needs to encourage PPP due to huge requirement of road development with each region of the country exhibiting different socio-economic characteristics of development. Therefore, in a country like India, development of newer models like

(Hybrid Annuity), (BOT + Annuity), TOT model and InvIT structure are welcome steps in meeting the road development requirement. Introduction of newer PPP models are expected to generate resources for future funding of road projects.

Analysis of the financial performance on BOT Toll and BOT Annuity models highlights that financial performance of road projects executed under PPP has not been a success at all instances. The possible explanation for weak performance could be attributed to aggressive bidding in the past for these projects. The developers possibly awarded EPC contract to their in-house companies in order to generate cash flows from project development activity. Thus, it helped the corporate involved to show higher order book and better valuation if the company is listed often ignoring the profitability of the SPVs. However, this aspect needs to be further researched in future studies in the sector.

SPVs executing road projects under PPP mode create long-term economic asset with revenue generation in the form of both toll and annuity. Commercially operational road assets attract long-term funds (e.g., pension & insurance, and sovereign wealth funds) to replace the promoters' risk capital helping in the process in deleveraging the balance sheet of the corporates involved in executing the road assets under PPP.

New class of developers for PPP road projects should be encouraged, especially with ones that do not have their own EPC business. These developers can take a long-term view of the road projects without looking at short-term benefits in terms of getting EPC business for the parent company. The project awarding agency can initiate this by keeping a few projects reserved for such class of developers, as the margin in business for such developers is expected to be lower, as they do not get any benefit in terms of margin on EPC business. In fact, this measure would help in deepening the PPP model for the road development sector in India.

PPP as a mode of infrastructure development has significantly contributed to the development of road infrastructure in India. However, it is facing significant headwinds, owing to which, it is not expected to replace traditional EPC framework for road development. Presently due to the lower interest shown by developers, government agencies are executing projects on traditional route of EPC with a hope to monetize them at later stage by way of InvIT structure or TOT model.

The present study analyzed the concession periods, ranging from 5-10 years, while in reality a concession period typically ranges 10-32 years, depending on the model. Hence, all returns getting generated could not be captured due to lack of availability of data for the complete tenure of the concession period. Going forward with increasing availability of data, future studies could be broadened to see returns being made on the projects' life-cycle. Analysis of PPP road projects under both toll and annuity models highlighted that both have had their own set of challenges in generating returns on equity. BOT Toll projects profitability in terms of ROE was higher than the BOT Annuity projects at the same time losses in these projects were also more than the Annuity based projects, primarily due to the dependence on toll collection for the revenue generation. Annuity projects, despite having defined revenue streams were impacted by negative returns. Generation of positive ROE by PPP road projects would thereby be important catalysts for future development of road assets under PPP in India. Further, analysis of the concession tenures highlighted that the concession tenure of the toll-based projects is more than the annuity-based projects. The need for longer tenure in toll-based projects is to mitigate the revenue risk. The shorter tenure for annuity-based projects signifies the desire of the developer to have lower pay back period for the investment made in the project.

8.1 Theoretical contributions and limitations

The study has attempted to examine the policy and regulatory challenges faced by PPP projects under road sector in India. Infrastructure policymaking demands policy integration across government departments that otherwise operate in policy silos (Keele & Coenen, 2019). It is important that private sector involved in road sector should not be viewed as only financers of critical infrastructure. Private sector should be treated as a key stake holder and adequately compensated for the risk undertaken by them. Role of the policy support to make PPP a success has been highlighted by the various studies i.e. (Devkar & Kalidindi , 2013), (Drike & Sinha, 2003), (Maniar, 2013), (Estache et al., 2007), (kalidindi & Singh, 2009). (Fisher & Babbar, 1996), (Pathak , 2011).

The study has findings in terms of no impact of the type of PPP models i.e., BOT Toll and BOT Annuity on the financial performance of the projects. SPVs executing road projects under toll and annuity models are facing financial performance challenges. It

may be mentioned that SPVs executing projects under Annuity model despite of defined revenue streams are facing profitability issues. The financial performance across various industries have been studied by the researchers in the past (Bhagyalakshmi & Saraswathi, 2019), (Sheela & Karthikeyan, 2012), (Herciu et al., 2010). However, study on the financial performance of the firms in the road sector under PPP are scant.

