FINANCING POWER PROJECTS: A STUDY OF INDIAN PRACTICES

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MANAGEMENT

By

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DECLARATION

I, **KONDRU SUNDARA SEKHARA RAO**, hereby declare that the thesis entitled, **“Financing Power Projects: A Study of Indian Practices”**, submitted by me under the guidance and research supervision of **Dr. S. MALLIKHARJUNA RAO**, is an original and independent research work. I also declare that, it has not been submitted previously in part or in full to this University or any other University or Institution for the award of any degree or diploma.

Place: Hyderabad **KONDRU SUNDARA SEKHARA RAO**

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CERTIFICATE

This is to certify that the thesis titled, **"Financing Power Projects: A Study of Indian Practices"**, submitted by **KONDRU SUNDARA SEKHARA RAO**, a Research Scholar enrolled for Ph. D programme in the School of Management Studies, University of Hyderabad, is a bonafide work done under my guidance and research supervision.

The thesis has not been submitted previously in part or in full to this or any other University or Institution for the award of any degree or diploma.

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- **Sundara Sekhara Rao Kondru**

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ABBRIVATIONS

AC	Alternating Current
ADB	Asian Development Bank
ANOVA	Analysis of Variance
APDRP	Accelerated Power Development and Reforms Programme
AT&C	Aggregate Technical and Commercial
BOT	Build/Operate/Transfer
CEA	Central Electricity Authority
CERC	Central Electricity Regulatory Commission
COPs	Certificates of Participation
CRR	Corporate Risk Review
CTU	Central Transmission Utility
DF	Degree of Freedom
DFI	Development Financial Institution
DPP	Dabhol Power Project
EA	Electricity Act
ED’s	Electricity Departments
EDC	Enron Development Corporation
EPC	Engineering, procurement and construction
EPF	Employees Provident Fund
EU	European Union
FDI	Foreign Direct Investment
FICCI	Federation of Indian Chambers of Commerce and Industry
FII	Foreign Institutional Investors
GDP	Gross Domestic Product
GDS	Gross Domestic Savings
GOI	Government of India
HVDC	High Voltage Direct Current
IBRD	International Bank for Reconstruction and Development
IDFC	Development Finance Corporation
IFC	International Finance Corporation
IFFs	Infrastructure Financing Facilities
IIIT’s	Investment in Inflation Protected Treasury Securities
IPFA	International Project Finance Association
IPPs	Independent Power Producers
IRR	Internal Rate Of Return
JVs	Joint Ventures
KPCL	Karnataka Power Corporation Ltd
LIC	Life Insurance Corporation
MDA	Multilateral Development Agencies
MIG	Multi lateral Investment Guarantee Agency
MoEP	Ministry of Environment and Forestry
MoP	Ministry of Power
MW	Mega Watts
NBFCs	Non-Banking Financial Corporations

NEP	National Electricity Policy
NHPC	National Hydro Power Corporation, Ltd.
NLDC	National Load Dispatch Centre
NTPC	National Thermal Power Corporation
OECD	Organization for Economic Co-operation and Development
O&M	Operation and Maintenance agreement
PCG	Partial Credit Guarantee
PF	Project Finance
PFC	Power Finance Corporation
PFI	Private Financing Initiative
PFP	Privately-Financed Projects
PLF	Plant Load Factor
POWERGRID	Power Grid Corporation of India Limited
PPA	Power Purchase Agreement
PPI	Private Participation in Infrastructure
PPPs	Public Private Partnerships
PRG	Political Risk Guarantee
PRI	Political Risk Insurance
PSP	Private Sector Participation in power projects
PSU	Public sector Utilities
PTC	Power Trading Corporation of India limited
RBI	Reserve Bank of India
REC	Rural Electrification Corporation limited
RLDC	Regional Load Dispatch Centers
SEBI	Securities Exchange Board of India
SEBs	State Electricity Boards
SERC	State Electricity Regulatory Commission
SLDC	State Load Dispatch Centers
SS_T	Sum of Squares
SS_R	Sum of Squared Residuals
SS_M	Model Sum of Squares
SPV	Special Purpose Vehicle
STU	State Transmission Utility
T&D	Transmission and Distribution
TRAC	Terminal Rental Adjustment Clause
UN	United Nations
ULDC	Unified Load Dispatch and Communication
UMPP's	Ultra Mega Power Projects
WEF	World Economic Forum

CHAPTER - I

INTRODUCTION

1.0 Introduction

Economic growth of a country can be largely influenced by the present state of the infrastructure. The development of infrastructure leads to the development of the economy. The infrastructure may be classified as:

- Physical infrastructure
- Economic infrastructure, and
- Social infrastructure

Infrastructure comprises public works like, railways, roads, major irrigation projects, public utilities such as: power, telecommunications, tap-water supply, sanitation and sewerage, etc. The importance of adequate infrastructure is that, it can facilitate economic growth, poverty alleviation, and environmental sustainability. Infrastructure has been defined by various organizations. Some of these definitions are:

"Infrastructure" means The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons.

- The American Heritage Dictionary (2000)

"Infrastructure" means "a wide array of public facilities and equipment required to provide social services and support private sector economic activity." According to the report, infrastructure included roads, bridges, water and sewer systems, airports, ports, and public buildings, and might also include schools, health facilities, jails, recreation facilities, electric power production, fire safety, waste disposal, and communications services.

