

## **CASE STUDIES OF INFRASTRUCTURE FINANCING IN KERALA**

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### **ABSTRACT**

Generating sufficient public infrastructure funds remains an issue for Kerala, and academic inquiry is necessary to give some direction to the policymakers. This research identifies the key financing mechanism with its characteristics and subsequently proposes a consistent and efficient framework for selecting appropriate financing mechanism. A sample of 10 major infrastructure projects that were financed through various mechanisms in the state was subjected to a detailed study. The total risk associated with each case was analyzed using a number of criteria. The most efficient financing mechanism is the one that diversifies and allocates the risks of a project to the parties that are best able to absorb them. The formulation of the framework has been based on the nature of financing mechanisms used in the state and the parameters generally used for analysing the projects considering the socioeconomic conditions and regulatory considerations.

**Keywords:** Financing Framework, Financing Mechanisms, Project Risk, Transaction Costs, Information Asymmetry, Risk Score, Financial Viability, Risk-return profile.

### **BACKGROUND**

Efficient and adequate infrastructural availability promotes rapid industrialization and improves the quality of life of the people. The global infrastructure needs are estimated to reach at US\$ 57 trillion by 2030, to keep pace with the exponentially growing global demand. The importance of efficiency in using appropriate financing mechanism is increasing globally and it plays a vital role in infrastructure sector. In a global study, it is estimated that US\$ 1 trillion per year can be saved worldwide in infrastructure development costs by adopting efficient financing mechanisms.

From the review of literature it was found that there is lack of a framework for public sector institutions to select appropriate and efficient financing mechanisms for public infrastructure development. This research tries to explore the appropriate financing mechanisms for infrastructure projects with special emphasis on efficiency based on the risk return profile. In

order to identify the appropriateness of the mechanism, the total risk associated with each case along with the risk management mechanisms and the financial viability were analysed against a number of criteria obtained from extant literature and finally a framework is proposed for selecting the finance mechanism.

## **IMPORTANCE OF INFRASTRUCTURE FINANCING**

Infrastructure plays a key role in promoting and sustaining economic and social development. **Infrastructure is generally defined as the physical framework of facilities through which goods and services are provided to the public.** Its linkage to the economy is multiple and complex and involves large flow of expenditure. The availability of adequate, reliable and affordable infrastructure is critical for increasing productivity. Properly designed infrastructure can also make growth more inclusive by sharing its benefits with poorer groups and communities by connecting remote areas to major business centers. The infrastructure requirements are increasing rapidly as well-developed and efficient infrastructure facilities are essential for socio-economic development and growth. The fast economic growth and growing population have led to huge demand-supply infrastructure deficit in the emerging markets. This has attracted new sources of funding in infrastructure development. Efficient financing for public infrastructure investment is of paramount importance and would depend on choosing a financing vehicle that minimizes the total cost of finance over the lifetime of the infrastructure asset.

## **INFRASTRUCTURE SCENARIO IN KERALA**

Kerala is a unique place popularly known as “God's Own Country” situated on the south-western coast of India, a country in South Asia. The State enjoys a distinctive topography with the Arabian Sea in the west, the Western Ghats in the east and a networking of forty-four rivers and diverse flora and fauna. The development experience of Kerala, widely known as Kerala Model of Development (KMD), has received international attention owing to its high achievements in the social sectors.

Kerala's GSDP growth and per capita income growth are at levels higher than that of India as a whole. The state has the potential for a much faster economic growth as a number of factors are now turning favourable to its growth. Lack of sufficient land, labour, and quality infrastructure continues to plague the state giving rise to inflationary trends and spiraling unemployment. The State exchequer finds it difficult to provide enough finance to all sections of the society, who need welfare measures. Hence, the Government is forced to rely on debt funds for public expenditure. As there are limits to borrowing, the state government is constrained to reduce unproductive expenditure and encourage private sector investment in infrastructure projects which are necessary for development.

*Unless there are adequate and affordable transport facilities, mobility of people as well as that of goods and services is severely constrained. Poor logistics increases costs within the state and results in unequal economic and social benefits to hilly and remote areas. Availability of affordable energy is a pre-requisite for well being of people as well as for the economy to function seamlessly. Rapid and smooth communication through effective use of Telecommunication and Information Technology are essential to ensure that Kerala's advantages as a globally connected state are fully tapped (State Planning Board, Various Volumes).*

Kerala's growth scenario can be divided into pre-liberalisation and post liberalisation periods. The pre-liberalisation period of 1956 to 1990 was marked by economic stagnation with a growth rate of just 1.12 per cent. But with the advent of liberalisation policies in 1991 there was a turnaround and the economy grew at 5.2 per cent till 2002-03 and accelerated to 8 per cent till 2008. The global meltdown in 2008, however, drastically affected the economic growth of both developing and developed nations. As the ripples of the global meltdown reached the shores of the country, economic growth remained stunted for a short while but picked up gradually later. The productive capacity had to be increased substantially in order to attain and maintain the growth rates at above 8 per cent especially in the wake of the low productivity trap of GSDP and employment. Due to the rapid urbanisation and increased demand for infrastructure facilities, strategic planning became crucial for an upward movement in terms of growth and development.

Kerala's economy has been growing at a pace faster than the national economy. The changes are not simply in traditional indicators like State Domestic Product and Per capita Income but also in other socio-economic indicators (Ahluwalia, 2000). Kerala's human development challenges and financing needs for human development have to be seen in the light of its own development challenges and fiscal constraints, which are different from the rest of India. The vast network of public supported educational and health institutions, effective public distribution system, rural connectivity, and social security measures that have been created over the years poses different types of challenges for Kerala. Maintenance of these assets cost heavy recurring expenditure on the exchequer. Moreover, additional investments in social and physical infrastructure are required for improving the quality of services needed to match with the rising expectations of the people (Pinaki Chakraborty et al., 2010). New avenues of infrastructure financing have to be explored to cope with the growing investment needs of the State and to catch up with the development status of other states.

Presence of quality infrastructure is vital for social, economic, and industrial development of the State. Better management of infrastructure would have impacts on output, income, employment, and economy. It will impact the poor directly thus reducing poverty. Greater supply elasticity

and low production cost will reduce inflation rate and the domestic falling price levels will increase export competitiveness. Consequently, international trade will ensure improved balance of trade, balance of payment, and less foreign debt burden. Since high quality infrastructure is the backbone of any economy, investment for improving infrastructure is essential for maintaining the growth prospects of the economy.

Kerala has a unique status in infrastructure development and the experiences in social development rank the state one among many developed countries. The infrastructure requirements in the state are very large and increasing rapidly because of strong economic growth. Even though there is huge demand for investment in infrastructure, its financial assistance largely depends on the government sector because of its characteristics. During the past two decades, the significant innovation in project financing, credit enhancement, and securitization has contributed to increased financing efficiency, enabling a combination of debt and equity financing from both private and public-sector sources. Generating sufficient public infrastructure funds, however, remains an issue for Kerala, and an inquiry is necessary to give some direction to the policymakers. This study will be useful to the government and other policy makers in setting policies that aim to regulate the service providers in ensuring that services provided have the required level and standard. Government agencies, project sponsors, investors and other financial institutions will benefit from the findings of this study since it will shed light on the impact of financing infrastructure projects under public-private partnership mode on the level of physical infrastructure created in Kerala. This study also seeks to uncover which financing mechanism is appropriate for an infrastructure project considering its nature and risk-return profile. A framework for selecting an appropriate financing mechanism for infrastructure projects is also proposed.

## **OBJECTIVES**

The main objective of this study is to find out infrastructure financing pattern, infrastructure financing mechanisms, and risks and return involved in it. The specific objectives are listed below:

1. To evaluate the risk and financial viability of infrastructure projects for choosing appropriate financing mechanism
2. To propose a suitable framework for selecting an appropriate financing mechanism for infrastructure projects
3. To determine whether these mechanisms are appropriate and efficient to finance public infrastructure investments through case studies

## **METHODOLOGY**

The problem is to identify key financing mechanism with its characteristics and subsequently to propose a consistent and efficient framework for selecting appropriate financing mechanism according to the structure and risk-return profile of the infrastructure project.