The present study based on the analysis of concession tenures of the sample SPVs executing road projects under PPP has validated that the type of PPP model is influenced by the concession tenures. (Mangu et al., 2021) in research has observed that the toll-based PPP projects in India in comparison to annuity are longer in tenure. The importance of concession tenures in PPP has been highlighted in the past by (Kulkarni, 2009) (Hill, 2011), (Vives et al., (2006).

In terms of the limitations, it may be mentioned that BOT Toll and BOT Annuity projects studied for concession period ranging from 5-10 years whereas concession period for PPP projects range typically from 10-32 years depending on the kind of model. Thus, all returns generated during the concession tenure of the project could not be taken in the study due to constraints of data availability. However, going forward with increased availability of data over the concession tenure, future studies could explore and analyze returns over a project's life-cycle. This would help to assess whether the present position of weak returns across PPP models also holds good for total tenure of the concession period. Further, the Hybrid Annuity Model (HAM) could also be introduced in future studies after availability of a sufficient sample size for research.

SUMMARY

S. No.	Summary of the empirical study
Objective 1	To study the policy, regulatory framework and the contribution made by the PPP projects in the road infrastructure sector development in India
1.1	Policy and regulatory issues require continuous improvement to make PPP road development a success in India.
1.2	The key parameters impacting the road development under PPP in India were identified as stable macro-economic environment, promoter and equity related challenges , substitution of promoters, avoidance of aggressive bidding for projects , land acquisition challenges, environmental challenges, design changes at the time of implementation of the projects, Right of way on the project site, shifting of utilities , resistance to payment of tolls, inadequate traffic estimations, single interface for the projects, allowing renegotiation of the contract, lack of dedicated institution for funding of road sector, challenges in financial closure of the road projects, avoiding development of competing roads, compensation to developers for delays not attributable to them, need for developed bond market for financing. Majority of the parameters mentioned above required continuous policy level initiatives to make PPP road development a success in India. Transport projects are influenced by factors beyond managerial abilities (Roumboutsos and Pantelias, 2019).
1.3	To make PPP road development attractive for the investor's newer models like hybrid annuity and TOT models have been introduced by the awarding agencies in India. Further tax efficient InvIT structures have been formulated to attract long term funds into road assets.
Objective 2	To undertake a comparative analysis of BOT (Toll) & BOT (Annuity) PPP models and their impact on the financial performance of the firms engaged in the road infrastructure development projects in India
2.1	Financial performance analysis with the help of Du Pont model

	highlighted that BOT Toll and BOT Annuity models have faced performance challenges, accordingly the type of model did not impact financial performance. Since both toll and annuity based SPVs/Firms were impacted by negative returns.
2.2	Out of 83 projects (BOT Toll 67 & BOT Annuity 16) for which initial financial analysis was done. Toll-based 27 and Annuity based 3 projects showed negative net worth in some of the years of operation. Hence the said projects were excluded from the analysis as in the case of negative net worth projects, the DU Pont analysis was not feasible. Further 6 projects were excluded as outliers due to uneven ratios generated by them. Final analysis was carried out 47 projects (Toll- 34 and Annuity-13). Projects with negative net worth and negative ROE were found in both toll and annuity models, thus highlighting financial performance challenges faced by PPP development in road sector in India.
Objective 3	To analyze the influence of the concession tenure on the type of PPP models.
3.1	The type of PPP model for road infrastructure development is influenced by the concession tenure. BOT toll-based projects, concession tenures were observed to be higher than the annuity based in the present study. In India toll-based PPP projects in comparison to annuity projects are longer (Mangu et al., 2021).
	Higher concession period for BOT (Toll) projects is primarily due to the revenue risk. Accordingly, they have larger concession period to mitigate the unforeseen changes in the revenue from toll collection and incentivize the developers for taking risk of developing project. Annuity concession tenure is influenced by the period for which the annuity paying agency which is usually the government institution wants to elongate its liabilities in terms of the annuity installments. Besides, the concession tenure is also influenced by the desire of the developers to have lower pay back period for the investments made.

