

FINANCING MODEL ON VIABILITY GAP FUND (VGF) MODEL IN PUBLIC PRIVATE PARTNERSHIP (PPP) FOR INFRASTRUCTURE PROJECTS AND COMPARISON WITH HYBRID ANNUITY MODEL (HAM)

A Thesis

Submitted in partial fulfillment of the requirements for the award of
Master of Architecture degree in Building Management

By

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SATHYABAMA

**INSTITUTE OF SCIENCE AND TECHNOLOGY
(DEEMED TO BE UNIVERSITY)**

Accredited with Grade "A" by NAAC

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BONAFIDE CERTIFICATE

This is to certify that this Report is the bonafide work of **S THIRUMAVAZHAVAN (39840020)** who carried out the Thesis entitled "**FINANCING MODEL ON VIABILITY GAP FUND (VGF) MODEL IN PUBLIC PRIVATE PARTNERSHIP (PPP) FOR INFRASTRUCTURE PROJECTS AND COMPARISON WITH HYBRID ANNUITY MODEL (HAM)**" under our supervision from January 2021 to May 2021.

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ABSTRACT

The gross domestic product GDP determines the economic growth of the country. When compared to other countries, India has lesser GDP over a period of time. This is because of less growth in infrastructure of the country like roads, irrigation facilities, railways, telecommunications, etc. As a result, a new system of public private partnership (PPP) model is introduced in India. This is formed to give the infrastructure projects to the private party which involves in construction, operation, maintenance of the party for the period of time. This private party with its own money involves in constructing the public works. The PPP plays a major role in forming road infrastructure all over the country. With a view to support the infrastructure projects, the Scheme for Support to PPPs in Infrastructure (Viability Gap Funding Scheme) was announced in 2004 and the modalities to operationalize it put in place by 2005. The VGF Scheme aims to ensure wide spread access to infrastructure provided through the PPP framework by reducing the capital cost of their access. The VGF Scheme provides financial support in the form of grants, one time or deferred, to infrastructure projects undertaken through PPP with a view to make them commercially viable. The Scheme provides total Viability Gap Funding up to twenty percent of the total project cost. The Government or statutory entity that owns the project may provide additional grants out of its budget up to further twenty percent of the total project cost. VGF under the Scheme is normally in the form of a capital grant at the stage of project construction. The Government of India has approved the hybrid annuity model (HAM) to increase the pace of award and construction of national highways apart from de-risking the developers and lenders from inherent shortcomings associated with conventional toll and annuity based HAM model comparison with VGF model. The financial feasibility study is carried out for the project in the earlier stages to determine whether the project is feasible or not to take over it. The two important parameters Net Present Value (NPV), Cost Benefit Analysis and Internal Rate of Return (IRR) are involved in determining the feasibility of the project.

The road project in India were not being completed on the time due to certain problems like toll collection risk, traffic risk which had to be borne by the concessionaire. These all factors led to delay in completion of road construction project. It will eliminate the problems being faced under the existing models and will ensure that the projects are completed on time.

Keywords: VGF, PPP, Net Present value, Internal Rate of Return, HAM

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LIST OF ABBREVIATIONS

BOT	Build Operate Transfer
EC	Empowered Committee
EI	Empowered Institution
Fi	Financial Institution
GOI	Government of India
LFI	Lead Financial Institution
O&M	Operations and Maintenance
PPP	Public Private Partnership
RFQ	Request for Qualification
VGf	Viability Gap Funding
JICA	Japan International Cooperation Agency
PSIF	Private Sector Investment Finance
ASA	Authorized State Agency
MPI	Ministry of Planning & Investment
PSIF	Private Sector Investment Finance
PMU	Project Management Unit
SOF	State Owned Enterprise
NPV	Net Present Value
IRR	Internal Rate of Return
BCA	Benefit Cost Analysis
PFI	Private Finance Initiative
PPI	Private Participation in Infrastructure
SPV	Special Purpose Vehicle
EPC	Engineering, Procurement and Construction
HAM	Hybrid Annuity Model
BPC	bid project cost
MCLR	Marginal cost of funds lending rate
MAPP	Method for impact assessment of programs and projects

NHAI	National Highways Authority of India
NHDP	National highway development project
NBFC	non-banking finance company
NPA	nonperforming asset
O&M	operation and maintenance
PPP	public–private partnership
ROE	return on equity
TPC	total project cost
VFM	value for money

CHAPTER 1

1 INTRODUCTION

This chapter explains about how the project has been selected for the study with the background which provoked the topic selection of the study. This chapter tells the aim and objectives of the study. The flow of study and methodology involved in the study is explained in the chapter. The significance which comes out from the study is also explained in the chapter.

1.1 BACKGROUND OF THE STUDY

PPPs, or public-private partnerships, have emerged as a viable option for infrastructure development, particularly in developing countries. PPPs are gaining traction as a cutting-edge policy tool for addressing the lack of enthusiasm for traditional public service delivery. They are a claim on public resources that must be comprehended and evaluated. They are frequently complicated transactions that necessitate a detailed specification of the services to be provided as well as an understanding of how risks are shared between the public and private sectors.

The recent increase in PPPs in developing countries has been attributed to several factors, including a desire to improve the public sector's performance by employing innovative operation and maintenance methods; lowering and stabilising service costs; reinforcing competition; and reducing government budgetary constraints by accessing private capital for infrastructure. Private sector involvement in the delivery of public services is not a new concept; PPPs have been in use for more than three decades, long before the 1970s contracting out initiatives in the United States. PPPs have evolved to include the procurement of social infrastructure assets and associated non-core services, after initially focusing on economic infrastructure. The debt and equity shares of the total cost of the project are used to finance PPP projects. The government also improves some of the financial schemes that assist private parties in starting up project construction. The Viability Gap Fund (VGF) and the Hybrid Annuity Model are two important schemes that favour PPP projects (HAM).

1.2 AIM OF THE STUDY

To study about the financial model on Viability Gap Fund (VGF) model and the hybrid annuity model (HAM) of Public Private Partnership for Infrastructure Projects.

1.3 OBJECTIVES OF THE STUDY

- a) To study the salient features and process of Viability gap fund (VGF) model and the hybrid annuity model (HAM) of Public Private Partnership (PPP).
- b) To analyze about the concession period of the projects having Viability gap fund (VGF) models and the hybrid annuity model (HAM).
- c) To explore about the financial feasibility of the Public Private Partnership (PPP) Projects.

1.4 RESEARCH QUESTIONS

- 1. How much VGF grant is given to the PPP projects?
- 2. How the financial feasibility of PPP projects studied?
- 3. How the concession period of the projects is calculated?
- 4. How the traffic volume will be calculated?
- 5. Comparison of both PPP models difference between?
- 6. Overview issues of the sector in BOT toll model?

1.5 SCOPE OF THE STUDY

The scope of the study is the understanding of financial models in the Public Private Partnership (PPP) projects and the study of financial feasibility of the project. The study also involves in understanding of Public Private Partnership (PPP) projects which are giving a concession period of 10 to 30 years is feasible or the private party to complete its debt loans and achieve its profit.

1.6 LIMITATIONS OF THE STUDY

The project is limited to only both models grant from the government, its process and working details of the project. The concession period of the project having both models grants is calculated and analyzed with the average annual income from the Toll road Project.

1.7 METHODOLOGY FOR THE STUDY

The methodology of the study started with the understanding of Public Private Partnership (PPP). This includes the definition, origin, purpose, and elements involved in PPP Projects. It also includes the study of process of PPP projects in India. The next step includes the study on number of projects which are operating, constructing and proposed projects in India where the different types of PPP Projects are studied. The next step of the study involves the financial supports which are given by the government to the PPP projects. On studying about the financial support, Viability Gap Fund (VGF) is one of the widely used financial support and compare with hybrid annuity model (HAM) for the projects. Next step includes the study of definition of VGF, eligible conditions for applying VGF, Eligible sectors and the process involved in VGF of the project. And compare these model with HAM Next, and the study on financial model involved in the project is done. Followed by the study of financial feasibility of the PPP projects. Next involves the collection of secondary data of international case studies of VGF and HAM projects in road infrastructure which is a very popular form of qualitative analysis and involves a careful and complete observation. It includes more emphasis on the full analysis of a limited number of events or conditions and their interrelations. The study also deals with the processes that take place and their interrelationship. The case study involves an intensive investigation of the finance of the projects. The next step involves the collection of primary and secondary data of VGF projects in India. It includes the finance and capital of the project, financial analysis of the projects, Cash flows of the project. From the case studies, the concession periods of the projects are studied and analysed. Analysing the concession period of the projects, financial calculations of the projects are carried out and its inference are determined.

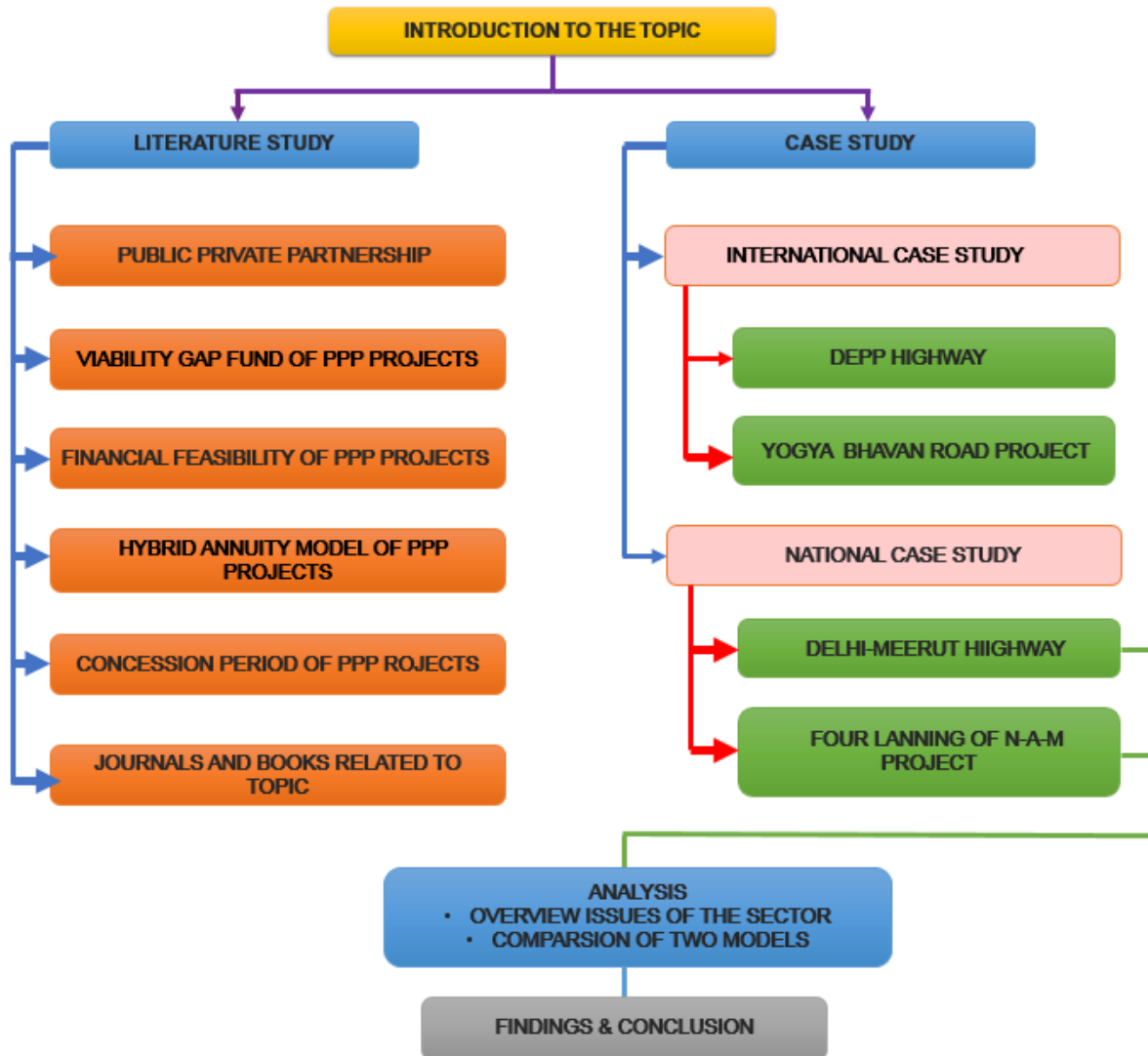


Figure 1.1 Methodology Of The Study

1.8 SIGNIFICANCE OF THE STUDY

The study signifies the financial knowledge to the road infrastructure projects along with the feasibility study. It also refines the concession period of the PPP projects and its beneficiary details for the private owners of the project.

CHAPTER 2

REVIEW OF LITERATURE

2.1 INTRODUCTION

This chapter details out the PPP model, definition, its purpose and its processes involved for PPP projects. In addition to this, VGF model, HAM model its eligible sectors and importance are also discussed. This chapter also discusses financial model and feasibility study for PPP projects.

2.2 PUBLIC PRIVATE PARTNERSHIP (PPP)

2.2.1 PPP - Definition

Public-private partnership (PPP) is a funding model for a public infrastructure project such as a road networks, bridges, irrigation supply, new telecommunications system, airport or power plant. The public partner is represented by the government at a local, state and/or national level. The private partner can be a privately-owned business, public corporation or consortium of businesses with a specific area of expertise.

According to Wikipedia, The public–private partnership (PPP or 3P) is "an arrangement between a government / statutory entity / government owned entity on one side and a private sector entity on the other, for the provision of public assets and/or public services, through investments being made and/or management being undertaken by the private sector entity, for a specified period of time, where there is well defined allocation of risk between the private sector and the public entity and the private entity receives performance linked payments that conform (or are benchmarked) to specified and pre-determined performance standards, measurable by the public entity or its representative".

2.2.2 Evolution of PPP at International Level

Private sector involvement in the delivery of public services is not a new concept; PPPs have been in use for more than three decades, long before the 1970s contracting out initiatives in the United States. PPPs have evolved to include the procurement of social

infrastructure assets and associated non-core services, after initially focusing on economic infrastructure. Housing, health, energy, water, and waste treatment are all examples of PPPs. Globally, PPP policy has evolved as governments develop the necessary skill set to procure infrastructure through PPPs, including the ability to create and maintain a regulatory framework. In several advanced countries, the private sector has become increasingly innovative, adding significant value to public procurement. With the introduction of the Private Finance Initiative, the UK has been a modern instigator of this wave of private sector involvement. Infrastructure and services have been developed and delivered using PFIs. Governments all over the world are adopting PPP arrangements as a result of the growing use of PFIs. PPPs have been used by the Australian government to deliver several social infrastructure projects; Ireland has used them for transportation infrastructure; the Netherlands has used them to deliver social housing and urban regeneration programmes; India is heavily investing in highways through PPPs; Japan has many new PPPs in the pipeline; and in Canada, many of the new infrastructure projects are desirous of PPPs.

In both developed and developing countries, public-private partnerships have become the primary means of delivering public services over the last two decades. There were 2096 PPP projects with a total capital value of nearly US\$ 887 billion between 1985 and 2004. Australia, Germany, Hungary, Italy, Japan, Korea, Spain, the United States, and the United Kingdom are all countries with PPP experience. The UK is widely regarded as having the most extensive PPP (or PFI, as it is known in the UK) experience among these countries. For example, the United Kingdom was the country with the most PPP investments in 2003 and 2004. Although public-private partnerships (PPPs) have been implemented in many countries, they are not equally applied to all infrastructure sectors. PPP projects are typically focused on transportation projects such as roads, bridges, tunnels, railroads, and airports in most countries. However, in recent years, the use of PPPs has spread across a variety of industries. PPPs are used in the development of schools, hospitals, and public housing in Korea; in the United States, PPPs are used in prisons, water supply, and wastewater treatment.