Inderst (2010), demonstrated that infrastructure investment decision is determined primarily by the risk-return profile of a portfolio held by an investor. The assessed overall risk of a project implies a certain level and category of expected returns. Chan *et al* (2009) stated that an efficient financing model is that which firstly acknowledges the risks associated with a project and then optimally allocates such risks to the parties that are best able to do so. Having assessed the implied risk category and level of risk and the financial viability of the project, the model helps for the selection of a financing mechanism that is appropriate for the infrastructure project.

### **Case Study Analysis**

The case study approach was adopted for conducting a detailed study of the research objectives. Yin (2009) has stated that the advantages of case study research are that the methodology fosters the use of multiple sources of data which facilitates validation, entails a detailed and particular focus on the subjects of the study, and that the researcher has no control over events within the researched organizations and/or projects.

According to the nature of case studies, they are mainly classified into instrumental case studies and collective case studies. Stake (1995) stated that an instrumental case study provides a general understanding of a phenomenon using a particular case and a collective case study is done to provide a general understanding using a number of instrumental case studies that either occur on the same site or come from multiple sites. Since the present study is of exploratory nature a collective case study methodology was adopted as a proper tool for delving deep into the subject.

The target population for this study consists of the most popular infrastructure projects funded through various financing mechanisms in the state. For the purposes of this research, nine sectors were identified as follows: power generation, airports, city roads, ports, housing, urban transport, hospitals, sports complex, and highways. One major project from each sector was selected. In the case of airports, however, two projects were selected as there is a wide gap of more than two decades time between their executions. Thus the sample for the study consisted of 10 major infrastructure projects that were financed through various mechanisms in the state. In each case study the financing mechanism used was identified followed by a discussion of its unique features and their impact on the project. In order to identify the appropriateness of the mechanism, the total risk associated with each case along with the risk management mechanisms and the financial viability were analysed against a number of criteria obtained from extant

literature. The criteria included the ability of the mechanism to diversify project risks, transaction costs, and information asymmetry risk factors.

### **Risk Analysis**

For having precision in analysis, the risk factors are subdivided into its categories. Accordingly, the project risk is subdivided into eight categories, viz, Construction, Operations, Demand, Political and Regulatory, Social, Environmental, Currency exchange, and Interest Rate risks. Transaction Cost Risks are categorized as Time taken to Contract, Adequacy of funding, and Project delays. The Information Asymmetry Risk is sub divided into awareness and no awareness Risks.

Each sub-category is evaluated and assigned scores on a 5 point rating scale where 1 denotes very low risk, 2 denotes low risk, 3 denotes average risk, 4 denotes high risk, and 5 denotes very high risk. A simple average rating is then calculated for each Risk Factor, assuming that all sub-categories carry the same weight. The risk score of the item is then calculated by dividing the average rating by the maximum possible score, ie, 5 given for very high risk. Then a Total Risk Score (TRS) for each project is calculated by summing up individual risk score of the Risk Factors. The risk quantification gives a value for the overall project risk, giving a quantitative indication of the expected return by potential investors of the project.

$$TRS_i = w_1 * PRS_i + w_2 * TCR_i + w_3 * IARS_i$$

### **Risk Management**

The impact of a risk is a function of the likelihood of its occurrence and its severity. The most important thing is to allocate the different risks across the stakeholders on the basis of who is best suited to handle and mitigate the risk. If the private party is asked to bear a high degree of risk due to procedural delays, absence of legal framework, lack of clarity for tariff revisions, demand uncertainty, etc., the return expected by the private party would also be higher. Optimal allocation of risks across stakeholders will reduce the overall cost of bearing the risk and thereby lower the project cost.

### **Evaluation of Financial Viability**

The financial viability gives a quantitative indication of the expected returns by potential investors of the project. The financial viability scores are also evaluated and assigned on a 5 point rating scale on the basis of service delivering against a tariff or user charge as follows:

Very Low – for the project that has no scope for generating revenues;

Low – for projects that can generate revenues but is too low even to meet the operating and maintenance (O&M) expenses;

Average – for project revenues that can meet entire O&M expenses;

High – for project revenues that can meet O&M and part of debt servicing expenses, and

Very High – for project revenues that can meet O&M, debt servicing, and part of principal repayment of debt

### **Final Project Score**

The final project score is calculated by summing up the weighted scores of Project Type Score, Total Risk Score, and Financial Viability Score. The score for project type is obtained on the basis of infrastructure type, ie, 1 for economic infrastructure and 0 for social infrastructure.

Having assessed the Project Type Score, Total Risk Score and Financial Viability Score the final project score can be calculated by giving equal weights to the three categories. Thus:

$$\text{Final Project Score} = w_1 * \text{PTSi} + w_2 * \text{TRSi} + w_3 * \text{FVSi}$$

### **Analytical Framework**

A typical format was developed to provide a detailed description for presenting each case. The inferences and interpretations and lessons learnt from the study were then presented. The cases provided ample opportunity to identify the financing mechanism used in the infrastructure projects and to discuss the impact and suitability of the mechanism. The total risk associated with each case was analysed against a number of criteria including the ability of the mechanism to diversify project risks, minimise transaction costs, and reduce information asymmetry factors. The financial viability of the project was also tested.

### **Selection of Appropriate Financing Mechanism**

A number of authors such as Esty (2003), Calitz & Fourie (2007), Chan *et al* (2009) and Sawant (2010b) proved that public infrastructure is financed through any one of the financing options like project finance or corporate finance. Whenever a public institution thinks about choosing a financing mechanism, they can utilise a framework to select an appropriate option. The financial framework analyses the relationship between the financing option and key risk factors such as project risks, transaction costs, information asymmetry and the risk management measures, and financial viability of the project.



Having assessed the total project score, the model helps to select the financing mechanism that is appropriate and efficient and one that reduces overall project financing costs. The selection of financing mechanism is based on the total project risk score as given below.

**Table 1: Project Score and Financing Mechanisms**

Category	Project Score	Financial Mechanism
1	>0.1 and <=0.4	Budget Appropriation
2	>0.4 and <=0.5	Special Purpose Bonds
3	>0.5 and <=0.6	Commercial Borrowing
4	>0.6 and <=0.7	Development Contributions
5	>0.7 and <=1	Public Private Participation

Category 1 is the lowest risk project and is appropriate to be financed through Government Appropriation. The second category can be financed through Special Purpose Bonds and category 3 can be financed through Commercial Borrowing. Category 4 can be financed through Development Contributions and category 5, the highly risky projects, can be appropriately financed through PPP mechanisms.

Though the proposed order may not always be appropriate, this framework allows the institutions to build up their financing order based on their portfolio of projects and risk appetite. It takes into account other considerations such as legislative or regulatory constraints that may restrict the use of certain financing mechanisms for certain projects. Combining the calculated overall project risk score with other considerations, an institution can make an overall recommendation for an appropriate and efficient financing mechanism.

### **FINANCING MECHANISMS FOR INFRASTRUCTURE PROJECTS**

The three principal forms of finance for infrastructure service delivery are public finance, corporate finance, and project finance. Chan *et al* (2009) stated that although many public institutions employ a variety of financing vehicles, these generally fall into two broad categories namely cash flow financing and capital market financing. Cash flow financing vehicles rely on the quality of cash flows from an asset being financed to repay the interest and capital. Conversely, a capital market finance vehicle relies on the quality of the balance sheet of an institution, to raise the required finance for a specific or for a number of projects.



While budget appropriations remain the major source of finance for public infrastructure, governments have increasingly been drawing on capital markets to finance public infrastructure. This partly reflects the impact of financial innovation on financing efficiency, as well as changes in the attitudes of government to debt and ownership of infrastructure assets (Chan et al., 2009). At the same time, Government has the freedom to choose to fund some or all of the capital investment in a project and the government can invite the private sector to bring in expertise and efficiency.

In Corporate financing, corporations provide equity financing through retained earnings and shareholders' equity. Investors may accept the project based on the balance sheet of the private operator rather than the project itself. Debt is secured through collateralisation of corporate assets and assignments of receivables. The benefit of corporate finance is that the cost of funding will be the cost of funding of the private operator itself and so it is typically lower than the cost of funding of project finance. But opportunity cost is associated with the corporate financing. Because of this company will only be able to raise a limited level of finance against its equity and the more it invests in one project the less it will be available to fund or invest in other projects.