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S.No.	Company	Web source for information on Company/SPVs/Financials
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2	Larsen & Toubro Ltd	https://www.larsentoubro.com/ accessed on multiple dates.
3	IRB Infrastructure Developers Ltd	https://www.irb.co.in/home/ accessed on multiple dates.
4	Ashoka buildcon Ltd	https://ashokabuildcon.com/ accessed on multiple dates.
5	IL&FS Transportation Networks Ltd	http://www.itnlindia.com/ accessed on multiple dates.
6	Reliance Infrastructure Ltd	https://www.rinfra.com/ accessed on multiple dates.
7	Welspun Enterprises Ltd	https://www.welspunenterprises.com/ accessed on multiple dates.
8	JMC Projects (India) Ltd	https://www.jmcprojects.com/ accessed on multiple dates.
9	Hindustan Construction Company Ltd	https://www.hccindia.com/ accessed on multiple dates.
10	Gammon India Ltd	http://www.gammonindia.com/home/gammon-india.htm , accessed on multiple dates.
11	Madhucon Projects Ltd	http://www.madhucon.com/ accessed on multiple dates
12	Sadhbav Infrastructure Ltd	https://www.sadbhaveng.com/ accessed on multiple dates.
13	KMC Constructions Ltd	http://www.kmcconstructions.com/ & http://kmcgroup.co.in/about-us.html accessed on multiple dates.
14	Oriental Structural Engineers Pvt Ltd	https://www.orientalindia.com/ accessed on multiple dates.

15	DiliP Buildcon Ltd	https://www.dilipbuildcon.com/ accessed on multiple dates.
16	Ramky Infrastrcture Ltd	http://ramkyinfrastructure.com/ accessed on multiple dates.
17	Gayatri Projects Ltd	https://www.gayatri.co.in/ accessed on multiple dates.
18	KNR Constructions Ltd	http://www.knrcl.com/ accessed on multiple dates.
19	Navayuga Engg Company Ltd	http://www.necld.com/ accessed on multiple dates.
20	Essel Infra projects Ltd	http://www.esselgroup.com/essel-infraprojects-limited-eil.html/ accessed on multiple dates.
21	PNC Infratech Ltd	https://www.pncinfratech.com/ accessed on multiple dates.
22	Simplex Infrastructure Projects Ltd	http://www.simplexinfra.com/ accessed on multiple dates.
23	Soma Enterprises ltd	https://www.soma.co.in/ accessed on multiple dates.
24	GVK	https://www.gvk.com/ accessed on multiple dates.
25	Bharat Road network Ltd	https://www.brnl.in/ accessed on multiple dates.
26	G R Infraprojects Ltd	https://grinfra.com/ accessed on multiple dates.
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28	IVRCL infrastructures & Projects Ltd	http://www.ivrcl.com/ accessed on multiple dates.

ANNEXURE I

Build and Transfer (BT) Model:

It is a contractual agreement whereby the concessionaire undertakes the financing and construction of a given infrastructure or development facility. After completion the said facility is transferred to the government agency, which pays the proponent on an agreed schedule its total investments expended on the project, plus a reasonable rate of the return.

Advantage (BT):

- a) Faster implementation of the project: Since private agencies can take up the project on priority and they may not have to go through the execution challenges and inordinate delays which usually a public sector agency faces in execution of the projects. Public agencies while executing projects usually experience bureaucratic and procedural delays.
- b) Defined revenue stream for the contractor: In this model contractor does not bear any demand risk. The contractor gets defined revenue from the project.
- c) Accessibility to easier bank finance terms: In this model since the revenue risk is not there as the state is paying money to the contractor of the project, bank finance could be arranged at competitive rates.