Contracting out was first used in developing countries in the mid-1980s, during the first wave of government privatisation of state-owned enterprises as part of structural adjustment programmes. Policies were enacted to address the government's perceived lack of managerial capacity, as well as the need to end state enterprises' on government subsidies. Between 1990 and 2004, approximately 14% of public sector infrastructure in Africa was provided through PPP, with water, energy, and transportation being the most common sectors.

The public-private partnership (PPP) trend is widespread, growing, and affecting a wide range of infrastructure sectors. The use of public-private partnerships in the social infrastructure sector has helped to reduce the concentration of PPP projects at the federal level. PPP agreements are being used by an increasing number of local governments to procure much-needed local infrastructure.

2.2.3 Evolution of PPP in Asia and India

In most Asian countries, key infrastructure services are not only in short supply, but also of poor quality. Without a doubt, the problem is more severe in Asia's low-income countries; however, infrastructure facilities in the region's middle-income countries are also inadequate. The countries in this region have long recognised the importance of improving the quality and quantity of their physical infrastructure, understanding that infrastructure is critical to economic growth and international competitiveness.

Due to a variety of financial constraints, governments in the region have altered their policies to foster long-term private sector involvement in their infrastructure sectors. This shift in government policy has allowed the private sector to participate in infrastructure projects. Because of the importance of infrastructure investments for long-term economic growth, governments in these countries have been forced to find new ways to fund infrastructure projects (Hammami et. al, 2006). Although few developing countries began infrastructure projects with private participation in the mid-1980s, the trend became a wave

that swept the developing world in the 1990s, according to the World Bank's Private Participation in Infrastructure (PPI) Project Database.

In Asia, countries such as China, Malaysia, and Thailand began some private-sector projects in the mid-1980s in one or more sectors, but by the 1990s, most of the region's countries had enlisted the private sector to provide one or more infrastructure facilities. Developing countries around the world, including Asia, have been reforming their public sectors and introducing private investment in physical infrastructure since the early 1990s.

2.2.4 Reasons for PPP projects

The reasons for public-private partnerships differ from country to country. However below are a few general reasons in brief, why state governments embrace public-private partnerships.

(a) Allowing the private sector to influence the delivery of public services: The private sector has long been able to maintain an enviable standard in management and delivery; however, most public sector organisations are engulfed in debt, mismanagement, and a lack of effective control. PPPs are seen as a capable hand that can steer the effective provision of public services, and the results have been positive in many cases.

(b) Budget constraints—most debt-ridden countries see PPP as a viable option for providing public services while also allowing them to channel their limited resources into other projects. This particular cause has had a lot of success.

(c) The private sector is far ahead of the public sector in terms of staying up to date on the latest technical know-how and expertise in order to maximise the potential of any sector in which it is involved. The majority of private-sector employees attend seminars and workshops, giving them an intellectual advantage that the public sector lacks.

(d) Accountancy treatment of public-private partnerships off balance sheet-: Public sectors are usually shrouded in mismanagement of its financial records, thereby hard for it to

maximize its potential and have an effective turn over. This is where private sector comes in to set up a lucrative agency to provide public services.

(e) Incentives are offered to aid private sector. Incentives such as tax relief in most cases offered.

(f) innovation-: innovation means injecting something new. Private sector re-invents and introduces new technologies with aid effective public services.

(g) The private sector is more technologically advanced and in tune with the latest technology, which is why their involvement in the delivery of public services is generally successful.

(h) Risk management—Risk isn't solely borne by one party. It is shared between the private and public sectors, which is beneficial to the economy. In the event of a loss, liability is unequivocally shared by both parties.

2.2.5 Essential elements of a PPP project

PPP Project is a project based on a contract or Concession Agreement between a Government or statutory entity and a private sector company, with the following essential elements:

- a) Fixed Concession period
- b) Pre-determined user charges/tariff
- c) Pre-determined scope of work for the Concessionaire
- d) Pre-determined bidding parameters, i.e., VGF/Premium/Revenue Sharing/Lease Rent
- e) All conditions, specifications, and project agreements frozen prior to inviting final bids
- f) Land required for the project available with the Implementing Agency

2.2.6 Implementation steps of PPP project

To implement a PPP Project, the broad stages involved are:

1. Completion of the preparatory works required to identify and implement the project.
2. Finalization of Bid Documents
3. Invitation of Bids
4. Pre-bid Conference
5. Evaluation of Bids
6. Award of Concession
7. Signing of the Agreement
8. Financial closure
9. Execution of the Project

2.2.7 Benefits of Public-Private Partnerships to the government and tax payers.

The benefits of PPP are as follows:

1. Inflow of Private Investment

There is limited budget support for these huge demands. Private investment is urgently required to undertake such important projects.

2. Increase in Efficiency

Private sector involvement will lead to efficiency in project execution and a time and cost reduction.

3. Use of Innovative Design & Construction Practices

Innovative design and construction practises by the concessionaire will bring the goal of cost and time reduction.

4. Assured Maintenance

The PPP concessionaire will be asked to maintain the projects in a correctly predetermined manner during the concession period.

5. Freeing up Government Resources

Private investment provides new capital sources and reduces direct spending on public money. These state resources may be used in other areas and projects of priority.

6. Sharing of Project Risks

Inherent risks could be inherent in any infrastructure project. The PPP project structuring assigns the most suitable risks to the agency.

7. Better Viability

The participation of experienced and credible sponsors and commercial creditors could improve the project's viability.

2.2.8 List on PPP projects

- There are **1899 projects** (accessed on 02.08.2019) under PPP model in India and the total project costs about **2,581,764,91 crores**. The following fig 2.1, 2.2 shows the list of PPP type models and list of sectors where PPP is implemented respectively

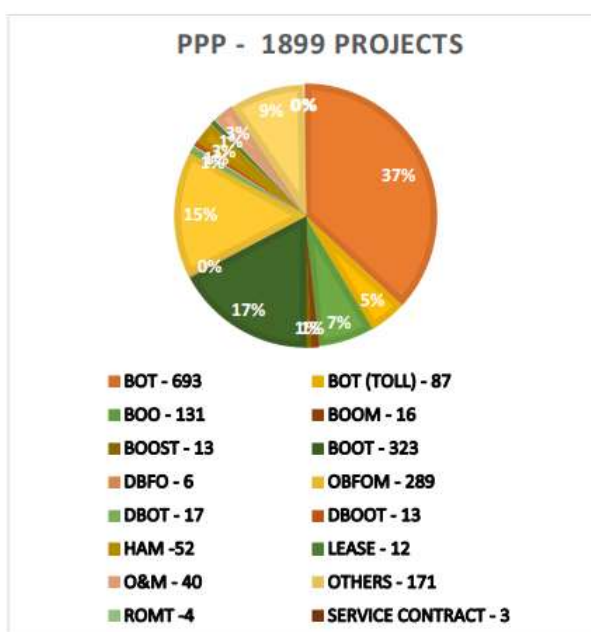


Figure 2.1 PPP projects

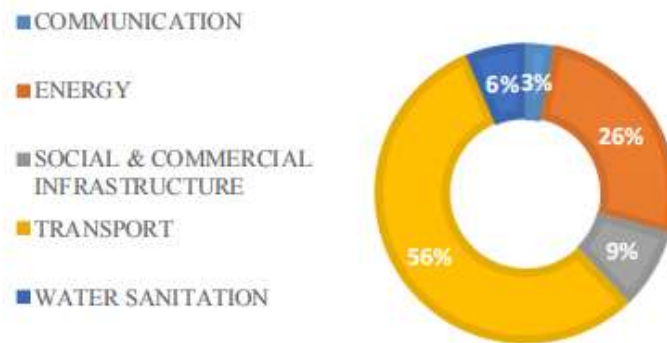


Figure 2.2 PPP projects

2.2.9 Key stakeholders of PPP projects

The public entity (government) and the private partner are the two main players in a PPP. There are a number of other stakeholders involved in PPP projects, in addition to the public entity and the private partner, some of whom are listed below.

1. Public entity – means all State Government Departments and Directorates, Government sponsored boards, societies, Municipal or Local Bodies, Panchayats, Government sponsored education, research, and knowledge management institutions, Public Sector Undertakings, Government owned companies, statutory authority, and other entities.

2. Private partner – includes any entity other than the Public entity.

3. Concessionaire – refers to the private partner who was awarded the tender for the PPP project's implementation.

4. Special Purpose Vehicle (SPV) - is simply a legal entity created to act as the legal manifestation of a project consortium, with no financial or operational history that the government can examine. An SPV is a legal entity that has no other activities than those related to borrowing. Typically, a private partner establishes a "Special Purpose Vehicle" (SPV) that contracts with the government. For the duration of the contract, the SPV will develop, build, maintain, and operate the asset. When the government invests in a project,

it is usually (though not always) given an equity stake in the SPV. A developer, operator, and bank lender(s) are usually part of the consortium. It is the SPV that signs the contract with the Government and with subcontractors to build the facility and then maintain it.

5. Transaction Advisors – Consultants are recruited from the Sponsoring Authorities through a transparent procurement system in order to assist them to project design and/or to provide technical, financial and legal information for project design and to advise on the management of the procurement process of their PPP private sector partner.

6. Lead Bank/ Lender – is the financial institution (FI) that is funding the infrastructure project by providing debt to an extent not less than 25 percent (twenty-five percent) of the total project debt and designated as such by an inter-institutional group or consortium of financial institution.

7. Lead Financial Institution - Means FI funding the PPP project and the FI is designated as such by the consortium if there is a consortium of FIs.

8. Independent Engineer – is a project supervision and quality monitoring consultant (different from TA). Independent consultant is typically appointed following the award of the project and the signing of the concession agreement. The independent advisor ensures that the work is performed according to the schedule and according to the quality criteria laid down in the contract.

9. Users – End users of created infrastructure or project beneficiaries in other terms. The success of a PPP project in the PPP project cycle plays an important role to each stakeholder. Any project for developing under the PPP framework must be considered by all stakeholders' interests

2.2.10 Financial support from the government

The Government has facilitated the PPP sector by offering:

1. **Viability Gap Funding (VGF):** Viability Gap Funding of upto 40% of the cost of the project can be accessed in the form of a capital grant.
2. **India Infrastructure Project Development Fund (IIPDF)**
3. **India Infrastructure Finance Company Limited (IIFCL)**
4. **Foreign Direct Investment (FDI)**

2.3 VIABILITY GAP FUNDING (VGF)

2.3.1 VGF – Introduction

The lack of funding sources is the principal constraint in India's infrastructure sector. In addition to the total difficulty of securing funds, certain projects may not be financially viable, but financially justified and required. This is the nature of several long-term and development-oriented infrastructural projects. The government has designed Viability Gap Financing to complete such projects successfully (VGF). Viability Gap Finance means a grant to support economically justified and financially unsustainable projects. The scheme is designed as a Plan Scheme to be administered by the Ministry of Finance and amount in the budget are made on a year-to-year basis. The VGF grant shall be granted as a capital aid to encourage players from the private sector to participate in otherwise financially unviable PPP projects. Because of a long gestation period and the future small income flows, projects may not be commercially viable.

In 2004, the VGF scheme for public-private partnership support was launched. VGF grants will only be available for infrastructure projects in which private sponsors are selected through a competitive bidding process. At the construction stage of the VGF grant, it is only after the private sector developer contributes to the project. Up to 20 percent of the total project capital cost is the usual grant amount. The government budget allocation will provide VGF funds. The statutory authority which owns the project assets also sometimes provides it. If the government/ministry sponsoring entity is aiming to provide assistance above the amount specified under the VGF, this is limited to another 20% of the total project cost. The project agreements also need to implement best practises to ensure value for

public money. The lead financial institutions for the disbursement of the grants should conduct regular monitoring and appraisal. The financial institution responsible for the project is responsible, especially for grant disbursements, for regular monitoring and evaluation of project conformance with agreed milestones and performance levels.

2.3.2 Eligibility for VGF schemes

The eligibility criteria for funding must be met by an entity with at least 40% private capital, i.e. built, maintained and operated throughout the project term. The relevant ministries in the Government of India would have to have vetted/supported the projects. The necessary government approval at the appropriate levels should have been received by all central projects. The total government support required for the project must not exceed 20 percent of the total project costs estimated in the preliminary evaluation or the actual project cost, depending on the lower level, of any other government funding required for the project, or any other source from the government of India and its agencies, in the preliminary estimate. A transparent and open competitive process must select the implementing agency. A preliminary project assessment should be accompanied by project proposals

1. techno-economic viability of the project,
2. Financial appraisal and project financing arrangements,
3. Extent, nature and target of the viability gap funding proposed and
4. a commitment letter on behalf of the lending institutions.

The project should provide a service against payment of a predetermined tariff or user charge. The Government/statutory entity concerned should certify, with reasons:

- a) The no longer possible tariff/user charge to eliminate or to reduce the PPP's viability gap;
- b) The no increase of the Project Term to reduce the viability divide; and
- c) The reasonable capital costs, which have been based on normally applicable standards and specifications for such projects and which cannot further limit capital costs to the reduction of the viability gap.

2.3.3 Eligible sectors for VGF grants

The sectors eligible for Viability Gap Funding under this Scheme are:

- a) Roads and bridges, railways, seaports, airports, inland waterways;
- b) Power;
- c) Urban transport, water supply, sewerage, solid waste management and other physical infrastructure in urban areas;
- d) Infrastructure projects in Special Economic Zones and internal infrastructure in National Investment and Manufacturing Zones;
- e) International convention centers and other tourism infrastructure projects;
- f) Capital investment in the creation of modern storage capacity including cold chains and post- harvest storage;
- g) Education, health and skill development, without annuity provision;
- h) Oil/ Gas/ Liquefied Natural Gas (LNG) storage facility (includes city gas distribution network);
- i) Oil and Gas pipelines (includes city gas distribution network);
- j) Irrigation (dams, channels, embankments, etc);
- k) Telecommunication (Fixed Network) (includes optic fibre/ wire/ cable networks which provide broadband /internet);
- l) Telecommunication towers;
- m) Terminal markets;
- n) Common infrastructure in agriculture markets; and
- o) Soil testing laboratories.

2.3.4 Process of VGF in the projects

The steps involved in the process VGF project are detailed below

2.3.4.1 Invitation to bid

Financial offers shall be invited to be granted within four months of the approval of the Empowered Institution by the Minister, the State Government or a statutory entity concerned as the case may be. The Department of Economic Affairs may extend this period, as appropriate. Through a transparent and open competitive bidding process, the private sector companies shall be selected. The bidding criterion shall be the amount of VGF that a private sector firm requires, where all other parameters are similar.

2.3.4.2 Final approval by empowered institution

The Lead Financial Institution must submit its project assessment in six copies for consideration and approval of the Empowered Institution, either hard or softly, within three months of the date of award or any extended period as may be permitted. An updated application, together with project report and project agreements will be included in the evaluation. The Lead Financial Institution verifies the applications content and transmits its Empowered Institution recommendation. The Ministry, State government or the statutory authority proposing a project shall, before final approval by the Empowered Institution, certify that a tendering process complies with the rules of this Scheme and has complied with all the conditions specified in the Scheme.

2.3.4.3 Disbursement of VGF

Prior to the disbursement of the money it will enter into the Tripartite Agreement in the format prescribed from time to time by the Empowered Committee of the Lead Financial Institution and the private sector company. A Lead Financial Institution (FI) is responsible for the project and in the case of a FI consortium, the FI as designated by the consortium is the Lead Financial Institution, for the purposes of this Scheme. VGF shall be disbursed only after the company of the private sector has subscribed to the project and expended the necessary capital contribution and shall be disbursed in proportion to remaining debts to be

disbursed thereafter. The Lead Financial Institution shall be disclosed as appropriate to VGF.