- US Council of State Planning Agencies
(Vaughan, R. and Pollard, R., 1980)

"Infrastructure is generally defined as the physical frame work of facilities through which goods and services are provided to the public"

- India Infrastructure Report

Infrastructure projects are large capital intensive monopolies such as: roads, power projects, telecommunications, etc. Most of these projects are owned by the government in India, but some are owned by private sector. Power sector is one of the components in infrastructure; it is one of the fastest growing sectors in the country. Therefore, the role of the power sector becomes vital in the economic development of the country. Some sectors like power, telecommunications, roads and bridges, etc., are more important than other sectors, for the development of economy. Thissen and Herder (2004) described it as "critical infrastructure" a term for a new perspective that is built on the assumption that some infrastructures are more vital and more critical than others. Critical infrastructure includes water, energy, transportation, and telecommunications.

India is the fastest growing economy next to China in Asia. The infrastructure sector is also growing at a rapid pace. Infrastructure sector's contribution to the Gross Domestic Product (GDP) is very very significant. The growth of the Indian economy significantly is faster than in the past, and also it required the power sector to account for 10 percent growth to support the rate of country GDP growth (around 9 percent per annum). However, the contribution of power sector to Indian GDP is merely 2.4 percent p.a. Though it is discouraging news, still it has gathered movementum to rapidly contribute its share for the increase in GDP level. It should increase at a significant level. According to global competitive report 2007-08 made by World Economic Forum (WEF), India's rank in infrastructure is 67 and China's 34. India is far behind China and other developed and developing countries, in terms of competitiveness. To increase its competitiveness, the Indian government recognizes the importance of infrastructure development, and has taken appropriate measures to speed it up. Recently Planning Commission of India estimated that the centre, state governments and private sector need to invest 1.5 trillion dollars (more than Rs 60 lakh crore) for the next decade to get full-fledged world class infrastructure. During Eleventh Five Year Plan (2007-12), the plan panel has projected an investment of $ 488 billion with nearly one – third of it going to the power sector. But India's electricity generation growth rate is 6.7 percent p.a, which is far below that of the developed and several developing countries in the world (wikipedia.org/wiki/ Economy_of_India).

Therefore, keeping in view the present scenario of Indian power sector, and requirement of investment for its development, the present has been undertaken to identify the factors influencing investment of power projects. This study mainly discusses various aspects of financing power projects, including the structure of the projects, factors influencing the investment, sources of investment, methods of financing and risks involved in the projects. The study mainly focuses on the methods of financing to identify the possibility of decreasing the risk of the project by using suitable method of financing to attract investments. This chapter gives a brief explanation of all these issues to give an overall idea about the structure of the projects, and the system of financing in power projects.

1.1 Structure of the Power Project

Power sector is fastest growing sector in India, it includes all kinds of power projects such as: coal, gas, hydro, wind, solar and bio-mass, etc. The design of these projects is different for each type of project. However, such all projects have some common elements, like basic features and its implementation. A power project involves various phases (Malden Sosic, Maladen Albisser, & Werner Baumgartner 1999) such as:

- Pre-project,
- Development,
- Construction,
- Testing, and
- Operation.

The time period is set for every project. Completion of each stage of the project depends on the risks involved in that stage. If any unforeseen contingencies or risk arises, it will take more time to complete that stage. However, the successful implementation of a project depends on the pre-planning of all activities. The final results of the projects depend on the technical feasibility, investment adequacy, adeptness and proficiency of human resources and the scrupulous execution of the contract agreements of the project. The promoters of the project should prepare the detailed feasibility report. It contains technical analysis, financial analysis, and demand analysis of the project for submitting to the government.

Each project involves a separate financing mechanism. For each project, the funds will be raised separately, and the project administration is also separate. Its activities are not mixed with the promoting company. Its balance sheet is separate, and the profit and loss are calculated separately for each project. Either it earns profit or loss; it belongs to that project only.

Project Phases

Pre-project	Development	Construction	Testing	Operation
Time period				
Variable	2-3 years	1-5 years	1-6 months	Up to 20 years or more
Activities				
Initial development Identify a project Request for authorisation Go ahead approval	Feasibility study Partner search Form project co Financing negotiations Design Bid, procurement	Site work Fabrication Erection	Start up, Testing Provisional acceptance	Commercial operations Punch list Final acceptance Maintenance Transfer Liquidation
Costs				
Pre-development cost	Development cost and expenses Financing costs	Construction costs	Commissioning adjustments	Operating expenses Fuel Maintenance
Revenues				
None	Recoup from partner?	Development fees	Operating revenues	Operating revenues Equity sell down

Source: Malden Sosic, Maladen Albisser, & Werner Baumgartner (1999).
Fig 1.1: Phases Involved in a Power Project

1.2 Investment of Power Sector in India

Investments in infrastructure may differ from competing investments such as immovables and capital goods in several ways (Nijkamp & Rienstra 1995). Especially, the high -fixed investment costs and the long construction and planning periods may make the investment very unattractive to private investors, because, in the initial stage of a project, a lot of capital is required, while the pay-back period is very long. As a result, the interest burden is very high. Immediately after starting commercial operations of a project, it will get less operating cash-flows and return on investments. Thereafter the profits will increase over a period of time, because, more repayments will be made at the initial stage, which reduces the interest costs. These features cause for high uncertainty and the high risks of infrastructure projects. Every investment has its own risks (major/minor). However, the risk in infrastructure is very high because, the long pay-back period; it will be surely act an obstruction for making good estimations of revenues.

The investment in power sector has been slowly increasing in India and picking up movementum in recent times for better development. State is the major investor of this sector than the private sector. The investment achieved in Indian power sector in the Eighth Plan was Rs 6,16,750 crores, the target for Ninth plan (1997-02) was Rs 12,45,260 crores, and achieved amount was Rs 5,75,760 crores (Karker, et.al, 2001). The investment in infrastructure during the Tenth Plan was Rs 8, 87,794 crores which constituted 5.07 percent of the GDP. This included Rs 1, 75,203 crores of investment kept by the private sector. Investment requirement during Eleventh Plan (2007-12) is Rs 250000 crores for power generation, and another Rs 250000 crores for transmission, distribution and rural electrification (Canning & Pedroni, 2004). It has been estimated that investment of about Rs. 9, 75,000 crore will be needed to meet the capacity addition requirement during Eleventh Five Year Plan. The full details about the investment of central, state and private sectors are given in Table 1.1.