The most common and efficient financing arrangements for PPP projects is "project financing" which is otherwise known as "limited recourse" or "non-recourse" financing. Project finance consists of government, corporations, and PPP financing investments solely through the revenue stream of the infrastructure projects without taking recourse to government guarantees. Project financing normally takes the form of limited recourse lending to a special purpose vehicle (SPV) which has the right to carry out the construction and operation of the project (World Bank, 2016).

#### **FRAMEWORK FOR SELECTING APPROPRIATE FINANCING MECHANISM**

Need assessment is the first step in the process of identifying the appropriate financing mechanism for infrastructure investment. The need identification and the feasibility study will indicate the type of infrastructure that is required for the satisfaction of the identified need. The assessment of infrastructure needs starts with determining the nature of infrastructure, i.e. whether it is social or economic infrastructure. This process is followed by classification of risks. The risks are categorized into project risk, transaction cost risk, and information asymmetry between public and private sectors and subsequently a detailed quantification of the identified risks takes place using a qualitative assessment tool. The quantification of risk yields a score of the overall project risk, giving a qualitative indication of the expected return by potential

investors of the project. All the risk scores are calculated using weights which is based on the circumstances of the project and other factors.

After assessing the total risk score, project risk management plan will be carried out for controlling the risk to the extent possible. Subsequent to that, financial viability will be tested on the basis of the lenders perspective to select an appropriate financing mechanism. This will enable the investor and lender to come to an agreed ratio taking into account the overall risk to be borne by the lender. Provisions of legislations, regulations, and guidelines have to be taken into account before a final decision is made on the choice of a financing mechanism. It will determine or guide the final choice of the mechanism and the administrative and legal processes to be followed to implement such a choice. Having assessed the total project score, the model helps to select the financing mechanism that is appropriate and efficient and reduces overall project financing costs.

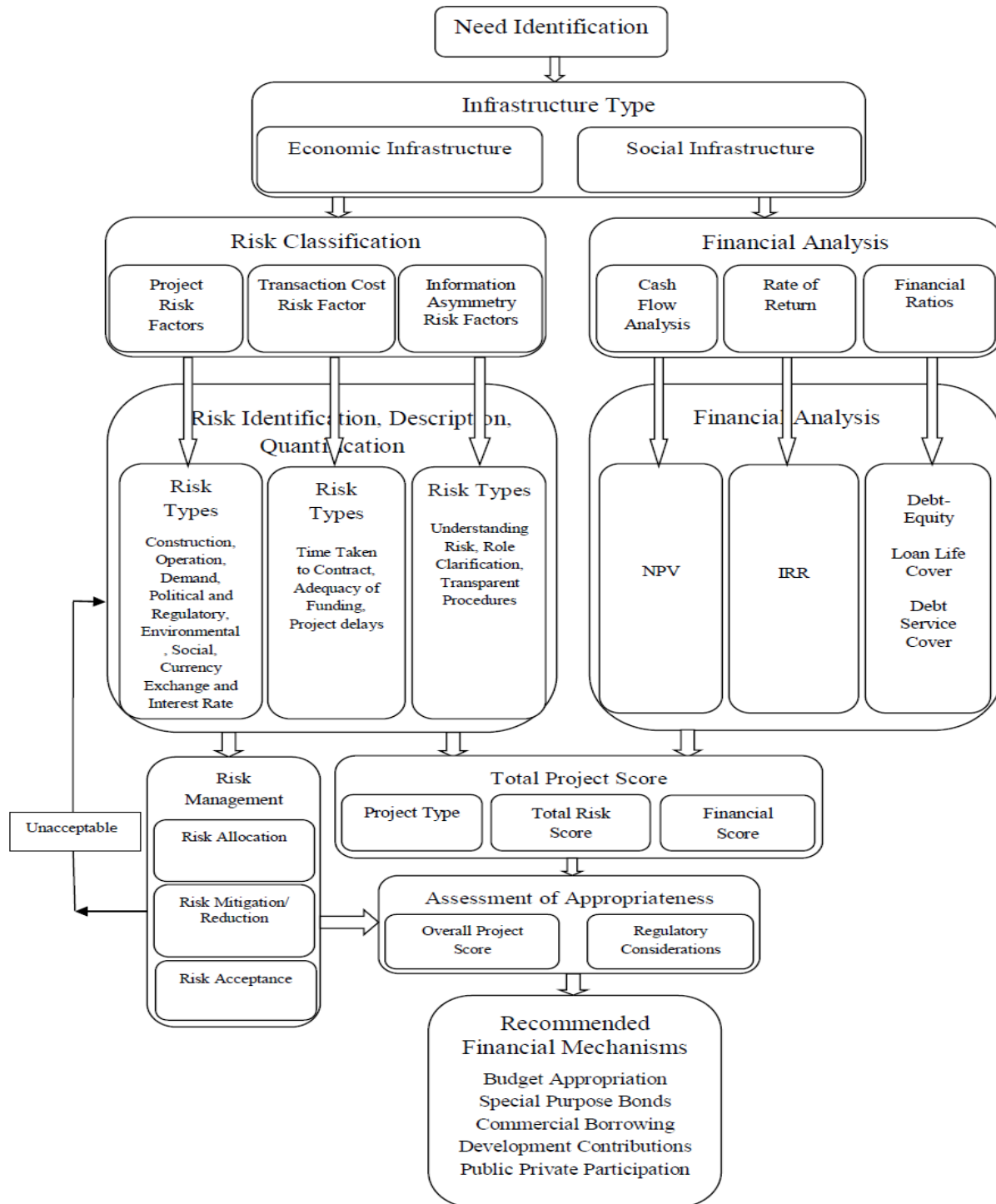
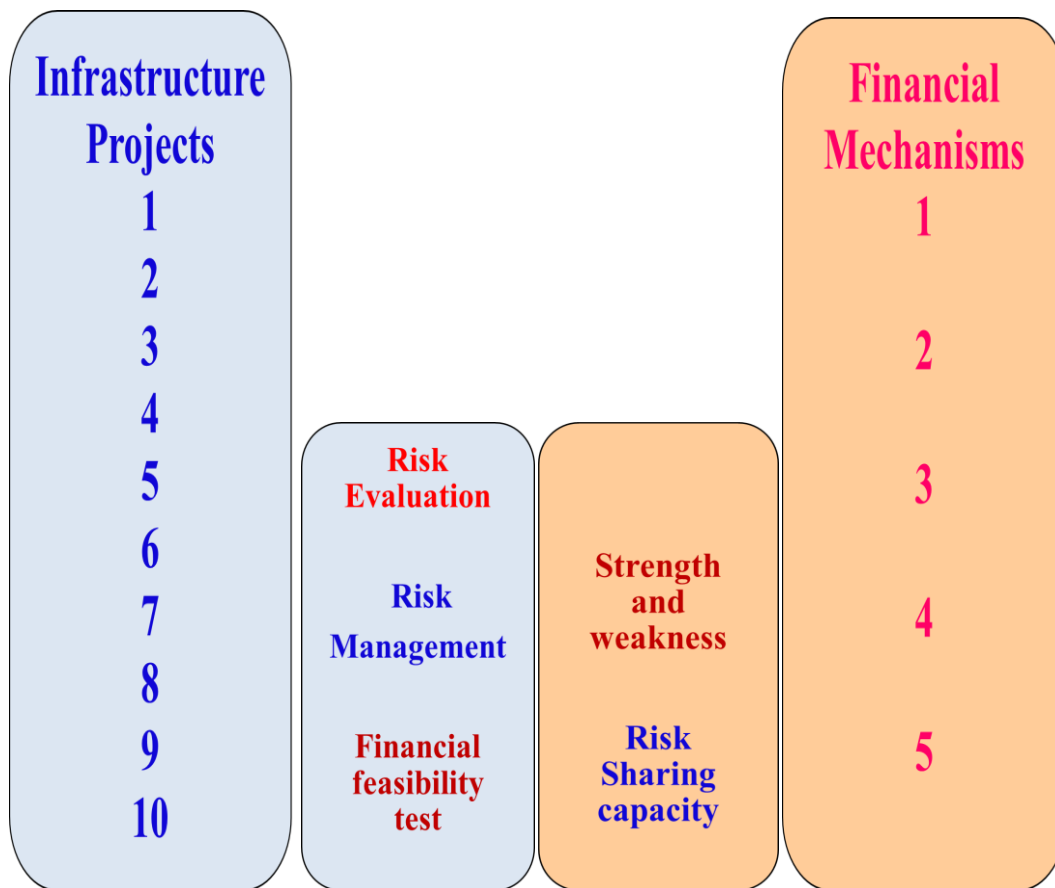


