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Why PPP Modeled Infrastructure Projects Failed:A Critical Review with a Special Focus on Road Sector

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Abstract*—Infrastructure is the back bone of economic development of any Nation. Road infrastructure plays key role for trade and commerce, connecting the production and consumption centers. Road and transportation infrastructure construction is highly capital intensive, wherein the government alone cannot meet its ends and initiated Public Private Partnership (PPP) for its execution right from planning and designing to its maintenance through various PPP models. Over the last few years many of the awarded roadprojects through PPP modelare stalled citing various reasons. This technical paper analyses the risk factors associated with PPP –toll operated road projects through case studies and suggested corrective measures like shadow tolling and hybrid models for restoration of PPP.*

Keywords— PPP in Highway Projects, Risk factors, Shadow Tolling, Hybrid Models.

I. INTRODUCTION

India's growth-story in recent years is a most phenomenal development in the world economy. Historically Indian economy has been a consumption driven and showing tremendous growth over the last two decades demanding large investments in infrastructure. In order to sustain growth in future, Government alone cannot fund such large investments in infrastructure projects and participation from private agencies is imperative. Initiatives from the government have led to increasing private sector participation in India's infrastructure development.

Roads especially expressways, highways & rural roads are the most critical part of infrastructure that aims directly improving connectivity from consumption centers to production centers across the country bridging the industry and agriculture for the improvement of trade and quality life of its citizens. The National Highways Authority of India (NHAI) - the nodal agency for ensuring rapid development of roads in the country has made PPP the preferred modefrom National Highway Development Programme (NHHDP) phase-III for most of its projects. Road Projects execution under PPPmodel,take much lesser time to complete and the Government does not have to bear cost over-runs where it plays a regulatory role.

Over the last half decade many of the road infrastructure projects have been stalled, abandoned or terminated either by the sanctioning authority or by the concessionaire due to various reasons. The reasons could be clearances on land and forest, non availability of aggregate due to ban on mining, or the financial risk or the cost overruns. Stalling of these projects has huge negative repercussion on the employment and growth. In this paper a critical examination of PPP models and the reasons for the failure of the projects initiation, is carried to suggest measures for its restoration.

Public Private Participation in Highway Sector:A Public Private Participation (PPP) is a consideration between government & private sector entity for public asset creation or public service delivery for specified period of time and performance measurable by public entity or its representative. As infra-projects are highly capital intensive, the PPPsarrangement helpsgovernments to meetits demands for the development of modern and efficient facilities, infrastructure and services while providing value for taxpayers[1].

II. OBJECTIVES OF PPP

- Harness Private Sector efficiencies
- Focus of Life Cycle approach for development of any project
- Innovation and Technological improvements
- Provision of affordable and improved services

Essential Conditions of PPP

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- Investments made by private sector entity
- Risk sharing with the private sector
- Performance linked fee payment structure &/or through user charges
- Conformance to performance standards

Table Different PPP Models

Design-Build (DB)	**Design Build-Operate (DBO)**	**Operation & Maintenance Contract (O & M)**	**Design-Build-Finance-Maintain (DBFM)**	**Design-Build-Finance-Operate-Transfer(DBFOT)**
Build-Own-Operate (BOO)	Build Operate Transfer (BOT)	Build-Own-Operate-Transfer (BOOT)	Buy Build Operate (BBO)	Build-Own-Lease-Transfer (BOLT)

Merits of PPP Models

- Easing Budgetary Constraints
- Value for money issue
- A realistic control of cost
- A streamlined construction schedule and reliable project implementation enable enhanced economic development
- Assets creation, maintenance and service delivery
- Set on sustainable and environmentally - Compatible development
- Social benefits
- Transparency
- Transfer of technology
- Project stability
- Focusing the Role of Public Authority on its Regulatory function

Demerits:

- Both the public entity and the private firm is seeking to gain from the relationship-user ends up paying more
- Involves high risk level
- Long term contracts not reliable

Most of the Public Private Partnership (PPP) projects in Highways sector have been implemented on the Design-Build-Finance-Operate-Transfer (commonly referred to as DBFOT or the BOT model).The matrix below Table-1 explains the fundamentals of this model with respect to the traditional Engineering Procurement Construction (EPC) mode of awarding infrastructure development works:

Table: 1 Responsibility Matrix for EPC Vs DBFOT

Responsibility Matrix	**Who designs**	**Who finances**	**Who constructs**	**Who operates and maintains**	**Who owns land and assets**	**Will the asset be transferred back?**
Normal EPC	Government	Government	Private	Government	Government	NA
DBFOT	Private	Private Gets toll collection Rights	Private	Private (Till the Concession Period)	Private	Government End of Concession

One of the advantages of BOT model is that it takes the infrastructure financing load off from the Government balance sheet.When the projects are notviable for private participation, Government funding and liability in the form of Viability Gap Funding(VGF) is contributed and is restricted to a max of 40% of the project cost or the Annuity payments depending on whether the Project is implemented as BOT Toll or as BOT Annuity[2].