Table 1.1: Public and Private Investments in Power Sector in India during the Period 2002-03 to 2009-10

(*Rs in crores*)

Year	Centre	State	Private	Total
2002-03	14219	20467	12926	47612
2003-04	17336	20566	15583	53485
2004-05	19708	18819	18428	56956
2005-06	22867	18329	21017	62268
2006-07	28332	19372	23825	71529
2007-08	29,386	27,252	54,497	1,11,134
2008-09	36,769	30,109	50,215	1,17,093
2009-10	39,528	31,193	55,237	1,25,958

Source: Ministry of power (2010)

However, the characteristics of this sector make it less attractive for investment. They are: longer gestation period, i.e. a longer time taken for generation of cash flows, reluctance to make investment on the part of investing agencies, absence of basic support system and initialization, risks associated, such as financial, environmental, etc, lack of social approval and support and clearances required for setting up an infrastructure related project.

1.3 Financing Power Projects

Infrastructure finance deals with raising finance to meet the requirements of the infrastructure projects. The term infrastructure finance is defined by various authors as:

"A sum total of all those activities undertaken in the financing of infrastructure development are known as infrastructure financing".

- Gurusamy (2005)

"Infrastructure financing refers to any credit facility extended by banks and financial institutions for developing, operating and maintaining any infrastructure facility".

- Reserve Bank of India (RBI), (2011)

Power sector is one of the components in infrastructure; these definitions are applicable to power sector also. Financing infrastructure projects is a critical issue. Because of its characteristics, the power sector differs from the manufacturing sector. Every project is to be treated as a separate venture and have its own financing structure. The characteristics of infrastructure financing are:

1. *Longer maturity*: Infrastructure finance tends to have maturity period of 5 - 40 years. This reflects both the length of the construction period and the life of the underlying asset that is created.

2. *Larger amounts*: While there could be several exceptions to this rule, a meaningful sized infrastructure project could cost a great deal of money.

3. *Higher risk*: Since large amounts are typically invested for long periods of time, it is not surprising that the underlying risks are also quite high. The risks arise from a variety of factors, which include uncertainty in demand, environmental surprises, technological obsolescence (in some industries such as telecommunications) and most importantly, political interventions and policy related uncertainties (Nachiket & Sehrawat, 2006).

Power projects are financed by using different methods of financing around the globe. These include: equity, debt, project finance, partnerships, including Public Private Partnerships (PPPs), joint ventures, leasing of infrastructure, structured financing, corporate financing and many other innovative financing methods. In India, only a few methods are implemented. However, the selection of the method is influenced by the project constraints and the preferences of investors. The overview of the financing methods, which is used in India, is given below.

1.4 Methods of Financing

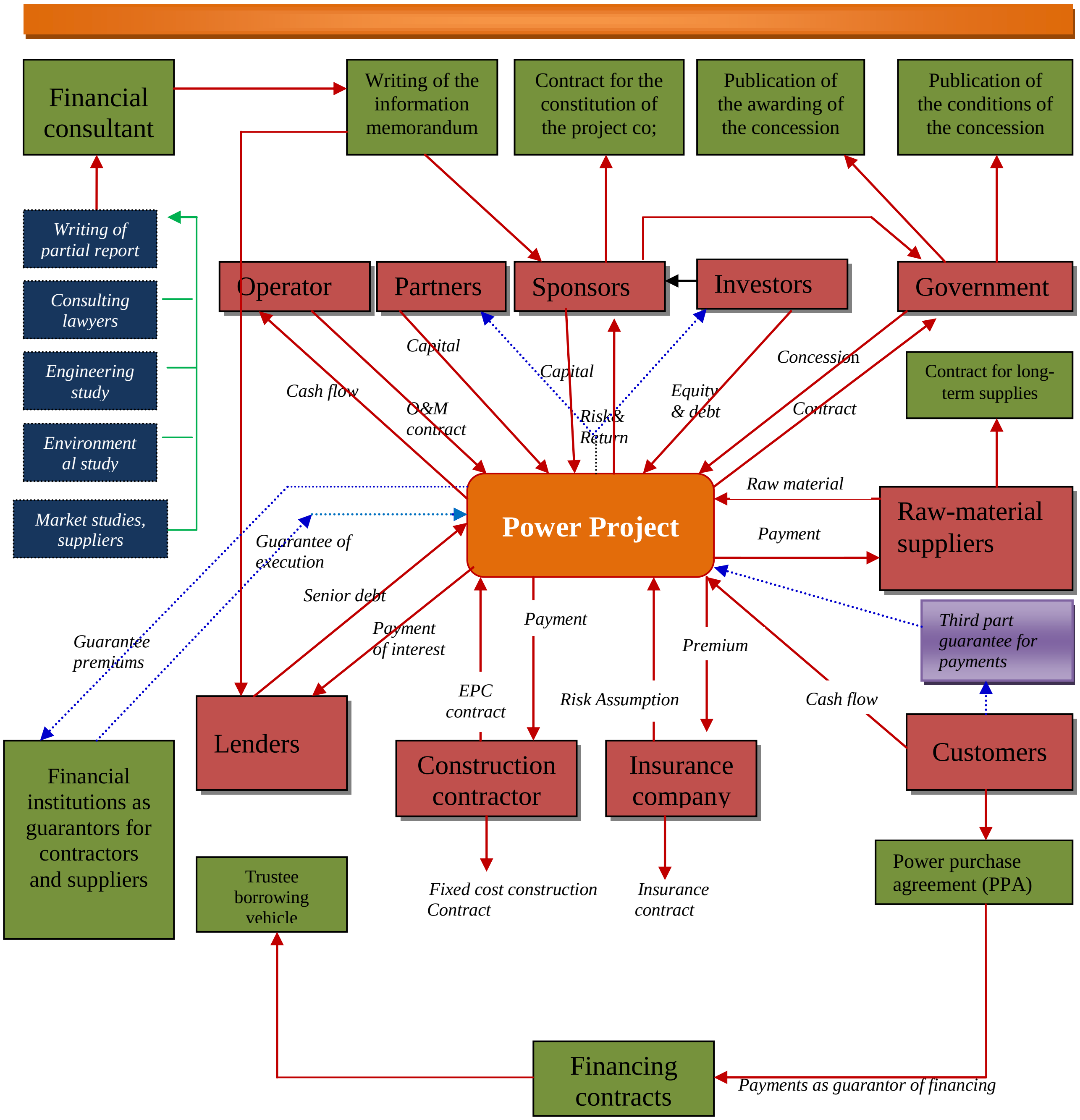
1.4.1 Project Finance**:** Project finance approach has been widely used for financing large and capital intensive infrastructure projects in the past decade. Project finance is a method of raising long-term debt financing for major projects through "financial engineering," based on lending against the cash flow generated by the project alone. It depends on a detailed evaluation of a project's construction, operating and revenue risks, and their allocation between investors, lenders, and other parties through contractual and other arrangements. "project finance" is not the same thing as "financing projects," because projects may be financed in many different ways (Yescombe, 2002).