Figure 1: Proposed Financing Framework for selecting appropriate financial mechanism

**SELECTION OF FINANCIAL MECHANISMS: CASE STUDY ANALYSIS**

One major objective of this study is to determine the nature, utilization, and appropriateness of various public infrastructure financing mechanisms. Ten major public infrastructure projects in Kerala were used to conduct the exploratory study. Projects were selected on the basis of various criteria like type, sector, nature, and size of project. The risk evaluation, risk management, and financial viability of the projects were assessed based on the characteristics of the projects. The strengths and weaknesses of various financing vehicles and some related issues that may affect the choice of financing vehicle were also explored.



**Figure 2: Process involved in financing mechanism selection**

**Table 2: Summary of projects selected for case study**

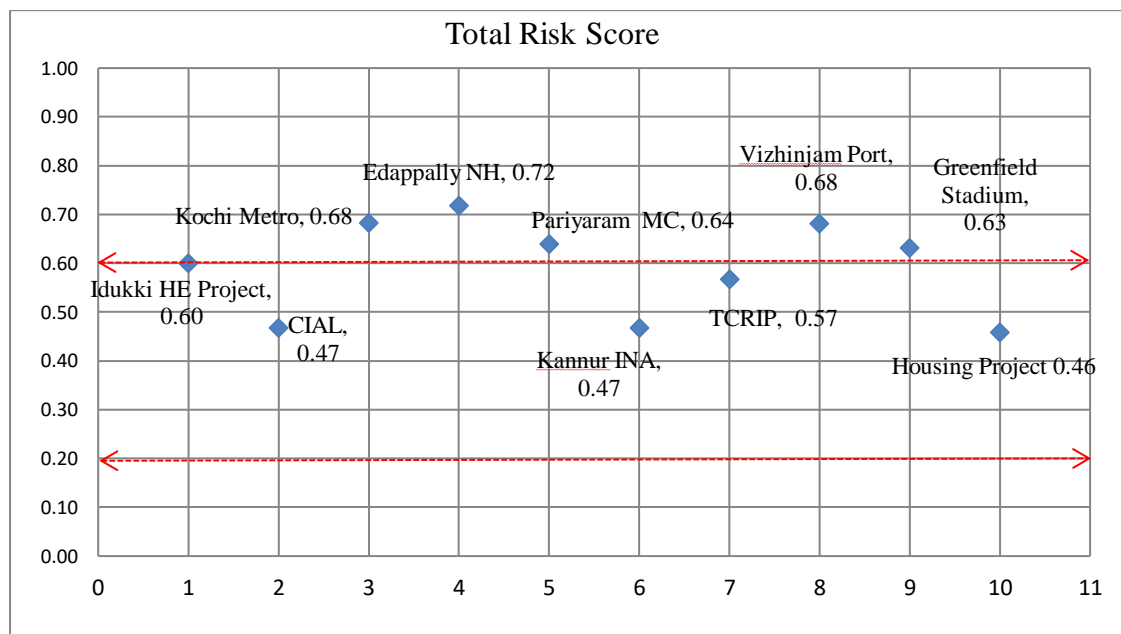
No	Type	Project Name	Organization	Financing Mechanism	Infrastructure Type	Project Cost (Cr.)	Completion Year
1	Power Generation	Idukki HE project	KSEB	Debt/Equity Financing (International Institutional Finance)	Economic	68	1976
2	Air Port	CIA	CIAL	PPP-BOO annuity	Economic	100	1994
3	Passenger Rail	Kochi Metro	KMRC L	Central & State Equity with Commercial Bank finance	Economic	5182	2016
4	National Toll Road	Edappally-Aroor NH Road	NHAI	PPP-BOT Toll	Economic	194	2010
5	Hospital	Pariyaram Medical College	Pariyaram Trust	State Govt. Equity with Domestic Institutional Finance HUDCO	Social	46.5	1993
6	Air Port	Kannur International Airport	KIAL	PPP-BOO annuity	Economic	1892	2016
7	Roads	City Roads Improvement Project	TRDCL	PPP- BOT annuity Banking Consortium finance	Economic	145	2015
8	Port	Vizhinjam International Seaport	VISL	PPP Landlord model	Economic	7525	2018
9	Sports	Kariavattom Green Field Stadium	KSFL	PPP -DBOT model	Social	141	2015
10	Housing	Housing for all	Nilambur Municipality	Project finance by domestic institution	Social	4.5	2015

### Case Study Risk Score

In order to understand the efficiency of a financing mechanism, it is imperative to primarily understand the risk profile of the project which in turn will indicate a return expected by potential investors. For that, a Total Risk Score (TRS) associated with the financing mechanism

of each project was calculated using the assessment framework. TRS is a weighted average of the Project Risk Score (PRS), Transaction Cost Risk Score (TCRS), and Information Asymmetry Risk Score (IARS).

Figure 3 illustrates the Total Risk Score (TRS) for each project. The Graph indicates that five out of the 10 projects had a TRS ranging between the minimum (0.2) and average (0.6) risk levels with one directly perched on the average risk level. A total of five projects come under the category of high-risk. Notably, the Edappally-Thrissur NH Toll Road project on PPP-BOT basis had the highest TRS at 0.72 followed by Metro Rail Project and Vizhinjam Port Project having a risk score of 0.68.



**Figure 3: Display of Total Risk Score**

The graph shows that 50 per cent of the projects had TRS between 0.4 and 0.6, and the rest between 0.6 and 0.8.

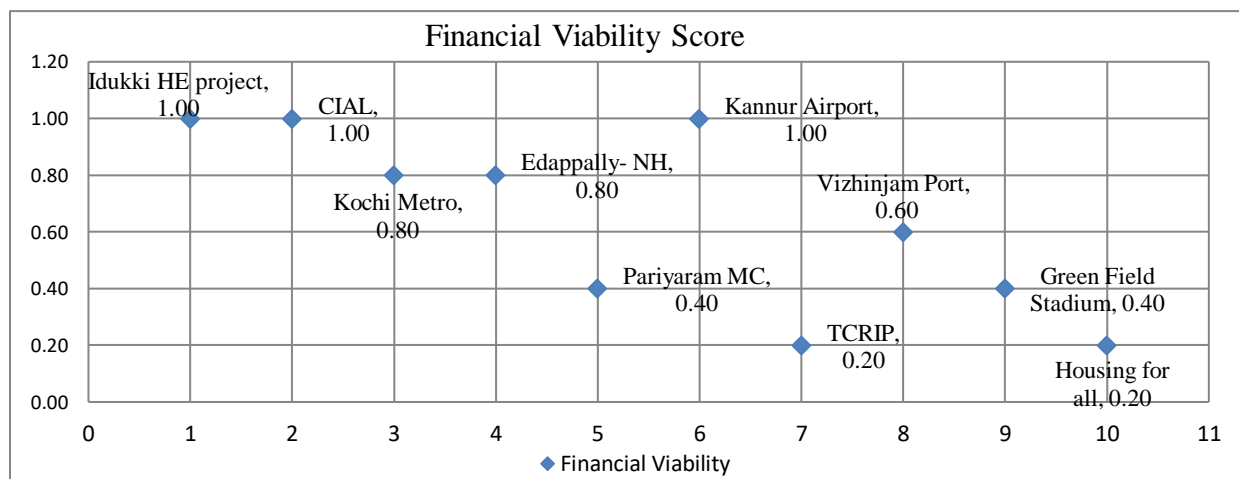
### Financial Viability Score

The financial score has been arrived at on the basis of service delivery against a tariff or user charge. It measures the extent to which the project can bear the capital expenditure on the project and project returns over a period of time that matches with the life period or the expected duration of the contract. NPV, IRR are some of the important methods for determining financial viability. Financial ratios, Rate of Returns, and insurance are some important factors considered while assessing financial viability. The assessment of revenue generation is made based on the

data collected from feasibility reports, detailed project reports, project viability reports, and personal interviews with people in the know of things. The financial viability score was calculated by assessing the revenue generating capacity of the project on a 5 point rating scale as explained in the framework. Each score is then divided by the highest score of 5 to arrive at the final score. The financial viability score is calculated based on inverse method since the project having high financial viability have less risk but those having low financial viability have high-risk. The final project score is arrived by summing up the weighted score of project type score, risk score, and financial viability score assuming equal weight for all the items.