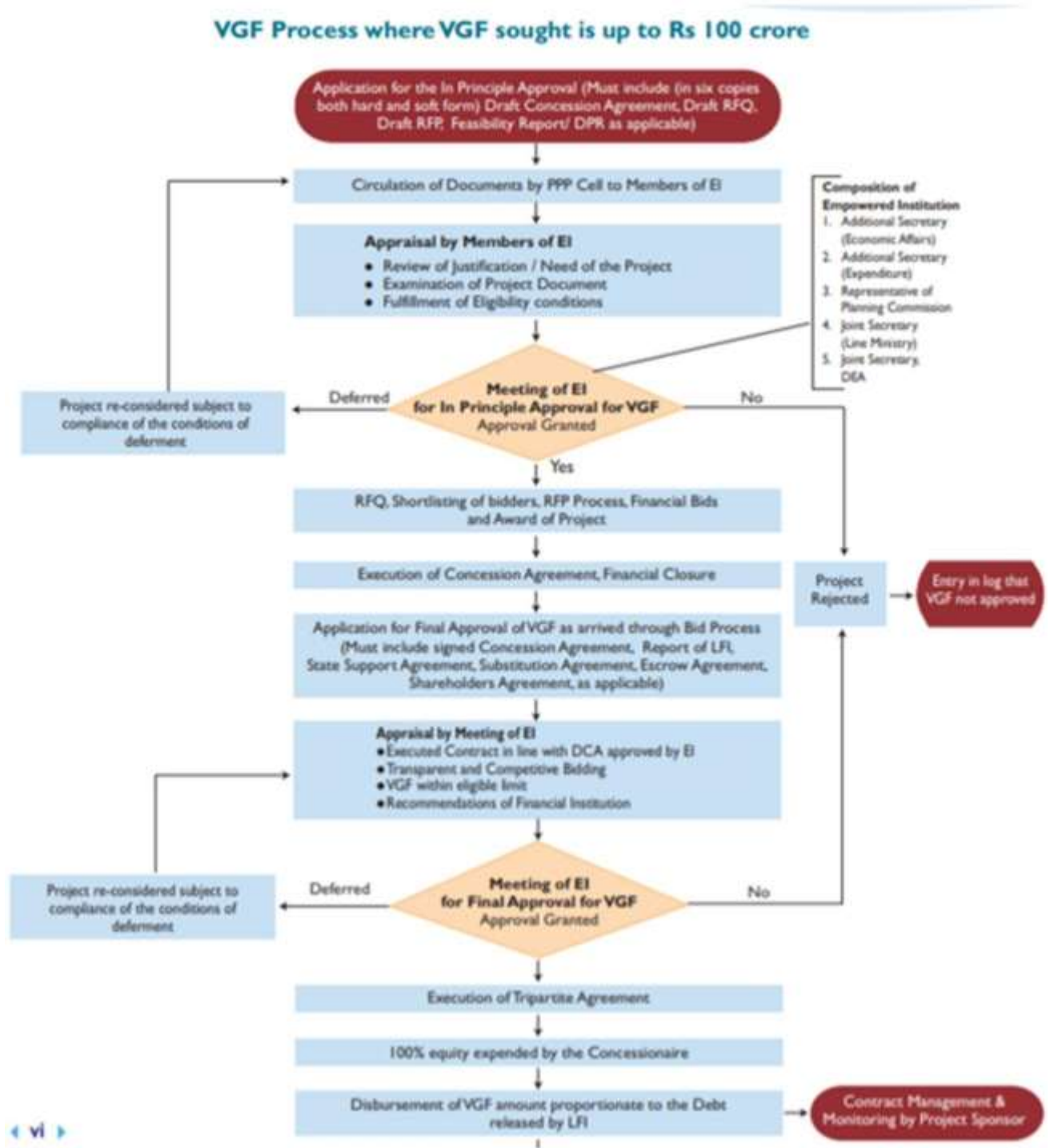


Figure 2.3 VGF process for upto 100 crores

VGF Process where VGF sought is more than Rs 100 crore and up to Rs 200 crore

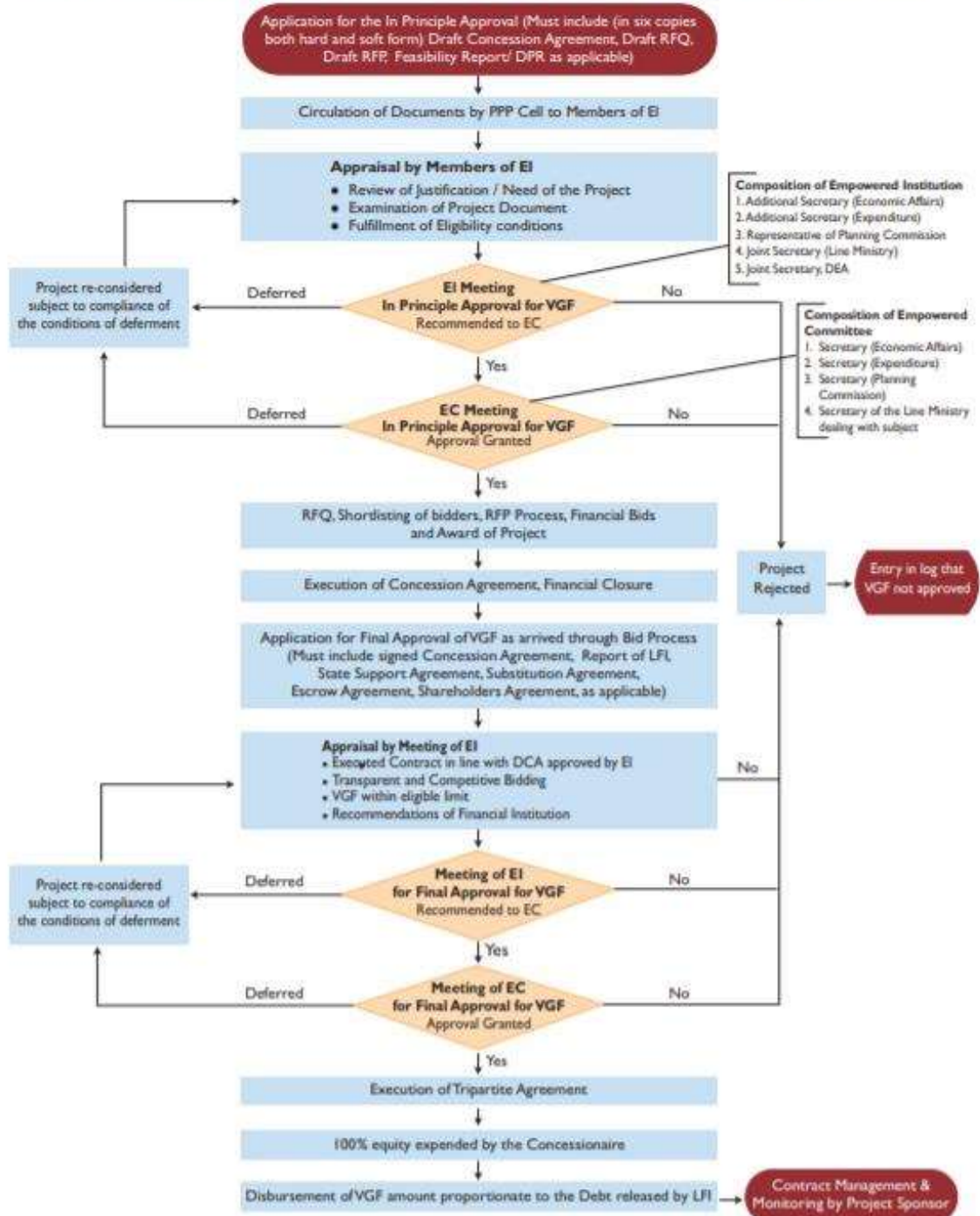


Figure 2.4 VGF process for more than 100 crores and upto 200 crores

Source: PPP India – VGF guidelines

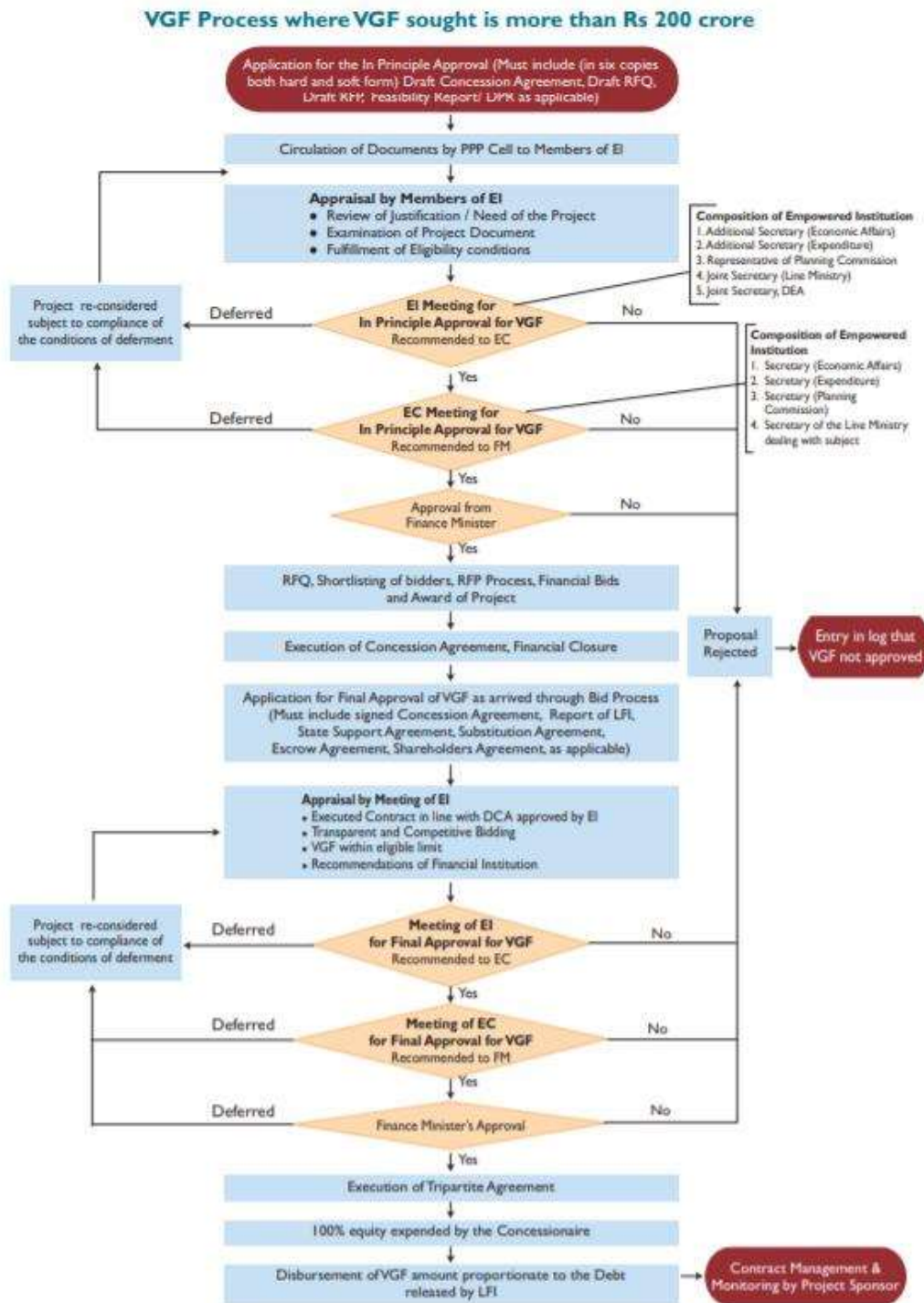


Figure 2.5 VGF process for more than 200 crores

Source: PPP India – VGF guidelines

2.3.5 VGF current scenario in India

Hyderabad Metro Rail Project in Telangana has the highest VGF model project, with a total project cost of 12.132 core project costs in 2013. The recently approved project is to develop DBFOT wheat storage silos in Kotkapura, Punjab in PPP model. The VGF model consists of 63 projects (as on 02.08.2019). The number of VGF projects from 2005 to March 2019 is shown in the following table 2.1.

Table 2.1 summary of number of VGF projects in year wise

Year Wise Summary: Projects granted final approval under the Scheme for Financial Support to PPPs in Infrastructure (VGF Scheme)
From 19th December, 2005 - 07 March, 2019

S.NO.	FINANCIAL YEAR	NUMBER OF PROJECTS	TOTAL PROJECT	VGF APPROVED (in Rs. Crore)
1	2018-2019	1	26.57	5.31
2	2017-2018	2	432.35	84.98
3	2016-2017	4	1,516.00	246.56
4	2015-2016	2	565.78	106.54
5	2014-2015	12	3,595.53	596.39
6	2013-2014	9	17,525.62	2,534.99
7	2012-2013	13	6,149.11	1,206.76
8	2011-2012	5	1,263.51	252.70
9	2010-2011	9	1,685.19	309.59
10	2009-2010	2	788.00	157.60
11	2007-2008	4	613.34	118.34
	Total	63	34,161.00	5,619.76

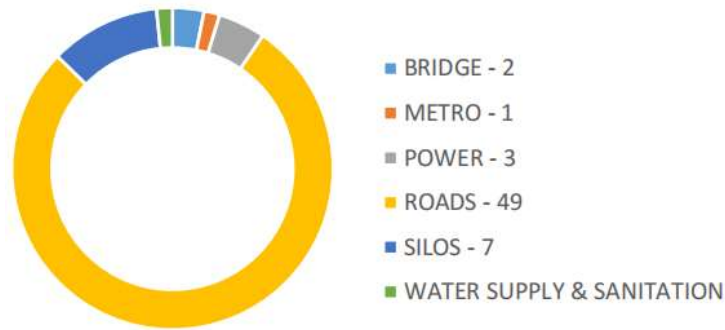


Figure 2.6 VGF sectors in india

2.4 HYBRID ANNUITY MODEL (HAM)

2.4.1 Introduction -HAM

HAM has emerged as a mix of the previous models – BOT-Annuity and EPC Model. During the construction phase, the government pays 40% of the project's capital cost, with the remaining 60% paid as annuities with interest during the operation phase. The first 40% is paid in equal instalments during the construction phase, with the remaining 60% paid as an annuity amount over a 15-year period of operation and maintenance. In addition to annuity payments, the developer will receive O&M payments twice a year. This new model lowers the concessionaire's financial risks during the project implementation phase. In comparison to EPC projects, the shift to HAM would relieve the government's initial cash flow pressure (MORTH, GoI, 2016). In the HAM model, the government also invests 60% of its budget during construction, and the HAM model employs an equal risk-sharing strategy in which risks are appropriately distributed. In the HAM model, the authority provides 60% of the funding during the construction phase and the remaining 40% is paid out over time. The diagram below shows how the various PPP models have been evolved in the transport sector.