According to Finnerty (1995), project finance means: *"raising of funds to finance an economically separable capital investment project in which the providers of the funds look primarily to the cash flows from the project as the source of funds to service their loans and provide the return of and a return on their equity invested in the project"*. Project finance (or project financing) involves performing a set of security arrangements to reduce risk in large infrastructural investments. It is a sound technique that has made a success of running capital intensive projects such as electric power generating facilities. This arrangement is made between the project company (the sponsors) and the agents interested in the project. These agents, so-called participants, can be:

- Clients or their agencies,
- A host government,
- A supplier,
- A constructor,
- An operator, and
- A bank or lenders.

Through these agreements, a project becomes less risky and therefore, less expensive to perform. The robustness of project finance is based on these agreements, which aims to allocate the risks to the different participants. In this way, each agreement guarantee against a specific risk (Ballestero, 2000).

Broadly speaking, in project finance, debt is provided by a third party (usually a bank) to a project company (usually a Special Purpose Vehicle (SPV)), in addition to capital injected by the project's sponsors. A SPV is set up to undertake the project, to raise finance and to enter into the main project contracts. The liability of the project sponsors is limited to the amount of capital they have invested. A lender will be looking for debt to be serviced (i.e. interest and principal repayment) from the project's revenues, which are the results of operating cash inflows, after deducting operating costs. Several parties involved in project financing, among all those parties, various contract agreements will be arranged. The contract arrangements minimise the risk of the projects, so that, the investments will be attracted. The key feature of project finance is the legal separation from sponsors' other assets of what is most typically a single large asset constituting a new, self-contained, well-specified investment by the sponsor(s). The typical structure of project financing and the flow of actives between the project and various parties involved in the project, given in figure 1.2:



Source: Malden Sosic, Maladen Albisser, & Werner Baumgartner (1999).
Fig 1.2: The Main Parties' Involved, Contract Agreements, and the Activities Flow in Project Finance Method.

1.4.2 Corporate Financing: In corporate finance, the project is financed by recourse debt and equity, without dissociation from the other assets of the operator. Corporate financing is not asset-specific, but represents the sponsor company's general borrowing. (FINON, et al 2008, pp11). Corporate-based financing can always count on guarantees constituted by personal assets of the sponsor, which are different from those utilized for the investment project. In project finance deals the loan's only collateral, refers to assets that serve to carry out the initiative; the result is advantageous for sponsors, since their assets can be used as collateral, in case further recourse for funding is needed (Gatti, 2008).

The crucial feature of corporate financing is the importance of the project developer (promoting company), and its direct involvement in taking the risk of the project into its own books. Under such an arrangement, the new asset (the power plant) remains an integral part of the sponsor's entity. The critical point in the modern finance perspective is that corporate financing represents the sponsor company's general borrowing. The issue of equity investment is common to both project finance and corporate financing methods (more details are given in Chapter-III).

Since, corporate finance involves multiple current and future projects, the same contractual arrangements cannot be affected in corporate finance. Therefore, cash flows are less verifiable in corporate finance than in project finance (Subramanian, 2007). There are several differences between project finance and corporate financing. The essential major differences are summarized as:

Table 1.2: Main Differences between Corporate Financing and Project Financing

Factor	Corporate Financing	Project Financing
Guarantees for financing	Assets of the borrower (already-in-place firms)	Project assets
Effect on financial elasticity	Reduction of financial elasticity for the borrower	No or heavily reduced effect for sponsors
Accounting treatment	On balance sheet	Off-balance sheet (the only effect will be either disbursement to subscribe equity in the SPV or for subordinated loans)
Main variables underlying the granting of financing	Customer relations Solidity of balance sheet Profitability	Future cash flows

Degree of leverage utilizable	Depends on effects on borrower's balance sheet	Depends on cash flows generated by the project (leverage is usually much higher)

Source: Gatti 2008 pp 4

1.4.3 Equity & Debt: The two basic types of financing methods are equity and debt. But now-a-days both are combindly using as a method of financing to finance projects. This method of financing is widely using in power projects in India. In fact, this method is similar to corporate financing. But leverage in corporate financing is likely to be as low as 50 percent, with a substantial amount of equity required for the project. Raising that much of equity is difficult to the projects. But, this method has the flexibility of deciding the debt and equity ratio. This method is supported by balance sheet assets of the parent company like in corporate financing.