Disadvantages (BT):

- a) Higher cost of development: In this model cost of development will be higher than the execution under EPC Contract as financing cost is to be built into the final cost of the asset created.
- b) Project dependent on Quality of developer: In this model quality of the developer in terms of execution skills are paramount for timely implementation of the project. If the developer selected is not competent to execute the project in timely manner same will result in project delays.

Build-Lease and Transfer (BLT) Model:

It is a contractual agreement whereby a concessionaire is authorized to finance and construct an infrastructure or development facility and upon its completion turns it over to the government agency or local government unit concerned on a lease arrangement for fixed period after which ownership of the facility is automatically transferred to the government agency or local government.

Advantages (BLT):

- a) **Faster Implementation:** This model helps in speedier execution of the project. Once facility is ready for operation it is handed over to the public agency for a fixed lease period. At the close of the lease term facility is transferred to the public agency.
- b) **Defined revenue stream for the contractor:** In this model firm executing the projects can get revenue for a fixed period after which the asset is transferred to the public agency.
- c) **Accessibility to easier bank finance terms:** In this model since demand risk is not on the developer hence better credit terms from the bankers can be obtained for building up of the asset.

Disadvantages (BLT):

- a) **Higher cost of development:** In this model also cost of development will normally be higher than EPC contract as financing is to be arranged by the developer for the complete project.
- b) **Implementation risk:** This model bears implementation risk if the selected contractor is not having requisite expertise in development of the project being awarded.

Build-Own-Operate and Transfer (BOOT) Model:

A project based on granting a concession by a principal (the Union or Government or a Local Authority) to the concessionaire, who is responsible for the construction, financing, operation, and maintenance of the facility over the period of the concession

before finally transferring the facility, at no cost to the principal, as a fully operational facility. During the concession period the promoter owns and operates the facility and collects revenue in order to repay the financing and investment costs, maintain and operate the facility and make profit.

BOOT type of projects are just like BOT projects with similar advantages and disadvantages. The main difference in this model in comparison to BOT model is in terms of ownership. In case of BOOT model contractor of the project is its owner till the time the asset gets transferred back to the public agency. BOOT kind of model sometimes gets awarded due to legal requirements.

Build-Own and Operate (BOO) Model:

A contractual arrangement whereby a concessionaire is authorized to finance, construct, own operate and maintain an infrastructure or development facility from which the proponent is allowed to recover its total investment, operating and maintenance costs plus a reasonable return thereon by collecting tolls, fees, rentals, or other charges from facility users.

Advantages (BOO):

- a) Ownership remains with the developer: Ownership of the project remains with the concessionaire and he continues to operate the asset without the same getting transferred to the public agency.
- b) Economical for the consumer: Since ownership of the asset remains with the developer, he can generate long term cash flows from the project therefore might charge less fee to the end consumer.
- c) Better quality: Since private developers know that the asset is going to remain with him for its life time, he will ensure that the quality of asset created is good.

Disadvantages (BOO):

- a) Asset does not get transferred to the state: In BOO model asset will remain perpetually with the private entity. This result in loss of opportunity for the state as the asset will never in its life time come back to state.

- b) Leverage with the developer: The very fact of the asset remains in the hands of developer might create a situation where pricing of the user fee might become arbitrary if the same is not regulated or competition is not there for providing of the same service by another agency.

BOO kind of models are not very common in India. Such projects are likely to have expected rate of return less than the BOT (Toll) kind of project. BOO model may be a necessity where infrastructure is being created by incentivizing the builder by allowing him to keep the asset for its life time.

Build-Operate-Share-Transfer (BOST) Model:

A contractual arrangement whereby a concessionaire is authorized to finance, construct, operate and maintain share a part of the revenue and transfer the infrastructure facility at the end of the period. The proponent is allowed to recover its total investment, operating and maintenance costs plus a reasonable return thereon by collecting tolls, fees, rentals, or other charges from facility users.