Projects Awarded under PPP Model but could not be initiated: As per the estimates of Working Group on Central Road sector that the targets set for the year2017 would be 85,000 km. It could be possible only through PPP model. PPP in highways started with the NHDP Phase-III. While the projects under NHDP Phase-I and Phase-II were predominantly implemented under the engineering procurement and construction (EPC) mode. Between2005-

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12, about 40,000 km of road was awarded to different concessionaires, out of which about 25,000 Km of road network is yet to commence its execution due to various reasons. Besides NHDP programme, 15 states awarded about 173 State Highway projects amounting to 80,000 cr (in which UP's Yamuna Expressway worth 30,000 is an important project) are in the process of execution are, too facing some hurdles[3].

Risk Factor in PPP: Risk is a threat or probability that an action or event will adversely or beneficially affect an organization's ability to achieve its objectives. Also risk is *'Uncertainty of Outcome'*, either from pursuing a future positive opportunity, or an existing negative threat in trying to achieve a current objective.

Various Risks in Road Infrastructure PPP projects:

A. Pre-operative task risks

- **Delays in land acquisition:**landis unavailable to be used within required time due to native's claims on the land.
- **External linkages:** adequate and timely connectivity to the project site is not available, which impact the commencement of construction and overall pace of project.
- **Financing risks**:sufficient finance is not available at reasonable cost due to changes in market conditions or credit availability, resulting in delays in the financial closure.
- **Planning risks:** Risks that the pre-development studies (technical, legal, financial and others) conducted were inadequate and not robust enough.

B. Construction phase risks

- **Design risk:** risk that the proposed design will be unable to meet the performance and service requirements resulting in additional costs for modification and redesign.
- **Construction risk**: risk that the construction will not be completed on time, on budget or to specification leading to additional raw materials and labour costs, additional financing costs, increase in the cost of maintaining existing infrastructure.
- **Approvals risk:** Risk of delays in approvals causing delay in construction as per the construction schedule. Such delays in obtaining approvals may lead to cost overruns.

C. Operation phase risks

- **Operations and maintenance risk:** Risks associated with need for increased maintenance of assets over project life-cycle to meet performance requirements.
- **Traffic risk**: Risk that demand for a service varies from initial forecasted expectations, causing short-fall in the total revenue.
- **Payment risk:** Risk that fees for services are not collected in full or are not set at a level that allows recovery of costs.
- **Financial risk:** Risk that the concessionaire introduces too much financial stress on the project by using inappropriate financial structure leading to additional funding costs for increased margins or unexpected refinancing costs.

D. Other risks

- **Change in law:** Refers to risk that the current legal / regulatory regime will change, having an adverse impact on the project.
- **Force Majeure**: These events are also called "Acts of God", to indicate that they are beyond the control of either contracted party.
- **Concessionaire risk**: Risk that the concessionaire will prove to be inappropriate or unsuitable for delivery of the project, for example due to failure of their company.
- **Sponsor risk:** Risk that the Sponsor will be an unsuitable partner for the project, for example due to poor project management or unable to fully recognise the agreed terms of the Concession Agreement[4].
- **Concessionaire/Government event of default**: Risk that the concessionaire/government will not fulfil its contractual obligations and that the other party will be unable to – either enforce those obligations against the concessionaire, or unable to recover some form of compensation or remedy from the other party for any loss sustained by it as a result of the breach[5][6].

Success and failures encountered while executing the project activities at some of the PPPprojects and the learning drawn are tabulated in Table:2 below.