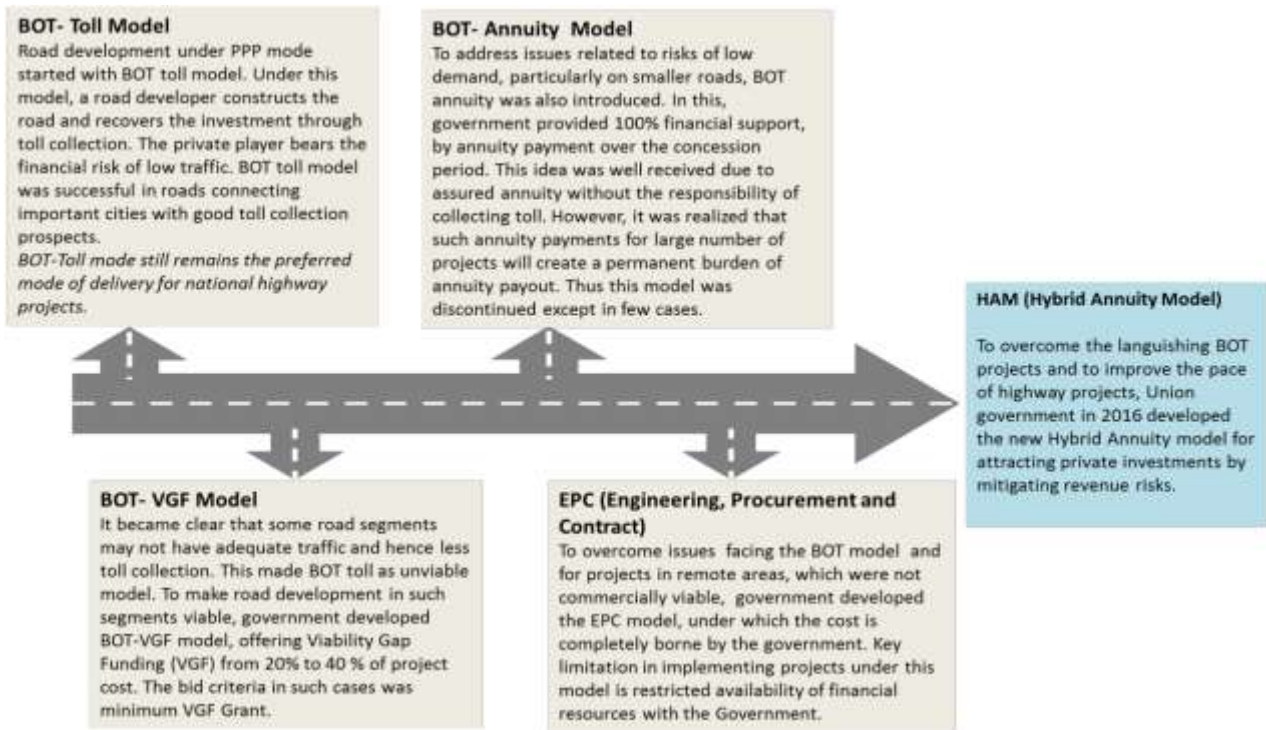


Figure 2.7 Different PPP models in highway development

2.4.2 Experience of using HAM in other sectors

HAM is also being explored in other sectors, Eg. Housing and infrastructure development. The Government of Jharkhand (Urban Development and Housing Department) has issued a Request for Qualification (RFQ) and a Proposal document for the construction of 40,000 housing units for the poor under the PMAY scheme using a hybrid annuity model and a public-private partnership. (Jharkhand Government, 2017) For infrastructure projects in Amaravati, the Andhra Pradesh government has decided to use the Hybrid Annuity Model (HAM). The HAM proposes to build roads, bridges, drinking water, sewage, and power in the three zones of Andhra Pradesh's capital region. The HAM has 3 major modifications in its implementation in their projects. The O&M period is reduced to 10 years instead of 15. Secondly, the share of the project cost will be 49% by the state government, and 51% by developers (as opposed to earlier 40% and 60% in the road projects). The government will have an increased share, because the projects will not be making high revenues.

The state government is also willing to provide guarantees in the event of an annuity payment shortfall (The Pioneer, 2017). Recently, bids were invited for the development of trunk infrastructure (development-estimate for investigation, design, and construction of roads, drains, culverts, water supply, sewerage, STP, utility ducts for power and ICT, reuse waterline, and avenue plantation compatible with trunk infrastructure in layouts for land pooling schemes in zone-12a area) in LPS villages in the Amravati district, costing Rs.4,595 crore. On a Hybrid Annuity Model, the winning bidder will be required to invest 51% of the capital cost and perform performance-based O&M for a period of ten years.

2.4.3 Financial arrangement under HAM

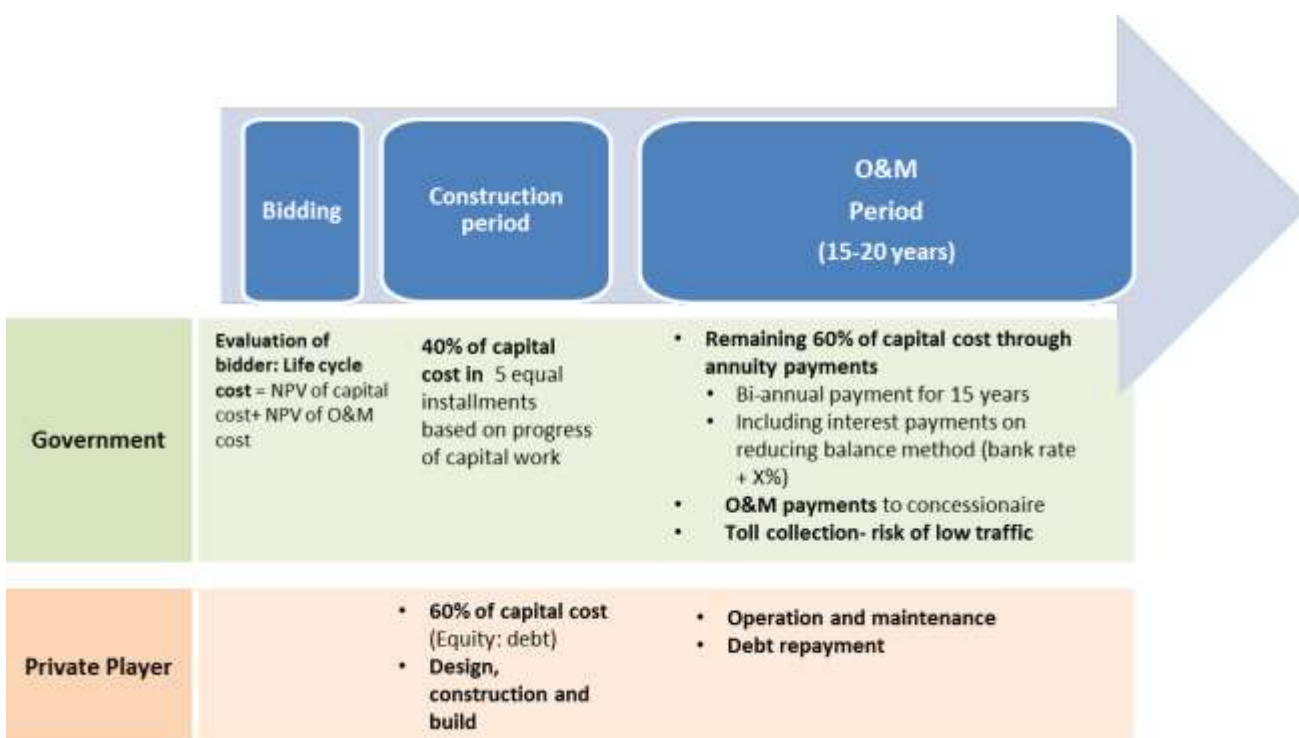


Figure 2.8 Financial arrangement under HAM

2.4.4 Hybrid Annuity Model – structure overview

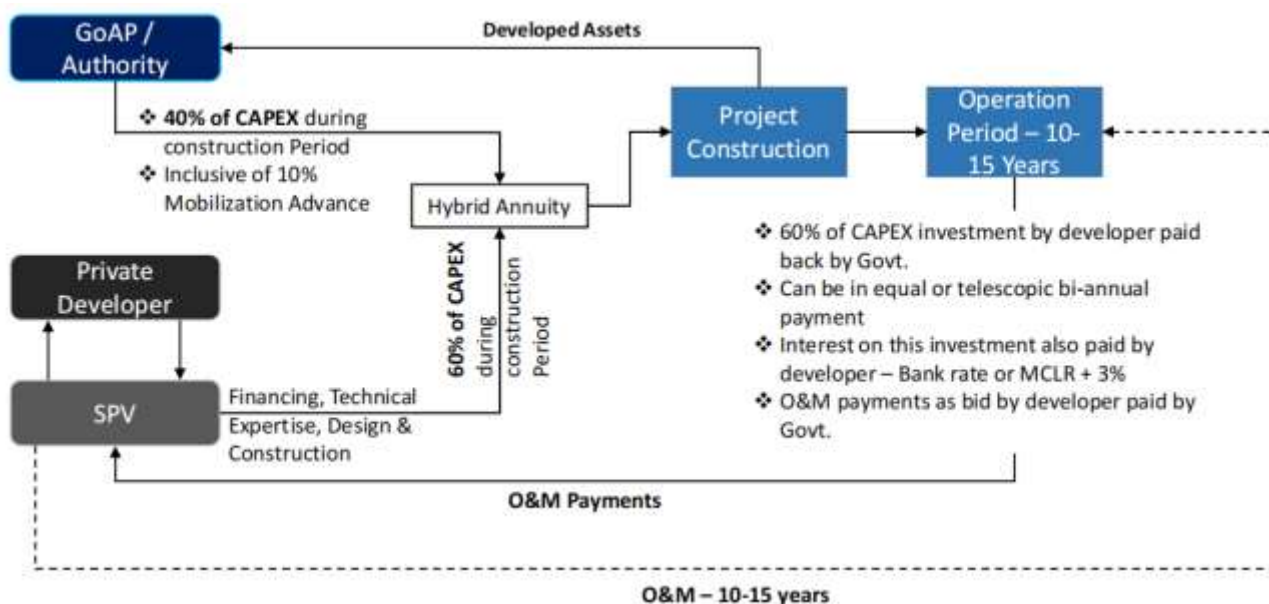


Figure 2.9 Hybrid annuity model – structure overview

2.4.5 Salient features of hybrid annuity projects

Bid parameter: The bid parameter is the project life cycle cost, which is defined as the Net Present Value (NPV) of the quoted bid project cost plus the NPV of the operations and maintenance (O&M) cost over the entire operations period. The developer with the lowest NPV for project life cycle cost wins the bid.

Cash Construction Support: The authority will pay the concessionaire 40% of the bid project cost in five equal instalments linked to the project's physical progress. The concessionaire will have to cover the remaining 60% of the project cost with a combination of debt and equity at first.

Escalation clause in the project cost: The project cost will be inflation-indexed (via a Price Index Multiple) (PIM), which is a 70:30 weighted average of the Wholesale Price Index (WPI) and the Consumer Price Index (CPI) (IW). Until the date of commercial

operations, the bid project cost will be changed to a variation in PIM on a monthly basis (COD).

Stable cash flow of annuity payments: On completion of the project, the Authority will make semi-annual annuity payments to the concessionaire for the remaining 60% of the final bid project cost. Interest on the remaining balance of the final construction cost will be paid in the form of annuity payments in addition to the annuity payments. The interest rate for the same will be the Bank rate plus 3%. (Currently 9.75 percent per annum).

Assured O&M payouts by authority: O&M payments, together with annuity by the Authority, shall be made to the concessionaire, in accordance with the quoted amount indexed to inflation. Until the end of the concession period, the concessionaire will remain responsible for maintaining the project.

Revenue for authority: Toll collection shall be the responsibility and revenue of the authority.

2.4.6 Risk of HAM model

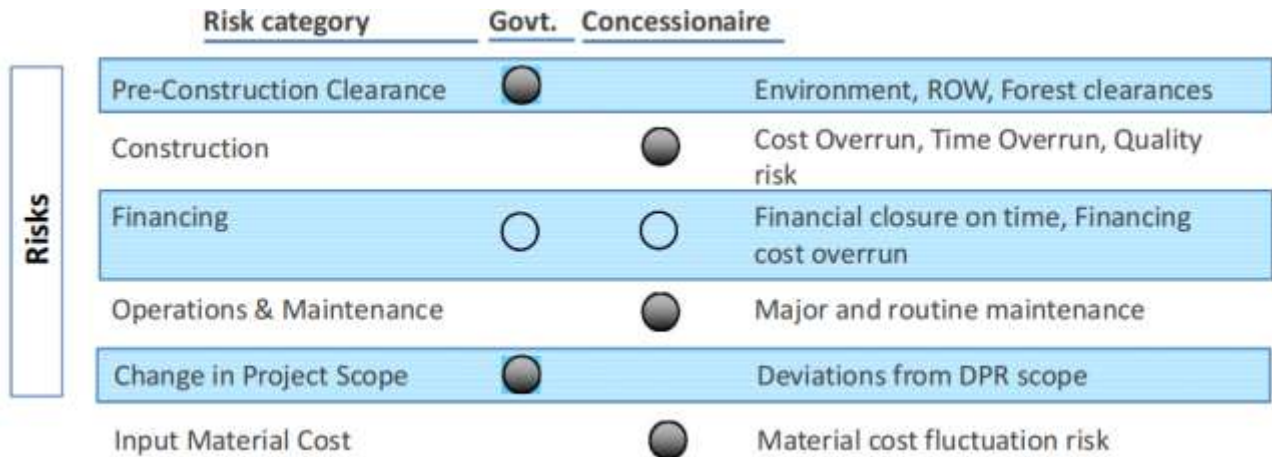


Figure 2.10 Block-diagram provides an risk of the HAM model

2.5 FINANCIAL MODEL OF PPP MODEL

Financial modelling plays a very important role in evaluation of projects for making project financing decisions by both the lenders and equity investors. The funding agencies look at future cash flows in the context of project finance in relation to the initial investment amount when deciding the investment. In order to determine its adequacy, the investors used the financial model to assess the returns from the project. The financial model, on the other hand, is applied by the lenders to determine their lending coverage and the timeliness of project debt service payments. The expenditure incurred towards construction of the project facility, i.e. EPC cost, is normally capitalized and then depreciated against revenues.

$$\text{Net cash expenditure} = -I_c - (1 - \tau) E_c$$

Where, I_c = Expenditures which have been capitalized

E_c = Expenditures which have been expensed immediately

Net present value (NPV) and Internal rate of return (IRR) are the two most commonly used methods to ascertain whether the worth of the project is more than the cost.