Investors in secured and unsecured debt, look to the firm's cash flow, for the repayment of interest and principal. However, in the event of bankruptcy, unsecured debt holders have a general claim on the firm's assets, whereas, secured debt holders have specific corporate assets that can be sold to recover any losses and these claims take precedence over the unsecured creditors' claims on the firm's assets (Ambrose, 2009).

Equity has the lower rank and the last claim on the assets and cash flows of the project. Debt is often structured in the form of senior debt or subordinated debt. Senior debt has higher priority than all other claims on project cash flows and assets. Subordinated debt ranks behind other unsecured loans in payment obligations (Zhang, & M.ASCE, et.al, 2005).

Equity capital acts as a buffer for absorbing variability in cash flows and is necessarily influenced by the risk profile. Generally, a considerable uncertainties associated with successful implementation of the project construction phase, are likely to make it difficult to raise high levels of debt for the initial part of the project. The required amount of debt can be obtained through innovative financing instruments, such as: simple subordinated debt, convertible debt, debt with stock warrants, and debt with an additional interest payment above the coupon rate contingent upon the existing financial performance (Ahluwalia,). Still, financing choices are not constrained to a simple dichotomy between equity and debt. Typical business financing models are now diversified. They are not only relied on canonical model of project financing, but also adjusted to fit particular purposes and needs of the project.

***1.4.4 Partnership Finance*:** Neither a purely public nor a purely private infrastructure development approach, is likely to be sustainable in the long-term. The remedy for it is partnership financing between public and private sectors. A Public-Private Partnership (PPP) approach can strengthen both the public and private sectors. India has been seeing rapid growth in recent years in its wonderful programme of infrastructure public-private partnerships. Despite the surge in demand for finance, local financial markets coped well over the period of time till 2007—and even offered better terms as they became more useful to the PPP model. Private involvement in infrastructure provision may occur in several ways like PPPs, Private Financing Initiative (PFI), etc. It is useful to make a clear distinction between financing and operation of infrastructure. The level of privatization in different components of infrastructure sector in India is shown in Table 1.3.

Table 1.3: Status of Privatization in Key Infrastructure Sectors

Sector	Subject	Level of privatization	Regulator
Power	Central/State	Low	Present
Oil and Gas	Central	Moderate	Present
Ports and Shipping	Central/State	Low-Moderate	Present
Roads and Bridges	Central/State	Low	Absent
Aviation	Central	Low	Present
Railways	Central	Nil	Absent
Telecom	Central	High	Present
Urban Infrastructure	State	Low	Absent

Source: India infrastructure, August 2007.

Ministry of civil aviation, annual report 2010-11
Ministry of Petroleum and Gas (2012), the petroleum and natural gas regulatory board act, 2006 no. 19 of 2006

1.5 Financial Model: Projected cost, revenue and expenditure figures will be fed into an audited financial model prepared by the sponsors or their financial adviser. The lender will use this computer model to generate projected financial statements and examine certain sensitivities that will test the elasticity of the project economics to various contingencies, such as cost overruns, changes in the rate of inflation, interest rates, electricity prices, and higher operating costs. The probability, nature and level of certain sensitivities will be devised in conjunction with bank advisers.

Successful financing will continue to be a major challenge for all renewable and non-renewable power projects. The key to successful project financing lies in structuring the financing method/mechanism with recourse of funds as much as possible to the private investor, while, at the same time, providing sufficient credit support through guarantees of project investors or third parties. Thus, the lender of the debt will be satisfied with the credit risk. The typical application of project financing method is suitable for capital-intensive projects associated with high risks (Kistner, R. & Price, Henry W. 1999).

1.6 Project Risks

The development of power projects in India is in a nascent stage and the developers have to face many risks (expected and unexpected) involved in the development of these projects. These risks are generally appearing in power projects around the globe. But in India, it needs special attention to reduce these risks, because, the credibility and liquidity of state owned monopolies (power purchaser, fuel supplier and transporter) is very poor to meet their contract obligations (payments).

Several risks are involved in the project, at every stage of the project, different kinds of risks will crop-up. For the success of power projects, the risk allocation is necessary. For the allocation of the risk, different agreements should be arranged among the parties. The different contractual and organisational arrangements, in order to mitigate or transfer the risks onto other parties, have, in turn, an impact on the attractiveness of alternative financing structures for power plant (OXERA, 2003). In reality, risk allocation is based on the negotiation capabilities of the different parties.

1.7 Types of Risks

The development of new projects involves various types of risks. The present study considered only selected risks which are mainly influencing the selection of financing methods. They are given below.

1.7.1 Construction Risk: Construction risk refers to unexpected developments during the construction period that leads to time and cost overruns or shortfalls in performance parameters of the completed project. It relates to delays in completion and cost overruns.

1.7.2 Operating Risk: Once the project has been completed and is demonstrated for a specific operation, a new risk phase begins i.e. operating risk. The operating risk arises due to the shortage of raw-materials for production. To mitigate this risk, long term supply contracts are required for necessary raw material supply at a predictable price.