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Table.2: Learning's from Success and Failures at Some PPP Infra Projects

Stage of Projects	Project Activities	Examples of successful PPPs	Examples of PPPs where problems were encountered	Learnings
Project Preparation	*Comprehensive due diligence Studies & Robust Traffic / Market Projections*	*Timarpur Integrated solid waste management project*: Detailed technical studies, financial & risk evaluation, obtaining regulatory & statutory approvals were done well in advance.	*Vadodara Halol Toll Road project:*Incorrect estimation of projected traffic resulting in increased revenue Risk.	Prior due diligence studies of technical & legal implications. Realistic Traffic estimates.
Procurement	*Dealing with Speculative Bids*		*Hyderabad Metro project:*Commercial utilization of land along with metro project led to wide divergent bids. Greater incentive to complete real estate development at the cost of metro.	Speculative bids should be avoided & terminated; Fresh bidding should be called for.
	Importance of Lead Consortium Member/ Promoter of Concessionaire		*Hyderabad Metro project:* Maytas Metro was badly affected due to issues faced by its promoter– Satyam Computer Services. Project failed to achieve financial closure.	Adequate due diligence of Experience & expertise of Lead consortium member or promoter.
Development	*Handling of Land Acquisition*	*Hyderabad Metro project*: Government handover 90% of the land within 120 days from signing of the agreement.	*Delhi Gurgaon expressway project*: difficulty in acquiring the land impacted the overall project schedule.	Completing land acquisition prior to Project Procurement.
	Streamlining of Approvals & Clearances	*Alandur Sewerage Project*: Key approvals, including road cutting, shifting of services & environmental clearances were taken in advance.		A single interface for coordination of all approvals to prevent delays.
	Environmentally &Socially responsive development framework: Learning:	*Vadodara Halol Toll Road project*: Intense public consultations were carried out. Bypasseswere introduced at various critical locations.		PPPs have an environmentally and socially responsive development framework.

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	Financing Innovations	*The Vadodara Halol Toll Road:*Deep discount bonds with an option of take-out financing; Long term loans as a part of its financing structure.		PPP projects to be financially independent; Minimize reliance on government grants or schemes.
Operations	*Favourable Operating Environment*	*Amritsar Inter-state Bus Terminal project:*Reduction in concessionaire's revenue risk.		Create favourable operating environment for private sector to function optimally.

Case Studies of PPP Projects wherein theconcessionaire is withdrawn: Among the awarded PPP highway projects,noteworthy mega projects where the concessionaire had withdrawn citing the problems of land acquisition and other reasons,areof GMR and GVK are of worth Rs. 10,700 crore. Similar projects of small size are many, wherein many projects are taken over by the concessionaire on premium. As many as 1646 cases related to NHAI projects are under litigation at different levels. As of March 31st 2011,funds amounting to the tune of Rs. 11206 cr are under dispute across various contracts involving NHAI. For better illustration case studies of three classical projects first one a port connectivity project, the second project passing through reserved forest and the otherone connectingtwo temple and heritage townsare discussed in the following paragraphs:

Case Studies projects awarded but could not be initiated:

Case Study-1: Chandhikole – Paradip NH 5A Proposal for 4 Lane to 6 Lane Conversion

The 4-laneproject road currently operated on BoT has been called for bidding for its up gradation to 6L two times on DBFOT basis and both the times could not get sufficient bidders for awarding the workon premium. The project road is the main linkage for bulk solid/liquid truck traffic movements from Paradip port to different parts of Orissa. At Chandhikole, NH-200 and NH 5 forming a junction with NH 5A which further leads to Paradip port. Project road and competingAlternate Routes (AR) are shown in the fig-1.