2.5.1 Net Present Value (NPV)

NPV is the fundamental financial measure of the present value of future net benefits to be derived from a project. It is calculated as the sum of time adjusted values of cash outflows and inflows for each time period to the planning horizon. The cash outflows are the costs and inflows are the

benefits. If CF_i is the after-tax incremental cash flow which occurs at the time period i , then the NPV can be calculated as follows

$$NPV = CF_0 + \frac{CF_1}{(1+r)} + \frac{CF_2}{(1+r)^2} + \dots + \frac{CF_n}{(1+r)^n}$$

Where, r = Rate of return for the project (or WACC)

n = Project planning horizon (or project duration/investment duration)

The decision rule is that the **project is worthwhile for the investors if the NPV is positive.**

2.5.2 Internal Rate Of Return

IRR is the project's expected rate of return. IRR can be explained as the discount rate at which the present value of cost is equal to the present value of future benefits which are generated from the project. In other words, it is the discount rate at which the $NPV = 0$. By equating the NPV of a project equal to zero, the IRR for the project can be determined by solving for discount rate in the following manner:

$$0 = CF_0 + \sum_{t=1}^n \frac{CF_t}{(1 + IRR)^t}$$

Where, CF_t = After-tax cash flow in the time period t

The decision rule is that the project should be undertaken if the project's IRR is greater than the project's cost of capital

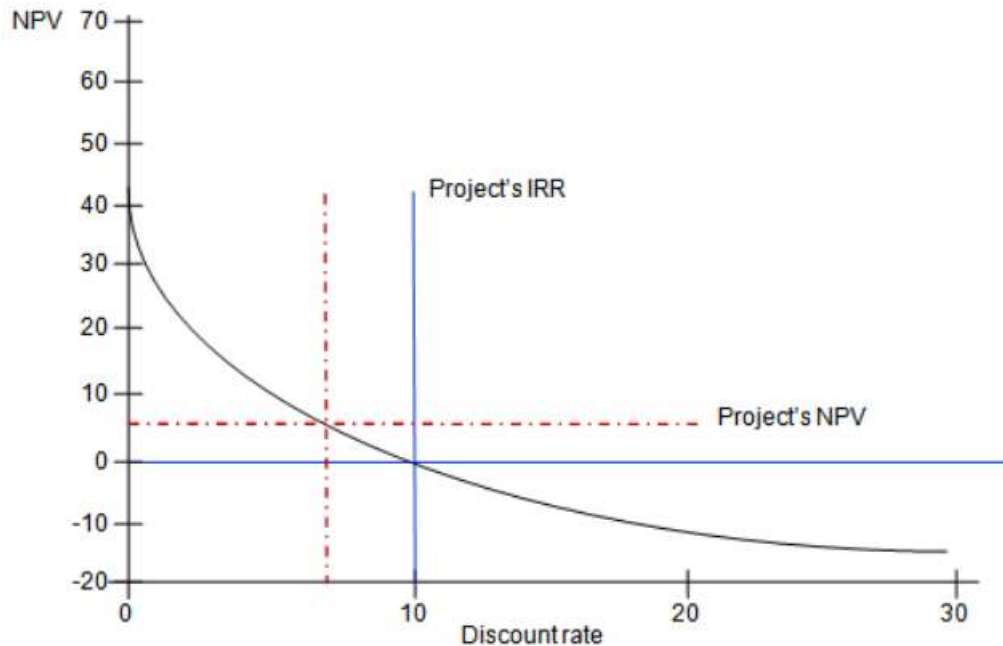


Figure 2.11 Relation between NPV & IRR

NPV and IRR are interrelated. The relationship of NPV with IRR could be shown using an NPV profile, where NPV is shown as a function of discount rate. The NPV profile shows the value of the project at different discount rates. It can be seen that if the project's NPV is greater than zero, then the project's IRR is greater than the project's cost of capital.

The two methods will yield the same result for projects which are both independent and conventional. Independent projects are those project where undertaking that project will not prevent investing in another project. And, conventional projects are those projects with initial cash flow followed by subsequent expected future cash flows, which are expected to be positive.

2.6 FINANCIAL FEASIBILITY STUDY OF PROJECT

The financial feasibility assessment is a critical part in the project preparation stage. It provides information about the costs, expenses and sources of revenues, and gives an indication whether the project is self-sustaining or requires additional financial support in the form of grant to make it viable.

In other words, financial feasibility helps determine whether the project will make sufficient revenues to offset all the costs incurred as well as allow for a reasonable return on investment for the private partner. Financial feasibility forms the basis for determining an appropriate project structure and eventually informs the preparation of bidding documents.

2.6.1 Key assumptions in financial feasibility - development of roads

In a typical road project to be developed, indicative assumptions that are required to undertake the financial feasibility assessment are given below.

- a) General Assumptions – number of toll plazas, number of lanes, operating framework – whether annuity/toll, scope of services to be delivered by the developer, etc.
- b) Tax Assumptions – Corporate tax, Minimum Alternative Tax
- c) Cost Assumptions – base construction cost, annual maintenance per km, periodic maintenance per km, operations cost (manpower, medical aid, etc.), cost of maintenance of toll plazas, etc.
- d) Revenue Assumptions – toll notification
- e) Demand Assumptions – number of PCU counts
- f) Financing Assumptions – Source of finance, cost of debt, cost of equity, debt to equity ratio, etc

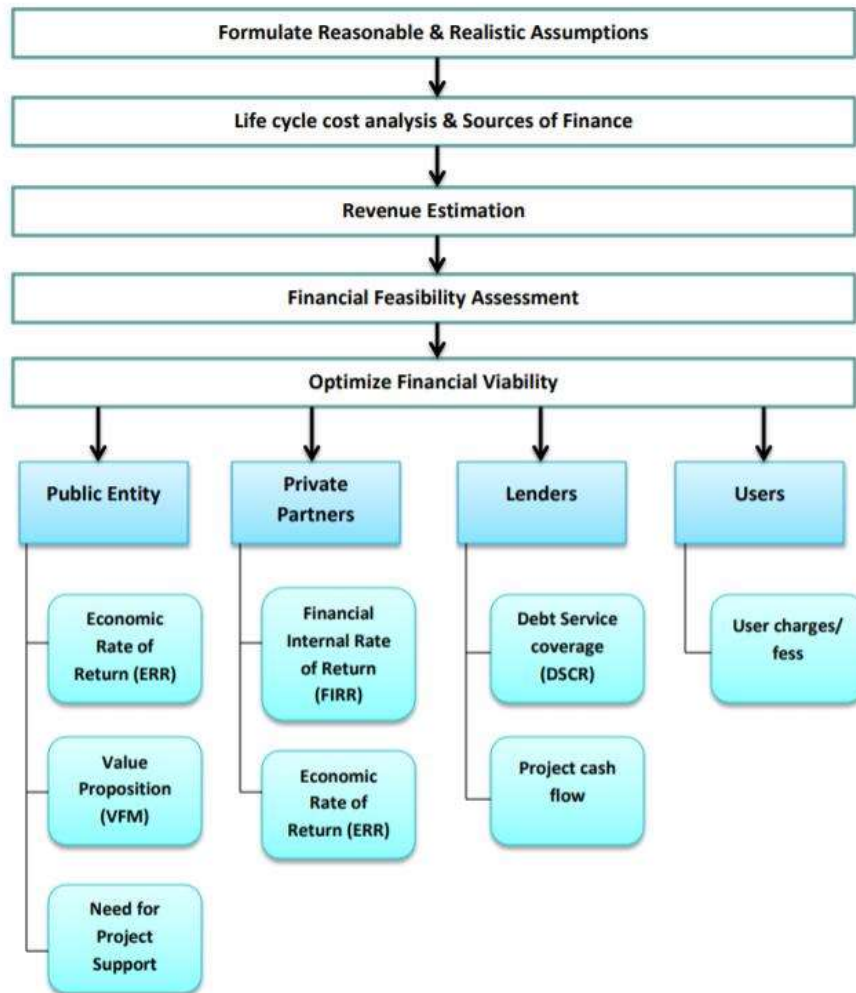


Figure 2.12 steps for financial feasibility study of the project

Source: PPP India

2.6.2 Life cycle cost analysis

The cost of the life cycle is measured by capital and operating costs (O&M costs). The expenditure for capital is generally calculated as the sum of basic building costs, preliminary and preoperational expenses and financing costs. Each component of the following is described:

1. **Base Construction costs:** These are basic direct costs of the project

2. **Pre-operative expenses:** These include accounting/ management fees, legal fees, labour burden, expenses on rent, repairs, telephone bills, travel expenditures, utilities, etc. They reflect expenditure on administration, management, risks and profits.
3. **Preliminary expenses:** These are costs towards carrying out engineering studies such as land surveys, concept layouts, designing, drawing and preliminary studies.
4. **Financing Costs:** This includes financing expenses collected by lenders, construction interest (IDC), etc. Factors such as building times, cost phases over the period, effective life spans of the asset, etc. need to be considered when estimating investment expenditure.

2.6.3 Sources of finance

Because infrastructure projects are highly capital intensive, before an investment decision is made, the private partner lists clearly the financial risks involved. In the case of a greenfield investment, no cash flow will occur during the building period. The private sector is therefore unlikely to finance total equity expenditure. In order to fund a PPP project, a project can use conventional or innovative means. Conventional financial mechanisms

Conventional financing means include mainly equity or debt (borrowings). The Government may also contribute to the development of projects in the form of grant support in addition to both.

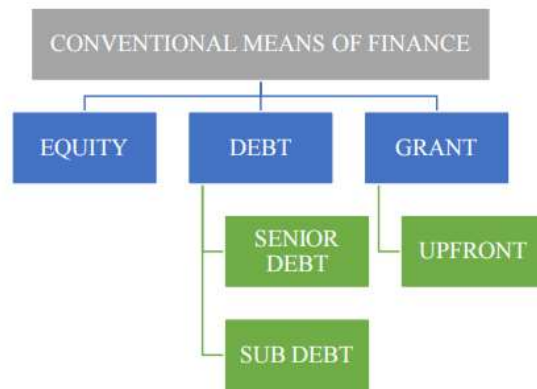


Figure 2.13 conventional means of finance

In most PPP projects, the project partner's consortium members provide equity. Other stakeholders, such as contractors, development partners, or the government, may be able to contribute equity. The equity investors bear the brunt of any project losses, with lenders bearing the brunt only if the equity investment is lost. This means that equity investors take on more risk than debt investors and, as a result, demand a higher return on their investment.

Banks, development partners, and government agencies provide debt, or bonds are issued. Subordinate debt and grants, in addition to these, may be sources of funding. The majority of the debt is classified as "senior debt" by lenders. Because senior lenders in project-financed transactions do not have access to the sponsors' balance sheets, they must ensure that the project generates enough cash flow to service the debt. They must also be given first priority over the project's assets, ahead of other creditors. Senior lenders may also look to their shareholders or a government agency for additional credit support. The senior lender expects more credit enhancements the riskier the project.

The government may provide support in the form of an upfront grant towards capital expenditure to improve the project's viability, depending on its financial feasibility. The Government of India provides capital grants to PPPs in infrastructure across sectors as part of its Financial Support (Viability Gap Funding Scheme).

2.6.4 Revenue estimations

The revenue is determined by the asset/demand services and the corresponding tariff rate. Estimation of revenues would be a by-product of the project's technical studies, such as market studies, traffic studies, and so on.

Tariff Framework

One of the key challenges in a PPP project is to define the most appropriate tariff. Tariffs for services must ideally cover the full cost of service provision, including capital cost, operations and maintenance expense, and the cost of negative environmental and social externalities. The level and structure of tariffs must ideally offer incentives to service providers to minimise costs, and to customers to consume services efficiently. When tariffs are inadequate, the financial feasibility assessment needs to identify a plan to improve cost recovery, and identify sources of financing the full cost of service provision. Different stakeholders have different expectations from the tariff. A framework explaining the expectations of three key stakeholders is provided in Fig 2.14



Figure 2.14 tariff framework

2.6.5 Financial feasibility assessment

A cash flow model is commonly used in financial analysis. Depending on the type and size of the project as well as the variables involved, the cash flow model can be simple or complex. Cash flow projections, which are a critical component of financial analysis, are calculated using capital expenditures, revenues, expenses, terminal cash flow (if any), discount rate, and general assumptions. Because a project's financial feasibility is determined by proposed investments and projected cash flows, it's only prudent to calculate the present value of future investments and cash flows to determine the project's net financial costs and benefits to stakeholders.

KEY FINANCIAL VIABILITY INDICATORS AND INTERPRETATION

The key financial viability indicators that are most commonly used are Project Net Present Value (PNPV), Equity Net Present Value (ENPV), Project Internal Rate of Return (PIRR) and Equity Internal Rate of Return (EIRR). A positive NPV for a project when discounted at weighted average cost of capital (WACC) would mean that project returns are higher than WACC.

2.6.6 Optimise financial viability

Changes in scope, type of PPP structure used, duration of PPP arrangement, increased tariff, provision of Government support in the form of Viability Gap Funding or other grants, unbundling a project, Government guarantees for transferred risk, risk transfer to the Government, and Government inputs in opera could all help to improve a project's financial viability. The following are some innovative options to consider in order to maximise the project's financial viability:

1. Monetising land
2. Transfer of development rights
3. Development of non-project specific infrastructure to support the main project like tourism, commercial development, etc.

2.7 REVIEW OF JOURNALS RELATED TO VGF MODEL AND FINANCE OF PPP PROJECTS

2.7.1 Hiren Maniar, 2012, How Viable Viability Gap Funding (VGF) Concept in Indian Infrastructure Projects? A Case Study on VGF in Indian Road Sector, MITSOM PGRC KJIMRP Vol. III - Issue 02

The paper focuses on VGF (Viability Gap Funding), which has been used in India to finance infrastructure projects, particularly road projects. The purpose of this paper is to investigate and assess the viability of the VGF scheme for Indian road projects by looking at projects that are eligible for the VGF option. The goal claims that the canter's inability to use (disburse) the majority of the budgeted paltry sum of Rs 1,500 crore for VGF this fiscal year will lead one to this conclusion, but government officials argue otherwise. The VGF is intended for PPP infrastructure projects with an estimated internal rate of return of at least 12%. The maximum VGF for a project is set at 20% of the total budget. Another 20% comes from the states and local government bodies.

Data for VGF has been collected from 96 proposals for VGF funding for 96 Highways and Road Projects, with an estimated total cost of Rs 52,620.54 crore, according to the author's research on the PPP India website. The amount sought in the VGF is Rs 10,327.62 crore. So far, 32 projects have received approval, while 5 others are still being considered. There are 21 highway proposals under consideration, and 38 projects have received in-principle approval. The VGF amount approved or under consideration for highway projects is Rs.8870.56 crore, which is 19.57 percent of the total project cost of Rs. 45334.87 crore (Same as per VGF guidelines).

Similarly, the VGF amount approved or in consideration for highway projects is Rs. 1457.06 crore, which is 19.99 percent of the total project cost of Rs. 7285.67 crore (Same as per VGF guidelines). The total VGF for highways and road projects is Rs. 10,327.62 crore, which is 19.63 percent of the total project cost of Rs. 52,620.54 crore (Same as per VGF guidelines).

While considering commercial considerations and the application of appropriate user charges, the VGF mode of infrastructure financing emerges as the most viable and desirable model. If a transparent risk and revenue sharing approach is used, the model is likely to succeed. However, several experts in the infrastructure sector have raised concerns about VGF, claiming that in many road projects, private developers received up to 40% VGF and did not commit to quality.

2.7.2 Suraj H. Sakure, P.H. Sawant and P.S. Jagtap, 2016, Economic and Financial Analysis for Feasibility Study of Public Private Partnership Road Project on Thane-Ghodbunder Road Project

The paper examines the economic and financial implications of expanding the existing 14.2-kilometer Thane-Ghodbunder PPP road project from four to six lanes. Following an economic analysis, a significant amount of money can be saved in the vehicle. Operating costs due to the improved Thane-Ghodbunder road, as well as financial analysis, show that the projects will benefit either of the participants. Thane-Ghodbunder Road is a state highway that runs from NH-8 chainage 497/00 km to NH-3 near Kapurbawadi. It is one of the main connections between the Eastern Express Highway (NH-3) and the Mumbai-Ahmedabad Highway (NH-8).

It also serves as a vital link between cities such as Thane, Borivali, and Dahisar. The rapid industrialization of Thane and Mumbai City has resulted in a massive increase in road traffic on this link. The goal of the study is to close this gap by expanding the existing four lanes to six. The Internal Rate of Return Method (IRR) was used in the study among the various capital budgeting methods. The discount rate for which the NPV value is zero is called the internal rate of return. The goal of the economic analysis is to find the most cost-effective solution for the road project among the various options considered.