1.7.3 Technology Risk: Even if the project passes its performance tests, still there may be some concerns about the long term risks if it introduces a new technology. Lenders are always reluctant to lend against a project that is using new and untried technology, whose performance cannot be checked against existing references. The problem is that the new technology risk may be unquantifiable and may not be covered from the EPC contractor.

1.7.4 Financial Risk: It arises due to the inefficient strategies which are used to design the capital structure of the project. Financial risk can be reduced or mitigated through the use of derivative instruments, such as futures contracts, forward contracts and options.

1.7.5 Political Risk: As a project has to be commercially viable, it must also be politically feasible. The fundamental issue is whether the project is beneficial to the country or not. Fight, A. (2006) said, "One way to avoid entering into potentially high risk lending situations, reducing political risk, is to lend through, or in conjunction with, multilateral agencies". The insurance is available for political risk also.

1.7.6 Regulatory Risk: This type of risk arises to the projects, because, infrastructure projects have to interface with various regulatory authorities throughout the life of the project, making them especially vulnerable to regulatory action. In general, regulatory risk is best handled by establishing strong and independent regulatory authorities that operate with maximum transparency of procedures within a legal framework that provides investors with credible recourse against arbitrary action. As for the regulatory risks, the vendor has implicitly accepted to bear it by signing up a turnkey contract without provision of revision of the price, in case of unanticipated regulatory difficulties.

1.7.7 Environmental Risks: The environmental aspects of a project may arise due to pollution and dispose of project wastage. It also arises due to various legal and wider political risks. The possibility of pre-existing pollution at the site will be an issue under the EPC contract, and the EPC contractor is, of course, required to construct the project to meet environmental standards on emissions, etc.

1.8 Risk Mitigation

FINON et.al (2008) identified that, the risks specific to a nuclear power investment in liberalised markets; regulatory, construction, operation and market risks can be mitigated or transferred away from the plant investor through different contract and organisational arrangements. It means the risks can be transferred through proper agreements with the parties that are involved in the projects.

However, the process of risk management is crucial in financing project for the success of any venture and is based on the following closely related steps:

1. Risk identification
2. Risk analysis
3. Risk transfer and allocation of risks to the factors best suited to ensure coverage against these risks, and
4. Residual risk management

Risks must be identified, in order to ascertain the impact they have on a project's cash flows. Risks must be allocated, instead, to create an efficient incentivizing tool for the parties involved. If a project participant takes on a risk that may affect performance adversely in terms of revenues, this player will work to prevent the risk from occurring.

From this perspective, "project finance" method can be seen as a system for distributing risk among the parties involved in a venture. In other words, effectively identifying and allocating risks leads to minimizing the volatility of cash inflows and outflows generated by the project. This is advantageous to all participants in the venture, who earn returns on their investments from the cash-flows of the project company.

Risk allocation is also essential for another reason. This process, in fact, is a vital pre-requisite to the success of the initiative. In fact, the security package (contracts and guarantees, in the strict sense) is set up in order to obtain financing, and it is built to the exclusive benefit of original lenders (Gatti, 2008 pp 10). Regarding the risk and its allocation more information is given in Chapter-III.

1.9 Financial Closure

Signature of the financing documentation alone does not mean that the lenders will start advancing funds to the project company. In order to draw down any debt at all, the project must first reach financial closure. This is the date at which all project contracts and financing documentation have been signed, and the conditions precedent to the effectiveness of the lenders' commitments have been satisfied or waived. The conditions precedent is effectively a checklist of documents the lenders require as the basis for their financing. When these are provided, the lenders are obliged to advance funds.

1.10 Significance of the Study

The power sector in India has grown from nascent to developing stage; it requires investment of a huge amount of funds for a long-period of time, which involve high amount of risks. Indian power sector has the potential for development. At present, over 43,600 MW of power plants are under execution with a total investment of Rs 2.31 lakh crores. According to an estimate of CRISIL about Rs 7, 50,000 crore is likely to be invested in the power sector by 2013-14. Of this, Rs 4, 80,000 crore is expected to be invested in the power generation (KPMG 2010). Now–a-days the power sector in India has been facing acute scarcity of funds. The government estimation shows that gap in the debt resources (debt requirement and debt availability) is around 20 percent. Government alone cannot satisfy the entire funds requirement of the power sector. The private sector capital is essentially required tapping of. It means the private sector should be encouraged to invest more funds. In India, the share of private participation in Tenth Five Year Plan for power sector was 31.47 percent; in Eleventh Plan, the government estimated 27.83 percent. Surprisingly, this is 3.64 percent less.

In the present scenario, it is difficult for getting private investment; investors are generally reluctant to invest funds in the power sector. It is due to the high level of risks which are involved in the projects. The risks should be minimised. There are several ways to reduce the risks, including the adoption of appropriate methods of financing to reduce the risk in power projects.

Keeping this in view the study has been undertaken to identify the influence of financing methods on project risks and vice-versa, suitable methods of financing to mitigate risks, the factors that influence the inflow of investment and its degree of influence, the investor's priorities for investment, and finally, to identify the factors causes for delay in financial closure.

As of now, many academicians and practitioners have undertaken various researches on infrastructure finance. But very limited research has been done at the national level after the economic liberalization. This study systematically plans to make a significant contribution for the development of the power sector, and draw inferences from the experiences of the Indian power sector during the last ten years.

1.11 Scope of the Study

The present study (on "Financing power projects in India: A study of Indian practices") is made by considering various factors. The scope of the study includes only the economic infrastructure, which has the characteristics of commercialization of its products. The scope of the study is very wide as it covers various components of the power project financing. Study covers both public and private sectors power projects in India and their experiences in financing issues. The study is mainly focused on factors facilitating investment, restricting investment, project risks, and financial closure and the investor's priorities for investing funds in power projects in India. The study also covers the national and inter-national methods of financing, in public and private sector projects and surrounding investment environment, and its impact on the projects. Moreover the literature obtained from other sectors like civil aviation and telecom will be helpful to understand the reasons for phenomenal growth of global affects on the active participation of private sector, and different financing methods to replicate the successful methods into power sector wherever the methods are suitable.