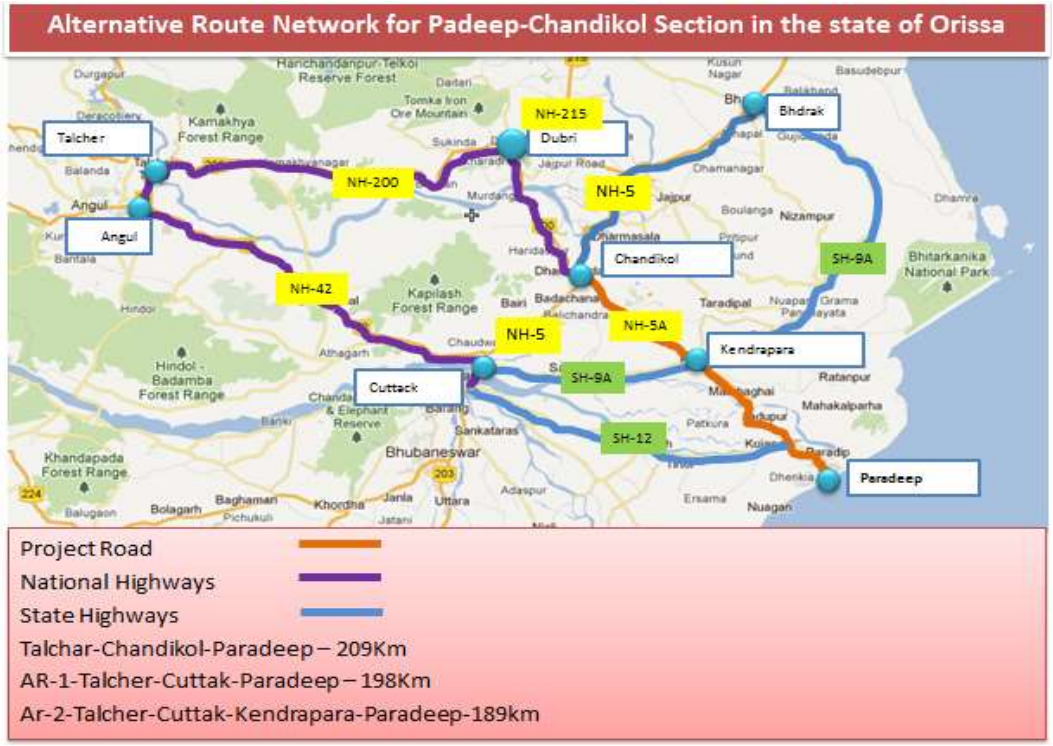

Fig.1: Chandhikole – Paradip NH 5A Road Map with Regional Linkages

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Salient Features of the Project:

- Project Length: 76.618 Km (from 0.000 Km to 76.618 Km proposed chainages) – starts from Chandhikole and ends at Paradip of NH 5A.
- Project Cost: 1014.36 Crores.
- Project Description: Six laning from 0.000 Km to 76.618 Km.
- Toll Plaza: 1 No's (at 4.000 Km design chainage).
- Bypasses: Nil.
- Major Structures costing more than 50 Crores: 1 No's (96.82 Crores Mahanadi Bridge at 66.175 Km).

Reasons for failure: The project is recommended for DBFOT (Toll) with only premium for a concession period of 30 years. Current traffic is about 12500 PCU/day(Authors personal investigation) and largely contributed by local trucks.As per the concessioners estimate and the project shall be qualified for 6-lane augmentation (above 40,000 PCU /day) in the year 2040. Observed Toll Collection at the Toll Plaza at the time of bidding was 7.12 lacs per day.Estimated Toll Revenues by Commercial Date of Operation (COD)would be 13.51 lacs/day. Main reasons for failure of the project is at the time of preparation of DPR due consideration is not given to new port connectivity railway line,, effect of other upcoming private BOT ports and decline in port export and import activity due to ban on mining. As per actual the project is not viable for 6L even on 40% VGF for a concession period of 30 years.

Case Study-2: Angul - Sambalpur (NH 42) Proposal for conversion to 4-lane on DBFOT Pattern: FourLaning of Angul-Sambalpur Section of NH-42 starts at Km 112.000 of Angul To Km 265.000 at Sambalpur in the State Of Orissa (Fig-2). Major Goods traffic on the project road would mineral ore coal and iron finished products. The project is called for bidding on maximum 40% Viability Grant Fund(VGF) for a concession period of 30 years. The project is awarded to concessionaire at a VGF of about 28% in August 2011, but could not take off for execution.

Salient Features of the Project:

- Project Length: 153.00 Km (from 112.00 Km to 265.00 Km chainages) – starts from Angul and ends at Sambalpur of NH 42.
- Project Cost: 1220.32 Crores.
- Project Description: Rehabilitation and up-gradation to four laning standards.
- Toll Plaza: 2 No's (at 188 Km and 244.5 Km existing chainages).
- Bypasses: 1 No's (Sambalpur bypass – 3.9 Km).
- **Elephant Under passes : 5No.**
- Major Structures costing more than 50 Crores: Nil.

Fig.2: Project Corridor Angul- Sambalpur NH-42
(Source: Google map)

Reasons for Non Commencement of Execution:

- 80% of the project road is in forest land and still awaiting for the clearances from MoEF and other local bodies.
- Fall in traffic due to ban on mining activity and could not achieve financial closure, as bankers are not ready to finance.
- Project cost escalations Total Project Cost given in DPR is 1220.32 Cr where as concessionaires estimate at the time of bidding 888 cr.