Thane Ghodbunder Road	Financial Internal Rate of Return in % (FIRR)
Length 14.9 km	21%

Thane-Ghodbunder Road	Economic Net Present Value of Net Benefits at 12 % Discount Rate (Rs in Lakhs)VOC only as Project Benefit	Economic Internal Rate of Return in %(EIRR)All Savings only as Project Benefit
Length 14.9 km	5937.98	29%

Figure 2.15 FIRR rate of return

The cost of various options is weighed against the benefits of reduced road user costs in the economic analysis. For the Thane-Ghodbunder Project Road, the Economic Internal Rate of Return (EIRR) and Net Present Value (NPV) for the Flexible Pavement option are calculated. Calculating the FIRR (Financial Internal Rate of Return) on the project investment is the basic methodology used to determine the project's financial viability. The results of the Thane-Ghodbunder Road Economic Analysis show that widening and strengthening the existing road is economically viable, with an EIRR of 29% for the entire road project. The results on financial analysis conclude that Private Partner can achieve his benefits.

Therefore, the study concludes that the Thane-Ghodbunder Road Project which operates on Built, Operate and Transfer (BOT) basis can be beneficial for Private Partner. Improvement of Thane-Ghodbunder Road is also adding many Social Benefits to the Society

2.8 SUMMARY OF UNDERSTANDING FROM LITERATURE REVIEW

The study on various aspects and topics related to the project is understood and noted. The detailed information on the PPP projects, VGF scheme, HAM Model and financial feasibility study helps to understand the details which can be collected in the case studies. The journals related to the project also gave the clear idea on the specific aspects of the project.

CHAPTER 3

CASE STUDIES

3.1 INTRODUCTION

This chapter includes the project study of case studies which includes two International case studies from Vietnam and Indonesia and two Indian Case study from Andhra Pradesh.

3.2 DAU GIAY – PHAN THIET EXPRESSWAY (DPEP)

LOCATION: VIETNAM

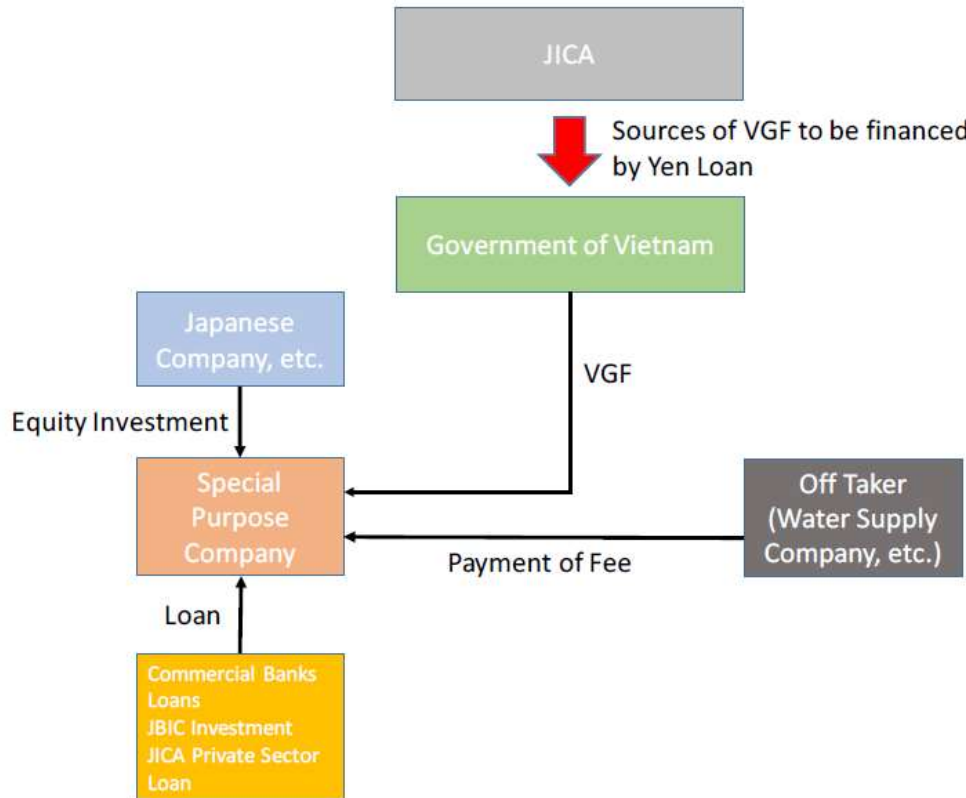
3.2.1 VGF in Vietnam, japan

The VGF Yen Loan is one of the new yen loan schemes introduced on December 9th, 2014 to help developing countries with infrastructure development. It was introduced alongside two other schemes, the Equity Back Finance Yen Loan and the Standby Yen Loan for Credit Enhancement, all of which were designed to aid infrastructure development through PPP. Behind this introduction was the Government of Japan's (GOJ) strong commitment to provide as much support as possible for Asia's massive financial needs for infrastructure development. The initiative titled "Partnership for Quality Infrastructure," announced in May 2015, was a concrete manifestation of this commitment.

The VGF Yen Loan will be used to back-finance VGF that will be distributed to PPP projects in developing countries. The loan will be extended to developing country governments in the same way that the other Yen Loans have been. However, its application is limited to VGF back-financing of PPP projects in which a Japanese/Vietnamese joint venture (or a group of Japanese companies; the term “a Japanese/Vietnamese joint venture” is used to refer to both a group of Japanese companies and a Japanese/Vietnamese joint venture) (SPC).³

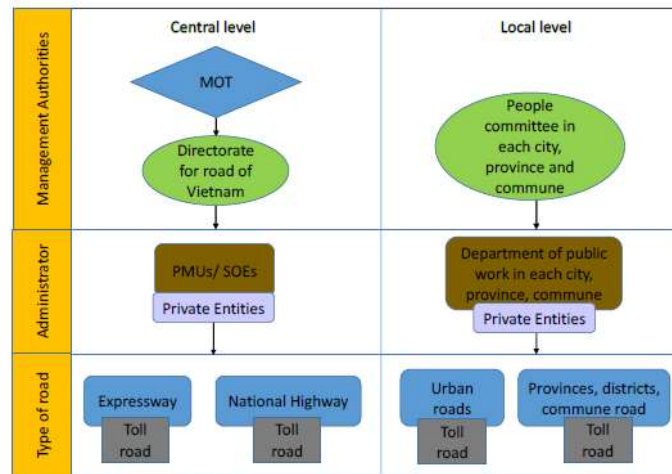
Its goal is to promote PPP projects by ensuring their financial viability through VGF. When a developing country's government decides to use VGF to ensure the financial viability of a PPP infrastructure project, the proceeds of the VGF Yen Loan can be used to back-finance

the VGF amount if the project is awarded to a Japanese/Vietnamese joint venture. The profitability of the project improves as VGF fills the gap between expected project costs and actual revenues, allowing a Japanese/Vietnamese joint venture to invest more in infrastructure in developing countries. Figure 4.1 depicts the VGF Yen Loan scheme in Vietnam and Japan.



Source: https://www.jica.go.jp/activities/schemes/finance_co/about/ppp.html

Figure 3.16 scheme of VGF yen loan



Source: JICA Study Team

Figure 3.17 administrative structure in road sector

3.2.2 Project Introduction

The Dau Giay – Phan Theit Expressway (DPEP) is a 98.3-kilometer-long project that will begin construction in 2019. The project has a four-year construction phase and a 26-year operational phase. The Build Operate Transfer scheme is used in the DPEP project (BOT). The project's repayment period is 20 years, and the project's depreciation period is 26 years. The toll price is USD 7.5/km, with an annual increase of 4%.



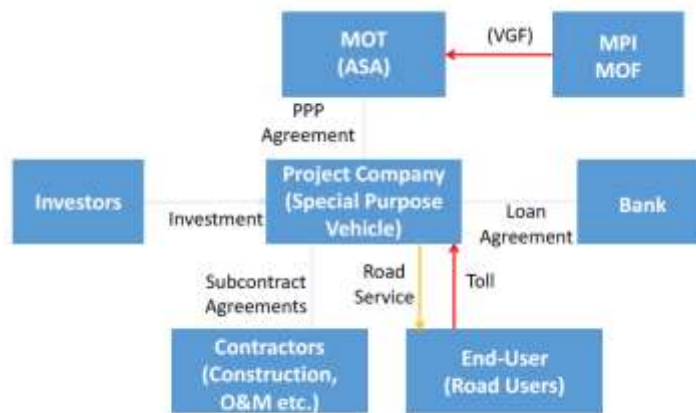
Figure 3.18 map showing DPEP highway route

3.2.3 Project details

DPEP was planned as the first PPP expressway in 2013, with the MOT contributing a portion of the cost as a public investment and investors expected to invest in the remaining section, as well as operate and collect tolls for both sections. BITEXCO was chosen as the first investor, contributing 60% of the required equity and accounting for 21% of the total project cost in the PPP section. The DPEP is expected to cost \$757 million in capital. The project's proposed concession period is 30 years. The DPEP project's SPV is BITEXCO. The project's concessionaire is this SPV.

3.2.4 Project scheme of DPEP

The DPEP Highway project's project scheme involves the Ministry of Transport (MOT), with the government providing a VGF grant to the project's SPV. The SPV collects debt from the bank in the form of a loan and from other project investors. The flowchart of the scheme of the project is represented in Fig 3.4



Source: JICA Study Team

Figure 3.19 project scheme of DPEP highway

3.2.5 Cost and revenue of DPEP

The VGF refers to the initial construction cost subsidy given to SPC (not for O&M cost). During the construction period, the VGF will be disbursed on an annual basis in accordance with the allocated budget for construction (first 2-4 years). The cost of land acquisition is not included in the project cost. The remaining 70% of the project's cost is financed with 30% equity and 30% debt. The debt portion is assumed to come from a domestic bank (option 1) or JICA PSIF (option 2). (Option 2). The former loan from a domestic bank is assumed to have an interest rate of 10.0 percent, while the JICA PSIF, which is provided in USD currency under the SWAP scheme, is assumed to have an interest rate of 5.0 percent.

The equal payment method is used, in which the annual principal and interest repayment amounts are the same throughout the repayment period. The repayment period is estimated to be 20 years, including the construction period's grace period (2-4 years).

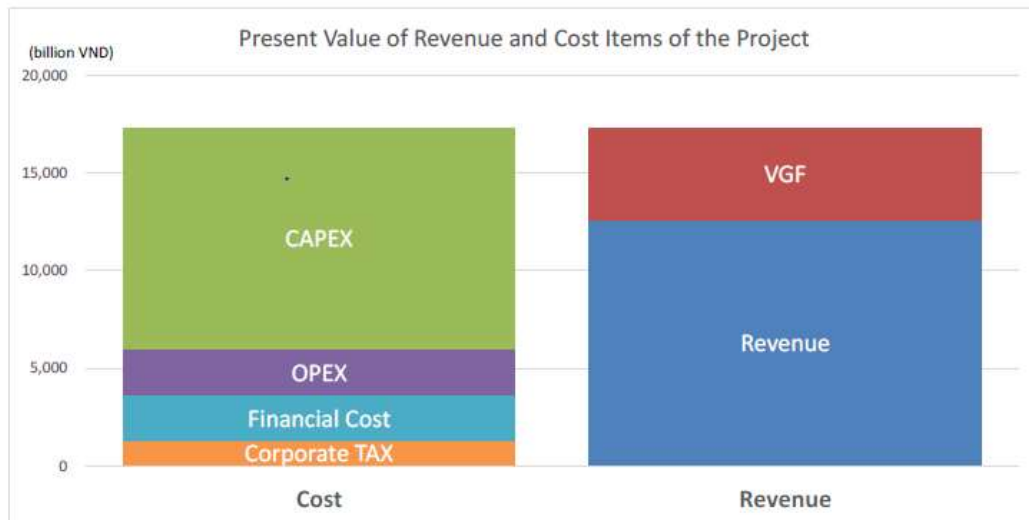


Figure 3.20 present value of revenue and cost items of DPEP

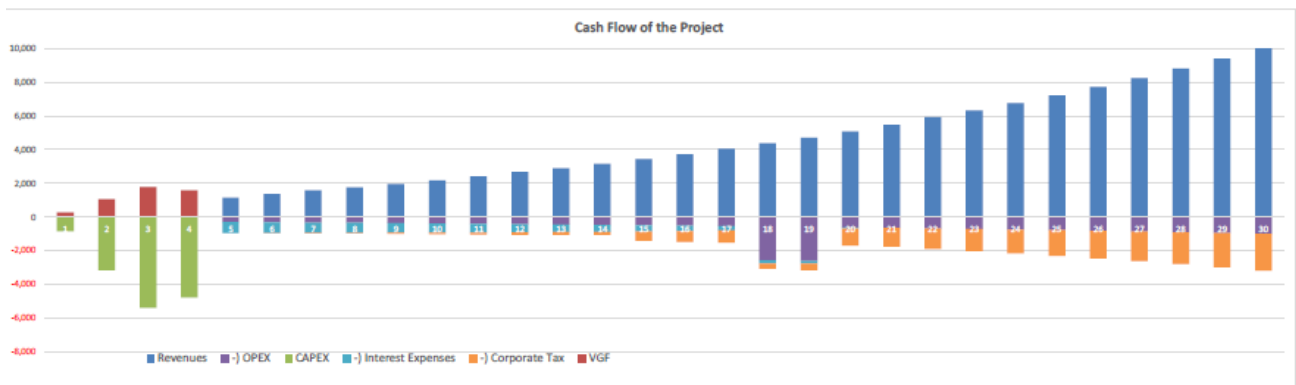
3.2.6 VGF of DPEP project

Borrowing loans from domestic banks with repayment terms of more than ten years is difficult in Vietnam's current economic conditions. If the loan is borrowed from a domestic bank, refinancing would take place after the first ten-year loan agreement (option 1). If JICA PSIF provides funding (option 2), JICA will ask the Vietnamese government to guarantee the exchange of revenue earned in Vietnamese Dong to hard currency and to mitigate exchange rate risk through swap arrangements and other means. In order to maintain an appropriate financial return for investors, the target Equity-IRR is set at 20%, based on previous PPP project cases in other countries.

To make the calculation easier, the internal reserve is not taken into account, and the entire profit is distributed as dividends. The VGF amount of DPEP is calculated as 33.1 percent of total CAPEX as a result of cash flow analysis.

3.2.7 Cash flow of DPEP project

FIG 3.6 shows the cash flow of DPEP highway project from its construction period to its overall operational period. It concludes the cash flow of capital expenditure, VGF grant, operational expenditure, revenue, and corporate tax.



Source: JICA Study Team

Figure 3.21 cash flow of DPEP

As mentioned above, another option (OP2) was also analyzed by assuming to apply 5% of interest rate from PSIF loan (USD). In this option, VGF amount is calculated at 17.5% of the total CAPEX. In addition, sensitivity analysis with +/- 10% change of annual revenue during entire project life

was calculated for reference. Table 3.8 shows the revenue and interest rate calculation of DPEP highway project with 5% and 10% interest rates.

Table 3.2 interest rate of DPEP project

Change In		Interest Rate	
		5%	10%
Revenue	+10%	8.0%	25.0%
	+/- 0%	17.50% (OP2)	33.1% (OP1)
	-10%	27.5%	41.3%

Source: JICA Study Team

3.3 FOUR LANING OF NARKETPALLY-ADDANKI MEDARAMETLA ROAD PROJECT

3.3.1 Project details

Four laning of Narketpally-Addanki-Medarametla Road Project is the road sector construction which is 212.5 KM (Kilometer) length. The project is VGF grant project. The Project Cost (as per Concession Agreement) is Rs 1196.84 Crore. The revised Project Cost in Rs 1760.53 Crore. The Grant Amount in Rs. 467.02 Crore. The concession duration of the project is 288 months (24 years) with its construction.