1.12 RESEARCH METHODOLOGY

The study is "explorative" in nature regarding financing issues of the power projects. It focuses on identifying the variables pertaining to the investment in power sector and the investors' priorities of investment. It also focuses on the measurement of influence of financing methods on project risks, and the variability of risks for public and private sector projects with different capacities. The study will draw the inferences from both qualitative and quantitative inputs.

1.12.1 Research Gap

From the review of literature (including theoretical and empirical studies), the study has identified various issues pertaining to the investment and the risks of power projects, such as: impact of external risks on selection of financing methods, impact of method of financing on internal risks, the factors that influence debt financing and the factors that influence the financial closure. These issues have gained importance for conducting research on Indian power projects, which has not been done in power sector hitherto. This is the first study that has attempted to analyse those issues in the context of the power sector in India.

1.12.2 Research Questions

The study has chosen to use some hypotheses. To formulate the hypotheses (to be tested) certain research questions were developed. These questions have been formulated from the review of literature on infrastructure financing which includes, national and international experiences to finance infrastructure projects. The formulated research questions are:

1. What are the factors that influence the investment of power projects?
2. Is there any relationship between financing methods and the level of project risks?
3. Is the risk of the project similar to projects with different capacities?
4. Is the time duration for financial closure similar to all projects?

5. What are the factors causing the delay in financial closure?
6. What are the investment priorities of investors?

1.12.3 Objectives of the Study

Broadly the objective of the study is to analyze the financing methods and its relationship with risks in power generation projects in India. The specific objectives are:

1. To study the factors that influence the investment of power projects in India.
2. To examine the relationship between financing methods and the risks involved in the power projects in India.
3. To analyse the factors that influence the debt finance in the power projects in India.
4. To examine the impact of the risk on projects with different capacities in the power sector.
5. To analyse the factors that influence the financial closure of public and private sector power projects in India.
6. To identify the investment priorities of investors to invest funds in the power projects.

1.12.4 Hypotheses

H1. Financing methods influence the internal risks in power projects.

H2. External risks influence the selection of financing methods in power projects.

H3. Project risks differ for each power project, based on its level of capacity.

H4. Time duration to get statutory clearances differs for public and private sector power projects in India.

1.12.5 Research Outline

Based on the purpose of the study, the total process of the research has been designed. This is the blueprint of the research and it shows each step of this study from starting to the ending stage.