Advantages (BOST):

- a) Opportunity to share revenue by Procurer: In this model certain portion of the revenue has to be shared by the concessionaire with the public agency during the currency of the contract period. NHAI in certain Indian road projects insists on the contractor to share revenue with the public agency. Contractor giving highest revenue share is awarded the project.
- b) Faster Implementation: In this model project gets implemented at a faster pace since it is in the interest of the contractor to start generating revenue from the asset being created. Faster completion of the project will lead to higher revenue collection as vehicular traffic may improve due to better road conditions.
- c) Better quality Asset: Asset quality created will be better. Since developer gets revenue from the project for the long time it is in his interest to create a long-lasting infrastructure asset.

Disadvantages (BOST):

- a) Higher cost of development: In this model cost of creation of asset will be more than a regular EPC contract. Since the financing cost, demand risk is to be borne by the developer besides execution risk.
- b) Problem of demand estimation: Since profitability of the project is arrived by the concessionaire based on demand estimate. If the actual demand is not as per the projected figure there will be question mark on the profitability of the project.

Build-Own-Operate-Share-Transfer (BOOST) Model:

A contractual arrangement whereby concessionaire is authorized to finance, construct, own operate and maintain, share a part of the revenue, and transfer the infrastructure facility at the end of the period. The proponent is allowed to recover its total investment, operating and maintenance costs plus a reasonable return thereon by collecting tolls, fees, rentals, or other charges from facility users.

In BOOST kind of structure, the revenue sharing with the public agency for the infrastructure being created is to be done for the awarded period. In this model the ownership of the asset is transferred to the concessionaire for the awarded period. Ownership transfer can be explained probably due to the legal requirements. This model has revenue share with the procurer.

This model has similar advantages and disadvantages as in the case of BOST expect that the asset ownership is with the developer till the same gets transferred back to the public agency at the end of the concession period.

Annexure II

Important Clauses in MCA

BOT (Toll) up to Rs 100 Cr	BOT (Toll) above Rs 100 Cr	BOT Annuity
Description of grant of concession period. Information about the project site.	Description of concession agreement. Scope of the project.	Definitions and interpretations of various terms used in the agreement.
Furnishing of Performance Security by way of bank guarantee by the concessionaire.	Grant of concession and the conditions relevant to the agreement. Furnishing of Performance Security by way of bank guarantee by the concessionaire.	Detail of Concession period. Acceptance of concession.
Fee to be levied by the concessionaire of the project.	Fee to be levied by the concessionaire of the project. Clause on additional toll way if allowed to be built by the awarding agency.	Project Site and details of handing over of the same. Right/ title and use of the project site. Possession and clearances.
Obligations & undertakings of concessionaire. Obligations & undertakings of awarding agency.	Obligations & undertakings of concessionaire. Obligations & undertakings of awarding agency.	Independent Engineer (IE) Procedure for appointment. Payments to be made to IE. Replacement and eligibility for reappointment of IE.

BOT (Toll) up to Rs 100 Cr	BOT (Toll) above Rs 100 Cr	BOT Annuity
Clause on appointment of Independent Engineer.	Clause on project development. Clause on operations. Clause on monitoring of project by independent consultant.	Concessionaire's obligations in term of furnishing of performance security. Arranging for financing. Preparation of drawings. Project implementation, operations, and maintenance. Shareholding of the concessionaire in the project SPV. No breach of obligations on account of: (a) Force Majeure Event, (b) NHAI event of default (c) Compliance with the instructions of the independent engineer/NHAI or directions of the government agency. (d) Emergency decommissioning of the project facilities. (e) Closure of the project facilities or part thereof in accordance with operations & maintenance requirements. (f) Closure of the project or part thereof with the approval of the independent engineer/NHAI. (g) Concessionaire's inability to remove any accident debris due to non-completion of any police/insurance related inquiry/ survey.