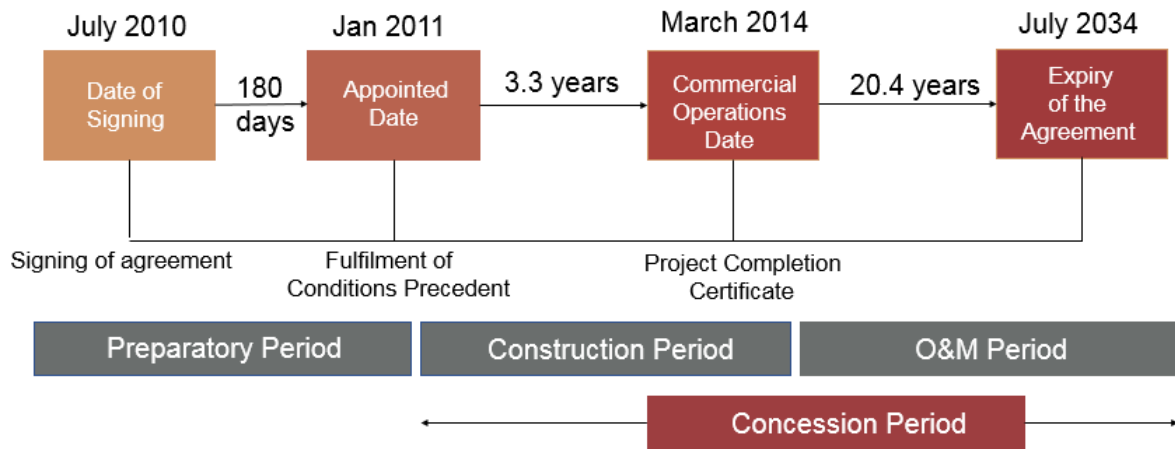


Figure 3.22 four laning of narketpally-addanki medarametla road

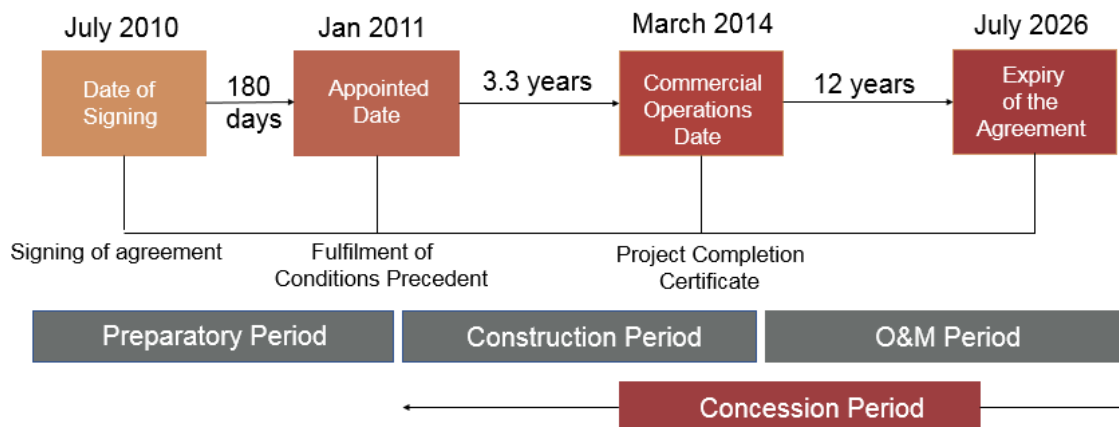
3.3.2 Timeline of NAM road

The Construction Completion Date (as per Concession Agreement) of the NAM project is 07-Jul-2013. The Construction Completion Date (Actual) is 06-Mar-2014. The Date to Start of Commercial Operation (as per Concession Agreement) of the project is 17-Jul-2013. The Date to Start of Commercial Operation (Actual) is 06-Apr-2014. The Concession End Date (as per Concession Agreement) of NAM road project is 22-Jul-2034.

TIMELINE OF NAM ROAD (VGF Model)



TIMELINE OF NAM ROAD (as per HAM Model)



3.3.3 PROJECT FEASIBILITY STUDY

3.3.3.1 Net Present Value

State highway which is going to be constructed is expected to have a life time of 15 years without any expansion being required in between

Net present Value =2,285.62crores

$$\text{Net Present Value (NPV)} = \sum_{t=1}^T \frac{\text{Cash Flow}_t}{(1+i)^t} - \text{Initial Cash Investment}$$

t = Cash Flow Period
 i = Interest Rate Assumption

3.3.3.2 Benefit- cost analysis

Just as income and expenses are used in private sector, so cost benefits are used in public sector to signify the economic consequences of economic decisions.

$$\text{Benefit-cost ratio (BCR)} = \frac{\text{Present value of Benefit (PVB)}}{\text{Investment}}$$

IF, BCR >1: Accepted

BCR <1: Rejected

Calculated value of BCR for the project = 1.12 ACCEPTED

3.3.4 Capital & finance

Fig 3.8 shows the cash flow of the project with capital expenditure of equity and debt and flow of grants from the government from the start of construction.

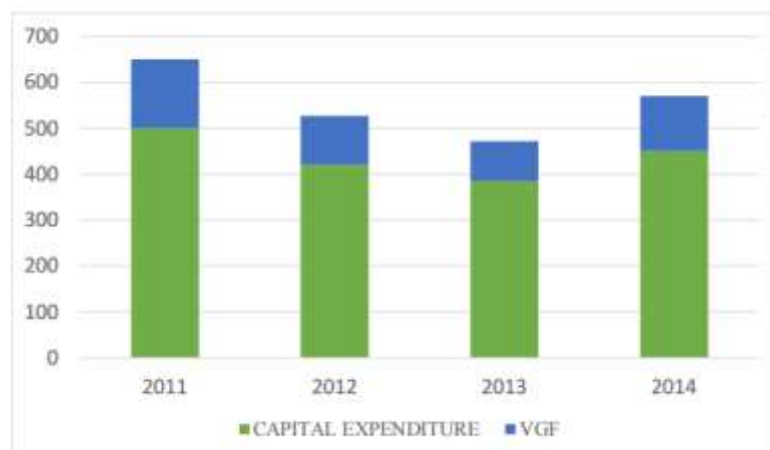


Figure 3.23 capital flow details of NAM project

3.3.5 Operational finance

After its construction, the income is generated from the three tolls on the road. The table 3.1 below gives the toll collections details on the last two years.

Table 3.3 toll collection details of NAM project

S.No	Particulars	Toll Collections (1.04.2019 to 31.02.2020)	Toll Collections (01.04.2018 to 31.03.2019)	Toll Collections (01.04.2017 to 31.03.2018)
01	Toll Plaza-1	54.24	49.36	45.87
02	Toll Plaza-2	46.52	42.77	39.21
03	Toll Plaza-3	39.95	33.82	24.56
	Total	140.71	125.95	109.64

Table 3.4 Rate details of toll plaza- 1 of NAM expressway project

Rates applicable up to 31" March 2020				Rates applicable up to 31" March 2019		
Car	Single	Daily	Monthly	Single	Daily	Monthly
LCV	55	84	1650	50	80	1610
Truck / Bus	120	170	4015	115	162	3980
MAV / HCV	240	350	6250	230	340	6180

Table 3.5 Rate details of toll plaza-2 of NAM expressway project

Rates applicable up to 31" March 2020				Rates applicable up to 31" March 2019		
Car	Single	Daily	Monthly	Single	Daily	Monthly
LCV	59	88	1650	54	82	1610
Truck / Bus	125	178	4025	119	168	4002
MAV / HCV	245	358	6260	235	345	6205

Table 3.6 Rate details of toll plaza- 3 of NAM expressway project

Rates applicable up to 31" March 2020				Rates applicable up to 31" March 2019		
Car	Single	Daily	Monthly	Single	Daily	Monthly
LCV	55	84	1650	50	80	1610
Truck / Bus	120	170	4015	115	162	3980
MAV / HCV	240	350	6250	230	340	6180

3.3.5 Traffic volume

Concession agreements have been provided with estimated traffic volumes in terms of passenger car units (PCUs). Failure to meet expected traffic volumes has typically resulted in the concession period being extended. Because an extension may impose additional responsibilities and obligations for the duration of the contract, it is not always in the concessionaire's best interests. Furthermore, the NHAI's traffic forecast may be inaccurate. As a result, actual traffic volume will continue to outnumber forecasts. This may result in traffic jams at toll booths and delays in crossing the stretch. As a result, additional project improvements will be required, resulting in additional costs

Under HAM, the government bears the revenue risk in projects where traffic volume is lower than expected, resulting in lower toll collection. The TOT model was used to fund NAM expressway highway projects that had been operational for at least two years and were collecting toll revenues. A new system was implemented to address tolling leaks (Turnover Tax). Aside from tolling in projects that have been completed or that may require repairs in the future, TOT.

3.5.6 Traffic projections in passenger car units (PCU)

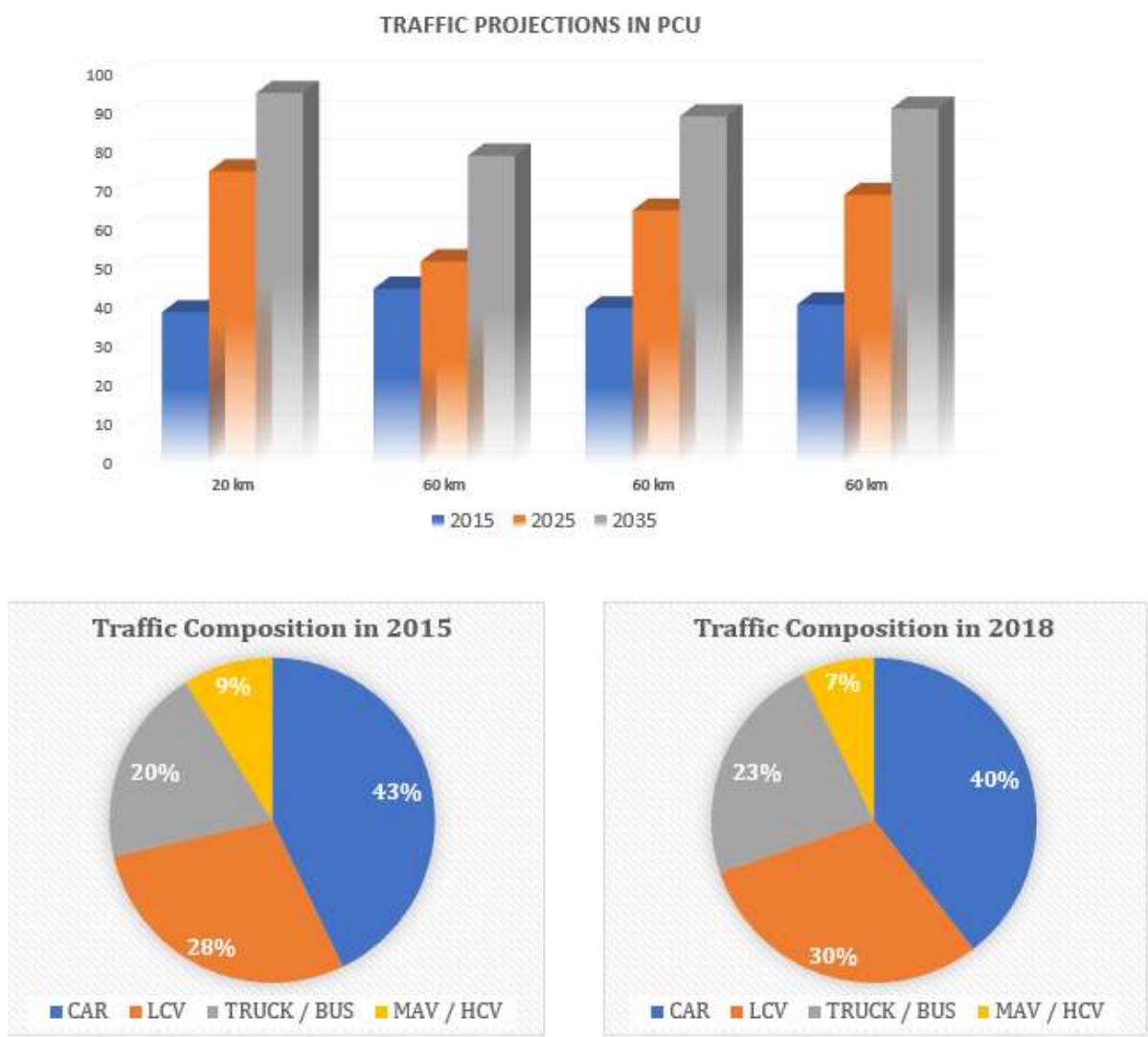


Figure 3.24 traffic projections in PCU

3.5.6 Financial summary of NAM project

The following table gives out the financial summary of the NAM project for March 2020

Table 3.7 financial summary of NAM project

		For the year ended	For the year ended	For the year ended
		31.02.2020	31.03.2019	31.03.2018
S.No	Particulars	(Rs.)	(Rs.)	(Rs.)
01	INCOME			
	Income from Operations	130,55,72,244	125,95,32,585	120,39,48,347
	Other Income	10,12,24,340	13,51,74,810	3,09,28,205
	TOTAL	140,67,96,584	139,47,07,395	1,23,48,76,552
02	EXPENDITURE			
	Employee Benefits Expense	72,18,460	65,77,270	49,95,685
	Finance Costs	1,65, 10,75,425	1,58, 22,75,555	1,80,90,45,970
	Depreciation & Amortization expense	14,52,36,412	11,25,75,385	12,05,87,270
	Other Expenses	17,25,29,452	13,12,87,258	9,66,54,049
	TOTAL	1,97,60,59,749	1,83,27,15,468	2,03,12,82,374
03	PROFIT/ (LOSS) BEFORE TAX	(56,92,63,165)	(43,80,08,073)	(63,31,60,533)

3.5.7 Financial growth of the project

Fig 3.17 shows the revenue and expenditure of NAM project after it comes to the operational period from 2015 to March 31st 2019. The flow of the cash is not constant and it varies from year to year.

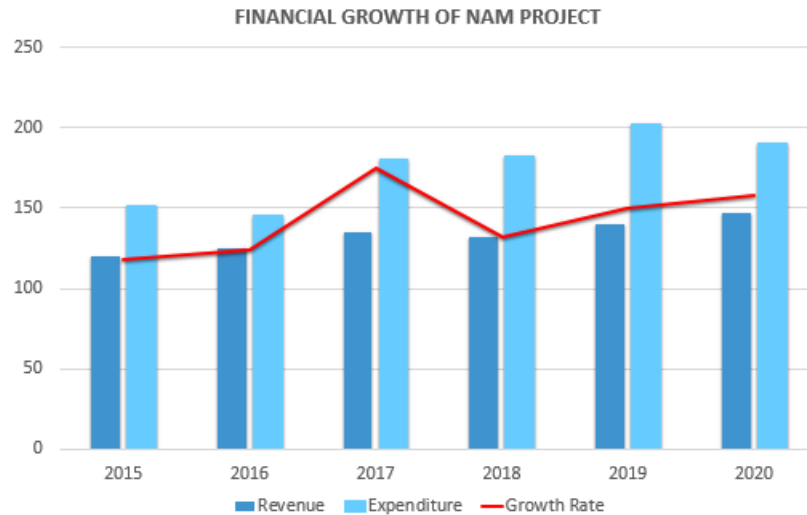


Figure 3.25 financial growth of NAM project

3.3.10 Risk allocation both model in NAM project

Table 3.8 risk allocations of both model IN NAM project

	Risk Type	BOT Toll (VGF)	BOT Annuity(HAM)
A	Pre-Operative Task Risks		
A1	Delays in Land Acquisition	Public Sector	Public Sector
A2	External Linkages	Public Sector	Public Sector
A3	Financing Risks	Private Sector	Private Sector
A4	Planning	Private Sector	Private Sector
A5	Approvals	Private Sector	Private Sector
B	Construction Phase Risk		
B1	Design Risk	Public Sector	Public Sector
B2	Construction Risk	Public Sector	Public Sector
B3	Approvals	Public Sector	Public Sector
C	Operation Phase Risks		
C1	Technology Risk	Public Sector	Public Sector
C2	Operations & Maintenance Risk	Public Sector	Public Sector
C3	Volume Risks	Private Sector	Private Sector
C4	Payment Risks	Private Sector	Public Sector
C5	Financial Risks	Private Sector	Private Sector
D	Handover Risk Events		
D1	Handover Risk	Private Sector	Private Sector
D2	Terminal Value Risk	Private Sector	Private Sector
E	Other Risks		
E1	Change in Law	Public Sector	Public Sector
E2	Force Majeure	Shared	Shared
E3	Concessionaire Risk	Public Sector	Public Sector
E4	Sponsor Risk	Private Sector	Private Sector
E5	Concessionaire Event of Default	Private Sector	Private Sector
E6	Government's Event of Default	Public Sector	Public Sector

3.3.11 Summary of the understanding

The earlier construction period of the project was given by 2.5 years but the construction exceeded by 9 months and finished its construction 6th April, 2014. This reduced the concessionaire period of 22.5 years to 21.8 years. The income from the tolls is exceeded the expenditure since its operational and maintenance cost is higher by day by day. The concession period is the time where the concessionaire finishes its loan acquired from the banks.