**Table 3: Financial Viability Score**

Particulars	Idukki HE project	CIAL	Kochi Metro	Edappally-Thrissure NH Road	Pariyaram Medical College	Kannur International Airport	City Roads Improvement Project	Vizhinjam International Seaport	Kariavattom Green Field Stadium	Housing for all
	1	2	3	4	5	6	7	8	9	10
Rating	Very High	Very High	High	Very Low	Low	Very High	Very Low	Average	Low	Very Low
Score	1	1	2	5	4	1	5	3	4	5
<b>Financial Viability</b>	<b>0.20</b>	<b>0.20</b>	<b>0.40</b>	<b>1</b>	<b>0.40</b>	<b>0.20</b>	<b>1</b>	<b>0.60</b>	<b>0.80</b>	<b>1</b>



**Figure 4: Display of Financial Viability Score**



**Table 4: Infrastructure projects and appropriate financing mechanisms**

<b>No</b>	<b>Project Name</b>	<b>Infra structure Type</b>	<b>Risk Score</b>	<b>Financial Viability</b>	<b>w. of Infra Type</b>	<b>w. of Risk Score</b>	<b>w. of Fin. Viability</b>	<b>Total Score</b>	<b>Financing Mechanism Used</b>	<b>Proposed Financial mechanism</b>
1	Idukki HE project	1	0.60	0.20	0.33	0.20	0.07	0.59	Budget Appropriation	Commercial Borrowing
2	CIAL	1	0.51	0.20	0.33	0.17	0.07	0.57	Public Private Participation	Commercial Borrowing
3	Kochi Metro	1	0.68	0.40	0.33	0.23	0.13	0.69	Commercial Borrowing	Development Contribution
4	Edappally-Thrissure NH Road	1	0.72	1.00	0.33	0.24	0.33	0.90	Public Private Participation	Public Private Participation
5	Pariyaram Medical College	0	0.64	0.40	0	0.21	0.13	0.34	Commercial Borrowing	Budget Appropriation
6	Kannur International Airport	1	0.47	0.20	0.33	0.16	0.07	0.55	Public Private Participation	Commercial Borrowing
7	City Roads Improvement Project	1	0.57	1.00	0.33	0.19	0.33	0.85	Public Private Participation	Public Private Participation
8	Vizhinjam International Seaport	1	0.68	0.60	0.33	0.23	0.20	0.75	Public Private Participation	Public Private Participation
9	Kariavattom Green Field Stadium	0	0.64	0.80	0	0.21	0.26	0.47	Public Private Participation	Special purpose Bonds
10	Housing for all	0	0.44	1.00	0	0.15	0.33	0.48	Commercial Borrowing	Special purpose Bonds

**CASE STUDY ANALYSIS**

The backgrounds, financing mechanism used, and risk-return analysis of each case has been made in detail and the appropriate financing mechanism is suggested based on the analysis and scores obtained using the proposed framework. It also explores the situation in which the used

finance mechanism has been adopted instead of the proposed financing mechanism. The suitability of a financing mechanism may differ due to a wide array of conditions like geographical heterogeneity, socio-political situations, environmental reasons, and regulatory conditions. The analysis also suggests some alternative mechanisms which seem practical considering the above mentioned conditions.

## **IDUKKI HYDROELECTRIC PROJECT**

**(PSU owned Project-International Institutional Finance)**

### **Background**

The Idukki Hydroelectric Project in the Periyar Valley located in the Western side of Nilgiri Hills in Kerala is the biggest hydro-electric project in South India. The dam constructed across the Periyar River to harness water is one of the highest dams in the world and the first arch dam in India. Construction of this Arch Dam and two other dams at Cheruthony and Kulamavu has created an artificial lake of 60 sq. kms. width and the water stored is utilised for production of electricity at the unique Moolamattom Power house, which is located inside the rocky caves.

### **Financing Mechanism**

The Idukki Hydro-Electric Energy project is a Canadian collaborated three stage energy project with 780MW capacity. The estimated cost of the project was Rs.68 crores. Institutional financing mechanism is used for this project. Canada provided two long term development loans to India for financing the imports of energy generating equipment and switch-gears for the stage I and II of the project. The first loan Rs.76.3 million and the second loan of Rs.34.7 million were provided by Canada through an agreement signed between the two countries on October, 1967 and June, 1972. The financial and technical assistance of European countries to India in respect of energy projects in terms of rupee payment has definite advantage over those repayable in foreign exchange currencies (Dr. Santosh Sharma, 2015).

### **Risk Return Analysis**

The risk-return profile of Idukki Hydroelectric project shows that it involved high-risks and uncertainties which are peculiar to a hydroelectric project. Risk of failure or delays in the execution of Hydro project is mainly due to construction and operation risks including cost overruns and inadequate funding sources. The prestigious project of Idukki also was a victim of time and cost overruns, mainly due to labour disputes. When Idukki Stage II project (three units of 390 MW) was put on line in 1986, after a time overrun of about eight years, it had a cost escalation of 115 per cent over the original estimate (Kannan & Pillai, 2002).

The traditional sources of financing energy projects are the retained earnings from revenues, supplementary government contributions, and the institutional financing from multilateral and bilateral agencies. The fiscal constraints and tariff regulations diminished the relative role of the utilities' retained earnings and government's contributions. Bulk subsidies for consumers led to low retained earnings and poor credit rating and simultaneously it made difficulties in rising funds from commercial institutions. Due to the low tariff prices the power utilities become unable to mobilize sufficient funds to finance supply expansion and as a result the government is constrained to provide a major share of capital for the project expansion or has to mobilize funds with government guarantees.

The financing framework suggested by this study proposed Institutional Finance as the appropriate financing mechanism for the project considering its economic nature, high-risk profile, and considerably high financial return from the project for a long time. This mechanism becomes the most appropriate one as it provides certainty to the investor in respect of the commitment of the public sector. Specific Purposes Bonds can be used as an alternative financing mechanism for power projects, particularly in the early stages of the project where the commercial viability is quite uncertain. Thus this study confirms that the financial mechanism used for large hydroelectric projects like Idukki Hydro project is the most appropriate one.

## **COCHIN INTERNATIONAL AIRPORT LTD. (CIAL)**

### **(PPP joint venture company model) (PPP-BOO annuity)**

#### **Background**

Cochin International Airport is a landmark in the area of transport infrastructure in Kerala. It is the first Greenfield airport setup under the Public Private Partnership (PPP) model in Civil Aviation infrastructure sector in India, a joint venture by Government of Kerala, Central Government and Non-Resident Indians (NRIs). The airport pioneered the concept of private investment in the airport sector after being incorporated as a public limited company, receiving investments from nearly 10,000 NRIs from 30 countries.

#### **Financing Mechanism**

The total cost of the project estimated was around Rs.283 crores. The funding was envisaged as interest-free investments from non-resident Indians working abroad, donations from industrialists, exporters, cooperative societies, and investment from the State government. A public limited company under the name Cochin International Airport Ltd. (CIAL) was registered for fund mobilization and to execute the project. The Government of Kerala holds 33.36 per cent stake, making it the single largest investor in the project. While Indian government companies

like Air India, BPCL, AAI holds 8.74 per cent stake, foreign companies holds 5.42 per cent stake. Indian private companies hold 8.57 per cent stake and scheduled commercial banks like Federal Bank, SBT and Canara Bank holds 5.91 per cent. The remaining 38.03 per cent stake is held by more than 18,000 personal investors from 36 countries, mostly NRIs.