BOT (Toll) up to Rs 100 Cr	BOT (Toll) above Rs 100 Cr	BOT Annuity
Constituting of Steering Group.	Description on the financing arrangements for the project to be arranged by the concessionaire. Clause on revenue shortfall loan to be provided by NHAI the awarding agency in case of an indirect political event taking place which may have bearing on the revenue generating capability of the concessionaire.	NHAI's obligations to be fulfilled for the project to be executed by the developer.
Clause on Preparation of drawings as per the specifications and standards.	Clause on Escrow account to be opened by the concessionaire within the stipulated period from the date of agreement.	Change of scope in the project and the procedure to be followed for the same.
Clause on Procedures to be followed during project implementation. Operations phase.	Clause on the State Support Agreement (SSA) required to be entered with the respective state governments where the project is being developed.	Annuity details in terms of the payment to be made to the concessionaire.
Conditions on Financing arrangement for the project to be undertaken.	Clause on requisite insurance to be taken by the concessionaire to fulfill its obligations.	Levy and collection of fees rights of NHAI. Obligations on part of the concessionaire.
Clause on Payment of supervisory charges by the concessionaire. Clause on Payment of project implementation expenses to be borne by the concessionaire.	Clause on audited accounts to be provided by the concessionaire to NHAI the awarding agency. Clause on requirement from the concessionaire to maintain proper books of accounts.	Capacity augmentation clause in the agreement to give flexibility to the awarding agency to carry out further augmentation in the project even after COD (project completion date).

BOT (Toll) up to Rs 100 Cr	BOT (Toll) above Rs 100 Cr	BOT Annuity
Clause on requisite insurances to be obtained by the concessionaire.	Clause on Force Majeure which includes non-political event, indirect political event or political event.	Change in Law such as enactment of new Indian Law, repeal, modification or re-enactment of any existing law, change in tax rates, change in interpretation or application of any Indian law by court consequent relief or obligations on part of the concessionaire.
Change of Scope of work as desired by the awarding agency.	Clause on suspension and termination of the contract.	Force Majeure events and obligations on part of the parties involved.
Clause on capacity augmentation. Clause on additional facility in the project.	Miscellaneous clause covering defect liability. Assignment and charges, Change in law. Liability and indemnity, right and title over the site. Dispute resolution. Advertising on the site. Governing law and jurisdiction.	Event of default and subsequent termination on behalf of the awarding agency. Event of default and subsequent termination on behalf of concessionaire.
Clause on Force Majeure.		Mode of payment to be done by NHAI.
Events of default. Events of termination of the agreement.		Handbook of project facilities involves clause on hand back and defect liability period
Clause on change in Law and its impact on the concessionaire.		Appointment of independent auditor. Payment of fees.

BOT (Toll) up to Rs 100 Cr	BOT (Toll) above Rs 100 Cr	BOT Annuity
Clause on handover of project asset. Clause on defect liability period.		Dispute resolution having clause on amicable resolution, arbitration, enforcement of award, Performance during arbitration.
Dispute resolution mechanism. Procedures to be adopted by the parties concerned.		Representations and Warranties. Disclaimer on behalf of the concessionaire. Disclaimer on behalf of the NHAI. Obligation on part of the parties to notify the change.
Clause on representations. Clause on warranties. Clause on disclaimers.		Miscellaneous clause covering defect liability, assignment and charges, change in law, liability and indemnity, right and title over the site, dispute Resolution, disclosure, redressal of public grievances, advertising on the site, governing law and jurisdiction.
Miscellaneous clauses- such as clause on assignment and charges, liability and indemnity, advertising on the project site, governing law and Jurisdiction waiver, survival, amendments, notices, severability, no partnership, language, exclusion of implied Warranties etc.		

Source: National Highway Authority of India

LIST OF PUBLICATIONS

S. No.	Journal Publications
1.	Koul, P., Verma, P., & Arora, L. (2022). Calibrating Lenders' Concerns and Performance Issues in Road Infrastructure Projects under Public Private Partnership. <i>International Journal of Public Administration</i>, 1-11. Rank 'B' category journal in ABDC list of 2019.
2.	Koul, P., Verma, P., & Arora, L. (2021). Road infrastructure development under PPP model in India: a credit rating perspective. <i>Built Environment Project and Asset Management</i>, 11(2), 266-283. Rank 'B' category journal in ABDC list of 2019.