CHAPTER 4

ANALYSIS OF NAM ROAD PROJECTS

4.1 ANALYSIS OF NAM ROAD PROJECT

This chapter analyses the proposed and actual concession periods of Narketpally-Addanki-Mederametla (NAM) road project from the same region and explains & issues of the sector how it differs in the projected profit of the projects and Findings & analysis of live case study of NAM study

4.2 NAM ROAD PROJECT – PROPOSED & ACTUAL CONCESSION PERIOD

In case of NAM Road project, the proposed completion date is 7th July, 2013 but the project completed in March 6th 2014 which is the delay of 8 months. This resulted in the change of proposed concession period of 21.5 years of the project. The concession period is calculated based on the study by Siddharth Sinha, February 2020, Toll Road Financing. This shows that the project has to give a profit 20% of the project cost.

The average of the last 5 years is 59.3 crores which is very low when compared to the initial project feasibility study. And the concession period now is 20 years and 10 months which is $20.8 \times 59.3 = 1233.44$ crores where the actual debt to be collected is 1043.51 crores. As per the actual concession period of 21.5 years, the $21.5 \times 59.3 = 1274.95$ crores where the profit of 231.4 crores will be achieved by the concessionaire which is **13.14% of the project cost**. In case of providing the 21.5 years to the project, the concession period of the project ends in **10th March, 2036**. The amount to be gained is 352.11 crores which is 20% of the total project cost. With the average amount of 59.3 crores per year, the project can be should be extended to another 7 months to reach its profit from the project to the concessionaire.

Therefore, the final concession period with the profit of the project takes time period of **25th November, 2037** for Narketpally- Addanki- Mederametla (NAM) road project. The study shows that any delay in the schedule of the project drastically reduces the profit as seen in the above case analysis of NAM road projects. While 8 months delay resulted in 7% reduction in the profit of the project according to their revenues generated. Further studies are required to identify the point where the delay occurs in the projected construction period of the project.

4.3 COMPARISON RISK ALLOCATION AMONGST MODEL (VGF) AND HAM MODEL

Table 4.1 risk allocation amongst model (VGF) AND HAM model

Risks	BOT Toll	Hybrid Annuity
Preconstruction		
a) Environment, forest clearances, Right of Ways	Responsibility of Handing over ROW on at least 80% of required area, Environmental protection& Conservations, Forest Clearances will be procured by the Authority.	
Construction Risk		
a) Cost overrun	Concessionaire to bear all risk	
b) Time overrun		
c) Quality		
Financing Risk		
a) Achieving Financial closure in time	Concessionaire to bear all risk	
b) Financing cost overruns		
a) Interest Rate		
b) Repayment		
c) Foreign Exchange		
Revenue		
a) Traffic volume	Shared by concessionaire & Authority. IF average Traffic volume falls below 2.5% of targeted traffic on targeted date (approx. 10 years after start of operations) Concession period is extended by 1.5% per 1% of shortfall. If Actual traffic exceeds the targeted traffic by 1% the Concession period is reduced by .75%.	NHAI to take all risks
b) Toll leakages	Concessionaire to bear all risk	NHAI to take all risks
c) Tariff Rates	Tariff rates are decided as per National Tariff Policy. Hence there is no ambiguity involved. However revenue may reduce if the WPI does not rise as per original expectations of the Concessionaire.	NHAI to take all risks
d) Competing road	Concessionaire to be compensated suitably if traffic exceed capacity	NHAI to take all risks
Operations Risk		
a) Annual O&M	Concessionaire to bear all risk	
b) Additional Periodic Maintenance		
Economic Risks		
a) Taxes	Concessionaire to bear all risk	
b) Inflation		
Force Majeure (FM) events		
Time extension		
a) Before Financial closure (Appointed Date)	Time set forth for achieving Financial closure extended by time of FM event	

Table 4.2 risk allocation amongst model (VGF) AND HAM model

Risks	BOT Toll	Hybrid Annuity
b) Between Appointed Date and Commercial Operation date (COD)	Time set forth for Project completion extended by time of FM event Non-political FM: Respective parties to bear the costs. Neither party is required to pay other party	
c) After COD	Concession period extended by time of FM event	Concession period not ex-tended. But Concessionaire will continue to receive Annuity
Cost arising out of FM event		
a) Before Appointed date	Cost to be borne by Concessionaire & Authority respectively	
b) After Appointed Date	Non Political Event : Cost to be shared by respective parties Indirect Political event : To be shared Direct Political : Cost compensated by Authority	
Hand Over Risks		
a) Quality of Road	Concessionaire to bear all risk	
b) Default of Concessionaire	Pay 90% of Debts due at that time	During Operations: 65% of debt due; During construction: 50% to 80% of debt due of 9% to 32% of Bid project cost which ever lower
c) Default of Govt. / NHAI	Pay all debts plus 150% of equity	Before COD : All debt due or 9% to 40.5% of PID Project Cost whichever lower plus 150% of equity; After COD: All annuity payments due till transfer date
Other risk		
a) Scope change during any stage	Authority to compensate if change cost increases beyond 0.25% of project cost.	Authority to compensate costs fully

4.4 OVERVIEW ISSUE OF THE SECTOR

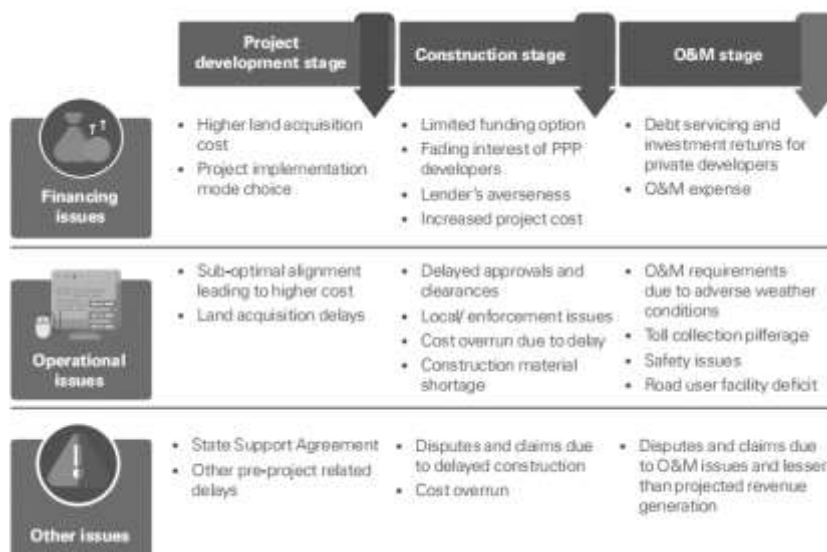


Figure 4.1 overview issue of the sector

FINANCING ISSUES

a. Project-development stage	b. Construction stage	c. O&M stage
Land acquisition cost has increased more than 30 per cent since 2017⁵ primarily due to enhanced compensation payment requirements as per 'The Right to Fair Compensation and Transparency in Land Acquisition, Rehabilitation and Resettlement Act'. In addition to this, current project implementation modes like EPC and HAM put high stress on government resources, thus limiting the number of projects that can be taken up at one go.	There is a lower appetite for private developers to absorb construction risk as well as traffic risk based on legacies – e.g. languishing projects and projects needing premium payment deferment. Road sector projects are increasingly facing financial closure issues. Reasons include wariness of banks to lend, high share of NPAs, asset liability mismatch and banks reaching infrastructure lending caps.	There is uncertainty on equity returns in existing operational PPP projects along with difficulties faced in servicing debt. This is due to uncertainty of toll revenue collection and variation of collected toll revenue compared to projected levels. This discourages private sector interest. The increase in O&M costs are also affecting the project returns.

Figure 4.2 financing issue of the sector

OTHER ISSUES

a. Project-development stage	b. Construction stage	c. O&M stage
All state government authorised projects are not backed by a state support agreement, which results in low interest in such projects.	Claims arising out of disputes between the concessionaire/contractor and the government authorities is also a significant cost which can lead to large liabilities.	The returns on projects is not upto expectations because of improper DPR and traffic reports in the feasibility stage. Actual traffic is much less than the anticipated traffic, and so the lower returns deeply affects the financials of the project. Arbitration issues also result in project delays, which cause cost and time overruns.

Figure 4.3 other issue of the sector

OPERATIONAL ISSUES

a. Project-development stage	b. Construction stage	c. O&M stage
Delays in pre-construction activities (such as land acquisition, relocation) is affecting project timelines. These processes consume considerable time. Land acquisition for road projects involve various stages. Each stage involves a number of stakeholders and regulatory bodies. The completion depends on other factors like geographical location and hence, the process is challenging. Inadequate technical due diligence at the time of preparation of Detailed Project Report (DPR) can also lead to high project costs due to aspects like sub-optimal alignments leading to enhancement in construction cost.	Road development process requires a number of approvals such as environmental clearance, forest clearance, railways clearance, etc. Each of these activities take considerable time and non-adherence to timelines result in cost overruns due to delays. In addition, other factors like enforcement issues and lack of construction material also result in delays. Managing problems of sub-contractors and holding them accountable is also a major issue faced. Sub-contractors also face payment issues.	Often unforeseen weather conditions require unplanned O&M, over and above the routine and periodic maintenance activities. This results in enhanced O&M expenses. In addition to this, there is a general lack of road user facilities. Safety related issues are also observed on many road stretches such as high accident response times, etc.

Figure 4.4 operational issue of the sector

4.5 FINDINGS FROM LIVE CASE STUDY

- **Project Corridor Dynamics Favour Traffic Growth**

The project road, which runs from Narketpally to Addanki and Medarametla and is part of the Andhra Pradesh State Highway 2, is 212.50 kilometres long. The project stretch connects Hyderabad to the port cities of Chennai and Nellore in the shortest time possible. Vehicles bound for important commercial centres around Hyderabad, as well as those bound for central and northern India, must pass through NAMEL. Andhra Pradesh's upcoming capital city could boost construction material demand while also increasing multi-axle vehicle traffic on this project road.

- **Strong Revenue Growth Historically Barring FY20**

Between FY16 and FY20, revenue grew at a healthy CAGR (Compound Annual Growth Rate) of 6.2 percent. During FY15-FY20, passenger traffic, which includes cars in general, accounted for roughly 13% of total annual revenue. During the same time period, commercial traffic accounted for 87 percent of total annual revenue

generated. In FY19, NAMEL's revenue increased by 18% year over year. Toll revenues, on the other hand, fell by 3.3 percent year over year in FY20, as traffic fell by 4%.

- **Traffic Growth slowdown reasons**

The decline in traffic can be attributed to the following reasons: Political uncertainty, which has slowed construction activity in Amaravati, the proposed capital city; a slowdown in industrial growth, particularly in automobiles, as a result of the overall economic slowdown in FY20; the region's mining ban, which was only lifted in September 2019 thanks to the Andhra Pradesh Mineral Development Corporation's new sand-mining policy; and toll susceptibility

- **Variable Concession Period**

The concession agreement establishes a target of 27,200 passenger car units by October 1, 2025, and allows for changes during the concession period if actual traffic falls short of or exceeds target traffic by more than 2.5 percent. In October 2019, the average passenger car unit count was 17,785; to meet the target traffic in October 2025, a growth rate of 52 percent would be required. In the event of a shortfall, the concession period will be extended by 1.5 percent for every 1% difference between actual and target traffic, up to a maximum of 20% of the concession period. In the event of excess traffic, the concession period will be reduced by 0.75 percent for every 1% difference between actual and target traffic, up to a maximum reduction of 10% of the concession period.

Advantages of HAM

Reduces capital outflow for the authority when compared to the EPC model: In the EPC model, the government is responsible for the entire investment during the construction period, whereas in the HAM model, the NHAI is only responsible for 40% of the cost during the initial construction period. Reduce the developer's equity investment: Under the HAM, the NHAI bears 40% of the project costs during

construction, while the developer is responsible for the remaining 60%, with the authority paying the developer compensation later. The developer typically invests only 20–25 percent of the project costs, with the remainder raised through debt. The private sector is not required to bear the traffic risk: Under the BOT model, the private player is required to study the traffic flow in a specific region prior to road construction in order to assess the project's feasibility. As a result, developers working under BOT must accept the risk of low passenger traffic. HAM, on the other hand, relieves the developer of the risk of passenger traffic.

Disadvantages of HAM

Although the bid project cost is calculated under HAM. Also, there is a chance of default by the NHAI, as NHAI has to finance various projects. If NHAI is not able to recover the toll collection. Then, it will ultimately lead to burden on the government.

CHAPTER 5

CONCLUSION

This study tried to understand the VGF model and HAM Model in Indian infrastructure specially roads. From the case studies, it is determined that the concession period is the important factor which determines the profit advantage of the project to the concessionaire. The construction period which is quoted in the early schedule of the projects gets delayed by 8 to 12 months due to various factors like economic, social, political, etc. This automatically reduces the overall concession period of the project to the private party. The operational cost of the road projects is the income for the private party within the concession period. The price rates are also determined by the private party according to their needs in the revenue. The concession period of PPP project can be given to the private party excluding the construction period of the project. This favours the private party to engage in the infrastructure projects of the government.

With the introduction of the hybrid annuity model, developers will be able to complete contracts because the government will initially fund 40% of the project costs. It will also help to improve various developers' credit ratings because they will be able to complete the contract on time. This model would solve the bank's problem of rising bad loans, as existing models made it difficult for banks to lend. It would also solve the toll collection, land acquisition, and other issues. This model is essentially the future of construction in order to accelerate the pace at which projects are completed.

5.1 RECOMMENDATION FOR FUTURE RESEARCH

The study can be taken forward with the changes in the tax and other sudden new implementary actions from the government which drastically influence the revenue of private party. For e.g. during the time of demonetization, nearly 20 days the toll did not collect the money which is the loss to the private sector which owns the public infrastructure. Profit analysis with varying income projections from the past data can be

done for the projects to determine the profit assumptions from the PPP project. During Covid-19 there has been shut down the toll collections for few months it will affect Toll revenues and bear the labour salary for that months. Without revenue collections they have to bear operation and maintenance cost of expressway. This would affect the private sector and they have to debt bank lends and create problems of the developers and its lead to extension of concession period. In many road projects it has been observed that private developers enjoyed up to 40 per cent VGF and did not commit to quality.

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