### **Risk Return Analysis**

CIAL is one of the most profitable airports in the country and recorded a cumulative annual growth rate of nearly 20 per cent in the initial eight years and thereafter at 12 per cent with annual passenger traffic touching 6.45 million in 2014-15. The State government had invested Rs 98.60 crores in CIAL and so far CIAL had given Rs.133 crore as dividend to Government. In 2015-16 also the company got a profit of 175.22 crores after tax and issued 25 per cent dividend to its shareholders.

The innovative idea of raising money to finance the project through private individuals and overwhelming response from them together with an effective leadership resulted in the materialization of a novel mechanism for infrastructure financing. The financing framework proposed by this study suggest Commercial Borrowing as the appropriate financing mechanism for the project based on the analysis that it is an economic infrastructure having moderate risk profile and fair financial viability. The moderate risk score together with its high financial viability for repayment enables the project to select a project financing mechanism like commercial borrowing. But the project investors selected an innovative mechanism of PPP – Build, Operate, and Own model in which the finance was sourced through equity from the Government, Government and Private Institutions, Private Parties and NRIs. The CIAL model showcases the prospects of the innovative method of NRI participation for sourcing fund for major infrastructure project.

### **KOCHI METRO (Central and State equity with Commercial Bank Financing)**

#### **Background**

Kochi is the business capital of the State which is growing in an exponential manner. With growing population and mega development plans coming up in Kochi the travel demand is expected to grow steeply. The inadequacy of public transport services will lead to a shift in passenger service to private modes which will increase the ownership of private vehicles in the city which in turn will increase the road blocks and pollution level. Hence it is imperative to introduce alternative mechanisms like Light Metro system in the city to provide fast, safe, economic, and environment-friendly mode for mass transportation. It is presumed that the carrying capacity of Light Metro System will be adequate to take care of the transportation problems for Greater Cochin area for the next 25 years.

### **Financing Mechanism**

The estimated **completion** cost for the construction for a route length of 25.612 kms of the Kochi Metro is Rs 5181.79 crores. It is a joint venture project of the Central and State governments with a Central share of Rs.3353.10 crores (68%) and State share of Rs1556.90 crores (32%). While the Financial Internal Rate of Return (FIRR) for the project has been assessed as 3.04 per cent, the Economic Internal Rate of Return (EIRR) has worked out to 14.2 per cent (Delhi Metro Rail Corporation , 2011).

The total external borrowing required for the metro rail project is nearly Rs.21.7 billion (US\$320 million). For that KMRL has signed a term loan agreement for Rs.1,170 crores with Canara Bank with interest reduction and some relaxations on their conditions. KMRL has also signed an agreement with the French financial aid agency Agence Francaise de Development (AFD) to provide Rs.15.25 billion loan for the project for a period of 25 years at 2 per cent rate of interest which is composed of a 20-year repayment period and a five-year grace period. The Centre and State governments contributed Rs.7.53 billion each as equity share for the project ([https://en.wikipedia.org/wiki/Kochi\\_metro](https://en.wikipedia.org/wiki/Kochi_metro)).

### **Risk Return Analysis**

Since metro rail projects need heavy investment, loans have to be taken to fund a part of the capital cost of the projects. Generally, these projects yield low financial internal rate of return though their economic internal rate of return will be very high. With reasonable fare level, considering its public good nature, servicing of these loans would become a grave problem. Increasing fares substantially to make the project financially viable will not be socially acceptable. In such a situation the number of commuters would come down significantly as metro traffic is sensitive to changes in the fare level. Therefore, it becomes necessary to keep the initial capital cost of a metro project as low as possible so that the fare level of the metro system can be kept at a reasonable level.

On the basis of analysis of the data on different risk factors associated with the project it is found that the construction, operation, and demand risks are very high. The high-risk associated with these factors may result in delays and defaults which in turn will increase the financial burden due to the measures taken for mitigating the same by the banker. Financial Internal Rate of Return (FIRR) for the project has been assessed at 3.04 per cent while the Economic Internal Rate of Return (EIRR) is calculated at 14.2 per cent. This shows that projects like this having a high-risk profile and a less attractive return profile and where the repayment of the project cost from the project itself is not possible, project financing cannot be adopted as a financing mechanism. Considering the EIRR, the project can be treated as a socially beneficial one, corporate financing model is the ideal financing mechanism for this project. With greater

acceptance of the user pays principle and limits on revenue raising capacity of local governments, development contributions have grown as an alternative source of funding urban infrastructure. The financial framework proposes Development Contribution as the suitable financing mechanism for an economic infrastructure project like this with sufficient equity support or Viability Gap Funding.

But there is not much scope of property development along the corridor in Kochi Metro as land is not available for the same. However, there is scope to permit additional FSI for all properties falling in the belt of 500 meters on either side of the metro alignment. This additional FSI will have to be purchased by the land owner/developers at a predetermined premium per FSI sq.m which can be reviewed periodically.

### **EDAPPALLY-VYTILLA-ARoor BOT ROAD (PPP Model- Private Annuity)**

#### **Background**

The Kochi Bypass is a bypass segment of NH 47 that bypasses the CBD of the city of Kochi in Kerala. The highway spans 17 kms from Edappally in the North to Aroor in Alappuzha district. The Government of Kerala started the preliminary works of the project in 1973. After a slow progress, it was partially opened for traffic in the beginning of the 1980s. The section between Edappally and Vyttila had four lanes from the beginning. The rest of the carriageway was also upgraded to four lanes and six lanes in 2010. Now the road has turned out to be the most important arterial road in Kochi and it is going to replace the Mahatma Gandhi Road as the state's major commercial avenue. The Bypass Road has enough width to accommodate an eight lane carriageway, service roads, and a median. This 17 kms stretch of road running across the city has now become the hub of business for the city.

#### **Financing Mechanism**

The initial estimated cost of the project was Rs.80 crores but the total project cost escalated to Rs.194 crores after the work was abandoned by the contractor midway and retendered. The road was constructed under the PPP BOT-Toll model in which the contractor is responsible to Build, Operate, and Transfer. In BOT (Annuity), the concessionaire relies on annuity payments determined by competitive bidding and made out of budgetary allocations spread over time. The first road to be tolled in Kerala was the Edappally-Aroor section.

#### **Risk Return Analysis**

Road construction has an array of risk characteristics inherent to its kind which can cause indefinite delays and defaults. Almost all the project risks are either very high or high which in turn will adversely affect the total cost of the project. Land acquisition for the project causes socio-political and environmental problems and subsequent delay in development. This type of road infrastructure requires huge upfront funds which cost high due to the long gestation period of the project. Since the government exchequer is unable to bear such huge expenditure, the government opted for PPP model in this sector with a provision of government grant for land acquisition. Considering the high project risks and moderate financial viability of the project the financial framework also proposes PPP as the most viable financing mechanism for the project.

### **PARIYARAM MEDICAL COLLEGE (Domestic Institutional Finance)**

#### **Background**

Pariyaram Medical College (PMC), the first self-financing medical college in the co-operative sector in the country was established in March 1993 at Pariyaram in Kannur district. For the time being people in this area lack specialized medical care facilities and the nearest medical college they trusted for treatment was Mangalore Medical College which is 125 kms away from this place. On 9 February 1997, the State government took over the management of the institution and constituted a committee named Board of Control to run the institution. Within a short span of its inception, it has made a mark in the field of medical education as a quality institution grooming future health care professionals. (<http://www.mcpariyaram.com/medicalcollege/AboutUS.aspx>).

#### **Financing Mechanism**

The estimated cost for the project was Rs.75 crores and the financing mechanism for the investment was institutional finance from Housing and Urban Development Corporation (HUDCO) a leading financial institution in the country. The loan taken from HUDCO way back in 1995 for the construction of the buildings and basic infrastructure facilities for the college was Rs.46.5 crores. As the Society could not repay the loan, the total liability with 19 per cent interest rose to a whopping Rs.658 crores, which the Society is unable to settle without government support. The Debt Recovery Tribunal has already allowed the attachment of the properties of the Pariyaram Medical College Hospital against the recovery of the loan taken by the PMCH Society.