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- The project stretch is a Naxalite prone area affecting the base camp and construction operations.

Case Study-3: Madurai- Ramanathapuram Section of NH-49 Prposal for Partial 4-laning and balance with 2-Lane with Paved Shoulders DBFOT (Toll): The Project stretch starts from Km 5+000 at Mthuraiand ends at Ramanathapuram beyond Km 120+1100(Fig-3),cconnecting two temple towns Madurai Meenakshi and Rameswaram.Salient features are:

- Project Length: **115.110 Km** (from 5.000 Km to 120.110 Km proposed chainages) – starts from Madurai and ends at Ramanathapuram of NH 49.
- Project Cost: **683 Crores.**
- Project Description: **Four laning** from 5.000 Km to 79.900 Km and **Two laning** from 79.900 Km to 120.110 Km.
- Toll Plaza: **2 No's** (at 28.00 Km and 90.00 Km existing chainages).
- Bypasses: **5 No's** (Silaiman bypass – 3.245 Km, Thirupuvanam bypass – 9.075 Km, Thirupacetty bypass – 2.00 Km, Paramakudi bypass – 9.480 Km and Ramanathapuram bypass – 11.810 Km).
- Major Structures costing more than 50 Crores: **Nil**.

Fig.3: Project Corridor Mathurai- Rameswaram NH-49
(Source: Google map)

Reasons for Bid Failure:

- Project road connects two famous Pilgrimage tourist places in India namely Madurai and Rameshwaram. But as the project road is approaching to a dead end after Ramanathapuram , chances for potential growth is limited.
- Current traffic volumes on two stretches of project road are 11000 PCU/day and 7000 PCU/day. Most of the DFOT rural roads enjoy Toll revenue due to the presence of 2-Axle and 3-axle traffic but on the project their contribution is very poor. Also the few trucks operating on the corridor carrying building materials are local and their Toll contribution is very low.
- As the project corridor is near to the sea coast significant portion of the land is under wastelands and future industrial growth is bleak.
- Only few % of vehicles carrying through traffic carrying withsalt, Tiles, Paddy, Fish /coir / Cement are the major commodities.
- Since the project corridor is having an alternative (NH-85/NH-226) road, once the project road is ready, traffic on the project road may be affected marginally to avoid the toll charges.
- Due to the above reasons the estimated toll revenue by Commercial Date of Operation (COD) would be Rs. 9.53 lac/day does not qualify for bidding even on VGF.

Risk Mitigating Measures:

Shadow Tolls: Shadow tolls were implemented in the UK during 1990s. It is a payment structure where the road user does not pay any toll; instead the concessionaire collects revenue from the government in proportion to the number of vehicles using the road. While private operators have only the pricing tools to collect revenue, government additionally has the taxation tool as well which it can use to charge a higher road tax to its citizens. One way of doing this is imposing a cess on fuel.

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The shadow tolling system effectively, makes the road services free for the user. At the same time, the government need not bear the extra burden of paying the toll, because it collects the money through the cess on petrol or diesel. The proposed cess would be minimal (less than a rupee) as it will be spread over a huge base and hence the citizens would not feel the pinch of the increase. The highway road traffic would not be hampered by high toll prices, and thus be closer to their capacity utilization, ensuring maximum economic and social benefit.

Conclusions &Remarks: In the present BOT scenario and also the prevailing social political environment is not conducive for running toll operations business is a tough situation to the concessionaire due to public resistance and political interventions for popular gains. Under this hostile environment, execution of stalled projects and commencement of new PPP projects under BOT model is uncertain. Regulatory Authorities (NHAI/State Governments) need to rethink and invent new strategies in PPP model for restoration of Infrastructure**.** Mechanism like shadow tolling have their respective pros and cons that need to be debated considering various policy constraints such as budget availability, willingness to pay tolls, value for money, transfer of risks to the private party, ease of implementation etc. Going forward, it is expected that Government would seriously explore such mechanisms on test case basis to address some of the main issues that exist on the Highways network. Other strategic options could be reducing the concession period and granting VGF, awarding projects at reduced concession period on VGF+ Annuity combination. Also Government should implement latest traffic management and monitoring technologies, where in the roads are Toll Freeand , traffic would be monitored and counted with state of technology and concessionaire would be appropriately compensated for the operated traffic. Such mechanisms would help Indian Government to achieve a Road User friendly environment and make driving on Indian highways a safer and a much better experience.

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