#### **Risk Return Analysis**

Governments become the natural investors as healthcare and education are coming under the social infrastructure category which is in the nature of public goods. As Pariyaram Medical



College is governed by a Society, Government had accorded sanction to avail itself of an institutional loan with State government guarantee. The high interest rate and penal interest charged by the financial institution together with the low internal earnings pushed PMC into a very grave situation and the institution became unable to service its liabilities on time. Even though the project had comparatively low construction risk it involved high operational and demand risks. The socio-political risks of the project were high and hence there were vast chances for delay in the project.

The main reason for the failure of the financial mechanism was the high-risk towards interest rate which was unbearable for such a social infrastructure project. This difficulty could be managed by increasing equity of the firm either through Government support or by NRI support. For a social infrastructure project, an alternative financing mechanism with low debt liability could yield better results. Hence, the financing framework proposes budget appropriation as the most appropriate financing mechanism for a social infrastructure project like this.

## **KANNUR INTERNATIONAL AIRPORT (PPP- BOO Model)**

### **Background**

The proposal for the development of 'Kannur International Airport' received 'in principle' approval from the Ministry of Civil Aviation in February 2008. The Government of Kerala has floated a company by the name of Kannur International Airport (KIAL) for the development of the airport. The project is being implemented on a Public-Private-Partnership (PPP) basis and on a Build-Own-Operate (BOO) model. The airport is expected to have an annual traffic of more than 1 million international passengers and above 0.3 million domestic passengers. With the operationalisation of the Kannur airport, Kerala will be the only state in the country to have four international airports (Kannur International Airport, 2015).

### **Financing Mechanism**

The Kannur International Airport is being set up by a government led consortium. The equity structure of the company is 35 per cent by the state government in the form of land, 23 per cent by central and state-owned public sector organizations, 26 per cent by Airport PSU's and 16 per cent by small investors and institutional investors. The development of the infrastructure project will be through global tenders in Engineering, Procurement and Constructions (EPC) Model

### **Risk Return Analysis**

The risks are moderate for this project but there is scope for higher return. The financing framework proposed by this study suggest Commercial borrowing as the appropriate financing mechanism for the project based on the fact that it is an economic infrastructure having moderate

risk profile and fair financial viability. The moderate risk score together with its high financial viability for repayment enable the project to select a project financing mechanism like commercial borrowing. But the project investors selected an innovative mechanism of PPP - Build Operate and Own model in which the finance was sourced through equity from Government, Government and Private Institutions, Private Parties and NRIs. The CIAL model, a pioneer in this sector and well acclaimed for its financial mechanism, paved the way for sourcing fund for major infrastructure project like this.

### **TRIVANDRUM CITY ROAD IMPROVEMENT PROJECT (PPP- SPV Model)**

#### **Background**

Thiruvananthapuram, the capital city of Kerala had witnessed rapid urbanization through the Trivandrum City Road Improvement Project (TCRIP). It was attempted as a 'life cycle' approach for urban road improvement making the Private Developer (Concessionaire) responsible for all investments, development-cum-operation, and maintenance of the project. Land acquisition and financial risks were borne by the government agency and financially backed by the Kerala Road Fund Board, a company under the State government. The recovery for the Concessionaire was envisaged through annuity payments. The project provided better roads, underpasses, flyovers and over bridges and ring roads in the city. The project also offers the greatest potential for a reduction in transport crashes and casualties and thereby ensures the safety of the public.

#### **Financing Mechanism**

The initial estimated project cost was Rs105 crores in 1999 but it was revised to Rs165 crores in 2003. The project was awarded in March 2004 to Thiruvananthapuram Road Development Company Limited (TRDCL), a Special Purpose Vehicle formed for this Project by IL&FS Transportation Networks Limited (ITNL), the lowest bidder based on the lowest annuity amount quoted. The Kerala Road Fund Board, the dedicated Road Fund established to increase the comfort level of the private sector for participating in the project, approved the Public Private Partnership arrangements and allocated funds to TRCIP. TRDCL had to complete the work within 30 months and undertake Operation and Maintenance (O&M) for a concession period of 15 years based on O&M requirements specified in the Concession Agreement.

#### **Risk Return Analysis**

The PPP toll model used for inter-state roads and highways is not easy to apply to urban roads due to difficulty in imposing user charges owing to the intricacies in identifying the users of urban roads. Hence annuity structure is adopted in the case of urban roads when tolling is not possible or inadequate to cover the investment. In such cases PPP is the best mechanism where

the private sector bears the construction cost and operational risk but the revenue risk lies with the public sector. Thiruvananthapuram capital city roads improvement is a classic example for this.

The project faced a series of risks and default in the course of development. Land acquisition was the most severe problem which hampered the progress of the project and finally led to termination of the agreement. The project risk shows a high score in construction due to the long delays in land acquisition. The social, political, and regulatory risks are very high and extremely challenging as the project had to be executed in the midst of highly literate people with heightened political awareness and with clamours of violations from environmentalists and Human Rights groups. At the same time the operational risk, the influence of currency exchange, interest rate had very low impacts upon the project.

This is the first urban road project in India, where an attempt was made to develop and maintain a City Road Project through PPP arrangements and it has proved to be successful. It is also unique in its use of a Road Fund for ensuring annuity payments to the Private Participant. Limited initial financial burden, better quality of work, and superior operational and maintenance work are the three important highlights which made this project well acclaimed nationally. But there are certain criticisms leveled against the financing mechanism of this project. In Build Operate Transfer - Annuity scheme Government has been bound to give high annuity payments. As per the contract agreement with Road Fund Board, Government has to pay Rs.17.5 crores on semi-annuity basis to the Concessionaire for a concession period of 15 years. Through this the public exchequer has to pay Rs.525 towards annuity payments, which is a huge sum when compared to the estimated cost of the project.

The financing mechanism employed for the Trivandrum City Road Improvement Project, having very high-risk factors coupled with social good nature of the infrastructure, cannot be treated as a viable mechanism. By using this type of financing mechanism, the public exchequer and in turn the taxpayers will be burdened with high liabilities due to the financial obligations. But it cannot be ignored that the State government have budget constraints for funding large infrastructure projects. Therefore, it is imperative to explore alternative means of financing for these types of infrastructure projects. The financing framework proposes domestic or international borrowing of funds with government guarantee as a suitable financing mechanism for the project as it involves medium risk characterises and low return from the project instead of the high annuity payments associated with budget appropriation. Land value capture model was a viable alternative suggested instead of the BOT annuity mode. Bonds which are rated and come with Government guarantee could also be used for this type of projects and it could be marketed overseas to NRI's and to Sovereign funds.

## **VIZHINJAM INTERNATIONAL DEEP WATER MULTIPURPOSE SEAPORT**

### **(PPP Landlord Model)**

*Efficiency in operations is critical in the new dispensation. This cannot be achieved in an environment where state-owned operators provide port services because there is no incentive for them to improve efficiency in the same manner as private operators driven by profit. This is why 88 of the top 100 container ports use the 'Landlord Port' model.* (Indian Infrastructure: Evolving Perspectives, 2012)

### **Background**

Vizhinjam International Deep Water Multipurpose Seaport is a prestigious flagship project of the Government of Kerala being developed on a landlord port model. Vizhinjam International Deep Water Multipurpose Seaport limited (VISL), an SPV of Government is the implementing agency for the development of the Greenfield port. The dream project proposed in 1990s was finally translated into reality in December 2015 and is a watershed in the history of Kerala. It would revolutionise the industrial and business sectors of the State throwing up tremendous opportunities for its socio-economic development. The natural dredging and geographical proximity to the international shipping route are some specialties of this port which helped to being developed as the transshipment hub to cater to large mother vessels. Vizhinjam is an all-weather port that will come up 10 – 12 nautical miles away from the Persian Gulf – Malacca lines. The port with a draught of 18.20m can handle new generation mother vessels of sizes ranging from 18000 to 22000 TEU.

### **Financing Mechanism**

The total estimated cost of the project is Rs.5,552 crore. The port is being developed on DBFOT (Design Build Fund Operate and Transfer) model and has been awarded to M/s Adani Vizhinjam Port Private Ltd., the Concessionaire. A Concession Agreement was signed between the Government of Kerala and the Concessionaire on 17th August, 2015 with a concession period of 40 years.

Out of project cost, Rs.4,089 crores is the Concessionaire's contribution, while State government will put Rs.1,463 crores for 'Funded Works' of the project. While the Central government would provide Rs.818 crores as Viability Gap Fund to support the project, the balance Rs.817 crores will be provided by the State government out of the total Viability Gap Fund (VGF) of Rs.1,635 crores sought for the project. The state would provide the required land and external infrastructure such as water, power, and rail connectivity for the project. It is the first project in the State and first port in the country to receive VGF assistance from the Central Ministry of Finance.

### **Risk Return Analysis**

Generally, the risk factors concerned with port development are very high since there occurs an array of delays and defaults related to socio-political, environmental, and regulatory issues. The high transaction cost reflecting a range of contractual and administrative complexities of the procurement process and high financing costs reflecting the shift of project risks to private-sector equity sponsors are the highlights of the port development costs. Because of its inherent characteristics like huge upfront finance and high project risks the project becomes economically unviable and hence, it becomes unattractive to private investors. At the same time, since the financial requirements of the project are of a tall order, governments are unable to fund it due to the financial crunch. In such a situation PPP arrangements in the form of Design, Build, Operate and Transfer is the only possible solution to implement the most ambitious project of the State. Since this type of project is not economically viable from its financial internal rate of return (FIRR) the project can be made economically viable with certain provisions. For promoting development of ports and anticipated further development of the business area both the Central and State government provided a Viability Gap Fund to make the project economically viable. In addition, the Concessionaire gets the ownership for land development of certain area and engages in business in that area to promote the entrepreneur.

Considering the realities, the financing mechanism used for the above project is justifiable and there is no suitable alternative for suggesting as a substitute. Harsh criticism has been leveled against this financing mechanism charging that this will only benefit the Concessionaire at the expense of land and money of the Government. The critics of this financing mechanism have suggested an alternative that domestic banking consortium loans could be utilized for this purpose. The Commercial banks have played a pivotal role in providing finance to infrastructure but the bank credit to infrastructure has resulted in a greater concentration of risks in banks due to the Asset Liability Management (ALM) mismatch and reaching the regulatory caps of RBI. In order to further lend to a particular sector and / or a particular developer, the regulatory caps could be raised or seek takeout of existing loans. Hence it can be affirmed that the DBOT is the most suitable financing mechanism for such huge projects like Vizhinjam International Port. The financing framework also proposes PPP as the most suitable financing mechanism for the project.

### **SPORTS INFRASTRUCTURE - KARIAVATTOM GREENFIELD STADIUM (PPP -DBOT Model)**

#### **Background**

The Kariavattom Green Field Stadium spread over 37 acres with a seating capacity of 50,000 is Kerala's 'first world-class stadium'. This stadium is built under the PPP - DBOT (Design, Build,

Operate and Transfer) mode and it is the first-of-its-kind in the country. It is located on 30.5 acres and 6.5 acres has been earmarked for a 1,000-vehicle parking lot.

### **Financing Mechanism**

The project with an estimated cost of Rs.161 crores was awarded to the lowest bidder, based on the lowest annuity amount quoted. Infrastructure Financing and Leasing Services Limited (IL&FS) had won the bid with the lowest NPV (Net Present Value) quote for Rs141.19 crores. Kariavattom Sports Facilities Limited (KSFL), a special purpose vehicle, created by IL&FS for the construction of the stadium. An agreement was executed for the construction of the stadium with a concession period of 15 years including two years construction period from the commencement date. Annuity payment shall be made on annual basis by National Games Secretariat (NGS) over 13 structured annuities.

### **Risk Return Analysis**

This social infrastructure project has low-risk profile in general. The construction and operation risk are low whereas the demand risk is high. The socio-political risk and environmental risk are comparatively low. The transaction cost and the information asymmetry are average and the total risk is low. The financial viability analysis reveals that the project is coming under the low category and it can generate revenues but it is too low even to meet the O&M expenses. Considering the low risk-return profile and its social good nature this type of projects is viable only through government funding and hence Budget appropriation or Special purpose Bonds is the appropriate financing mechanism for the project. The proposed financing framework suggested Special Purpose Bonds as the appropriate financing mechanism for this type of projects.

## **HOUSING PROJECT OF NILAMBUR MUNICIPALITY (Project finance by domestic institution)**

### **Background**

Housing is important in terms of economic development and social welfare. A decent house can solve many problems for the households. Hence in any policy to improve quality of life of marginalized groups, improving housing condition cannot be ignored. The Nilambur Municipality, one of the northern Municipalities in Kerala, recognized that the Local Self Government institutions can play a significant role in increasing the housing stock in the country by preparing a plan for providing reasonable housing facilities to the downtrodden. But demand for housing finance is not fully met by the Local Bodies due to lack of funds and hence they opted to source finance from financial institutions. Thus Nilambur Municipality has formulated a



new housing proposal titled “**Housing for All**” intended to provide housing to low income groups with the support of a financial institution.

### **Financing Mechanism**

The estimated cost of the project was Rs.4.5 crores for building 300 houses for the economically weaker sections of the society with beneficiary support. The Kerala Urban and Rural Development Finance Corporation Ltd (KURDFC), a State government Non-Banking Financial Company created for funding the infrastructure needs of Local Self Government institutions in the State, sanctioned the required loan. An agreement was executed with KURDFC for the execution of the project with a repayment period of eight years on quarterly basis. The State government have accorded sanction to Municipalities to utilize 15 percent of its plan funds, earmarked for infrastructure component, for the repayment of the loan. Therefore, the financial burden of the Municipality towards the repayment of the loan will be partial.

### **Risk Return Analysis**

The housing projects are also coming under the category of social infrastructure projects. In social housing projects the total project risk is considerably very less as the construction, operation, and demand risks are low. The project does not generate any revenue for the repayment and hence the financial viability is also low. Even though the project has low-risk factors the project is not financially viable because of its social good nature. Such projects are not attractive to private entrepreneurs as it is not capable of generating revenue. Hence, considering its social obligations the government should make arrangements for funding these types of projects. In the instant case, the Municipality opted for commercial borrowing from financial institution as a viable mechanism for sourcing funds for the project. Since a part of the repayment is ensured from the State government’s plan funds to Municipality, there will not be any burden towards the repayment of the loan and it would be similar to that of a Budget appropriation. For extending this type of project to other parts of the state, the government can issue Special Purpose Bonds in order to source sufficient funds for the project and such bonds can be marketed overseas to NRI’s and Sovereign funds.

### **CONCLUSION**

There is a wide variety of financing mechanisms available for raising funds for infrastructure projects which promote socio-economic development. The efficiency of a financing mechanism is to a large extent determined by the risk-return profile of the project. Hence, to understand the efficiency of a financing mechanism, it is imperative to primarily understand the risk profile of the project which in turn will indicate the return expected by potential investors. An accurate assessment of the risk profile together with the mitigating mechanisms and financial viability



will give a precise picture of the mechanism to be adopted for financing the infrastructure project. Based on the analysis of case studies and literature review, this study has come up with a framework that would be useful for selecting appropriate financing mechanism for infrastructure projects. The proposed framework is based on the analysis of Project type, Risk factors, and the financial capabilities associated with an infrastructure project. Risk management and external factors such as regulatory constraints were also considered in the choice of an appropriate financing mechanism. In the case of Kerala, however, due to the special characteristics of the state like high density of population, highly sensitive and politically literate people, geographical conditions, some of the generally used financing mechanisms may not be practicable.

The backgrounds, financial mechanism used, and risk-return analysis of the cases studied were done in detail and using the proposed framework an appropriate financing mechanism was suggested for each case. The suitability of the financing mechanism may differ according to an array of conditions like geographical heterogeneity, socio-political situations, environmental reasons, and regulatory conditions. The analysis also revealed some alternative mechanisms which seem practicable considering the above mentioned conditions.

Even though the proposed framework is based on exploratory research, it provides a practical basis to the users for assessing the financing mechanism for their infrastructure projects. The framework will certainly help them to optimise project risk allocation, reduce information asymmetry, and reduce transaction costs and reinforce the financial viability of the project by minimising the total cost.

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