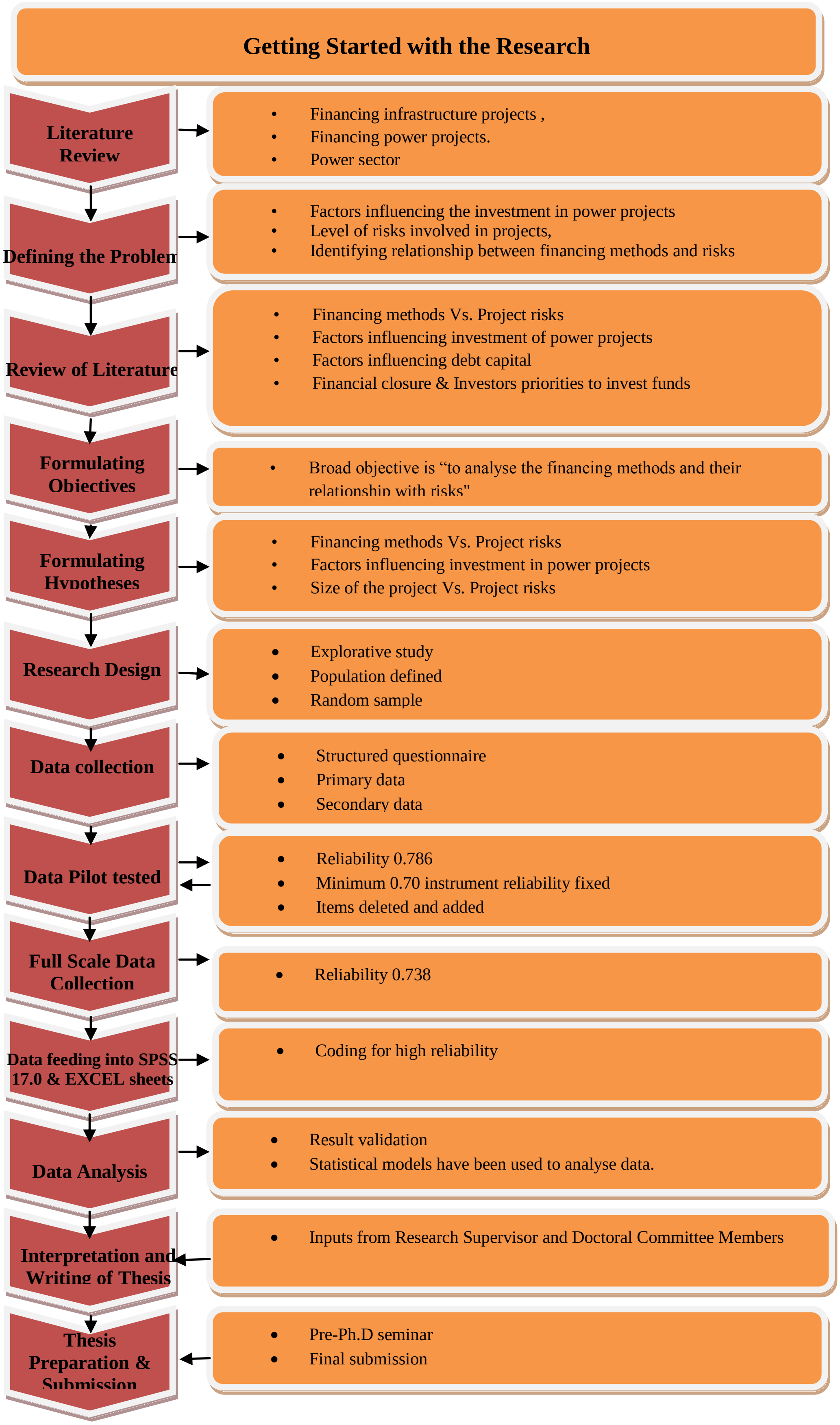


Fig 1.3: Research Flow Chart

1.12.6 Target Population: The target population of the study is all kinds of power projects in India, which are in operation and the projects that achieved financial closure and are in different stages of construction. Now-a-days, everybody wants to start up a power project because of demand for its output in the market. So many project proposals are received by Ministry of Power for granting permission to start new plants. In India, so many projects are at the stage of just granted permission. The study has not considered those projects and not included those projects in the study population.

1.12.7 Sample Size and Sampling Technique

The study has mainly intended to analyse the impact of financing methods on project risks and vice-versa. Also the study intends to identify the affect of various investment factors on inflow of investment, and to identify the priorities of investors to invest funds in the projects. For this purpose, the study wishes to cover all projects which are in operation and the projects which have achieved financial closure and are at different stages of construction, because, the projects which are in different stages of construction already, begin to get funds from various sources by using different methods of financing. For these projects, the risks also start from the stage of construction. So the study considered it is better to include these projects to test and analyse the above said phenomena.

1.12.7.1 Sample Size**:** The study considers Krejcie & Morgan (1970) method of determining the needed sample size, to represent the total population. To calculate the representative sample size, they have given the following formula:

$$\boldsymbol{S} = X\ 2NP\ (1 - P) \div d\ 2\ (N - 1) + X\ 2P\ (1 - P).$$

S = required sample size.

$X2$ = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (0.05).

Based on this formula, they have developed a table, which includes the total population (N) and the representative sample size (*S*) (See Annexure – I). According to that table, for a total of 3000 population, the representative size of sample is 341 and for the total population 3500, the size of representative sample is 346. For the present study the total population is 3073. According to the above mentioned criterion, the study wants to set 400 as the size of the representative sample. From the determined representative sample, only 379 responses have been received from the respondents.

1.12.7.2 Sample Technique**:** The study has chosen the simple random sample technique to select the representative sample size. Through this method, the sample has been selected from different states in the country.

The total number of power projects in India is 3073. It includes the projects already in operation and the projects that have achieved financial closure. The projects which are in operation are 2080. Among these projects public sector projects are 1363 and private sector projects are 717. The projects which have achieved financial closure are 993. Among these, public sector projects are 61 and private sector projects are 932. The details are given in Table 1.4.

Table 1.4: Study Population of Power Projects, including Public and Private Sector Projects

Power projects in operation	
Public sector projects in operation	Private sector projects in operation
1363	717
Power projects that achieved financial closure and are in different stages of construction	
Public sector projects that achieved financial closure	Private sector projects that achieved financial closure
61	932
Total	
1424	**1649**

Source: CMIE investment report 2008
CMIE data base on power sector 2011
CEA 2011 database on power projects in India
Manish Kumar Urele: "A Study of Indian Power Sector-Enthralling Private investors" ICRA Limited
sikkim_teesta_rangit_basin.pdf
Database of Private Hydro Electric Projects, Dec 2010
Www .cea.nic.in, Hydro Power Policy 2008 and Project Monitor

http://greenworldinvestor.com/2011/02/17/list-of-current-and-future-solar-photovoltaic-energy-and-solar-thermal-plantsprojects-in-india/
http://www.iitr.ac.in/departments/AH/pages/Testing+Hydropower_Stations.html
http://thermalpower.industry-focus.net/industry-overview/342-list-of-upcoming-thermal-plants-in-india.html
http://www.energy-business-review.com/archive/4294967287-4294939993/page/2?SearchTerms=powewr+generation+companies+in+india&btnSubmit=
http://biomass-power.industry-focus.net/
http://solar-power.industry-focus.net/
http://wind-power.industry-focus.net/

The study obtained a total of 379 responses from both public and private sector projects. Among these, the total responses from the projects which are in operation are 148, wherein 99 are public sector projects, and 49 private sector projects. The total responses received from the projects, which have achieved financial closure are 231, among these 30 are public sector projects, and 201 private sector projects. The total number of responses from the projects in different states and sectors are given in the Table 1.5.

Table 1.5: Responded Representative Sample Size of Power Projects, including Public and Private Sector Projects

Power projects in operation	
Public sector projects in operation	Private sector projects in operation
99	49
Power projects that achieved financial closure and are in different stages of construction	
Public sector projects that achieved financial closure	Private sector projects that achieved financial closure
30	201
Total	
129	250

1.12.8 Geographical Distribution of the Population

India is a federation, composed of 28 states and 7 union territories. All states, as well as the union territories of Pondicherry and the National Capital territory of Delhi, have the elected legislatures and governments. The remaining five union territories are directly ruled by the centre through appointed administrators. According to the ministry of power and its convenience, the country is divided into five regions, such as northern, western, southern, eastern and northeastern regions. The northern region includes the states of Delhi, Haryana, Jammu & Kashmir, Himachal Pradesh, Uttarakhand, Rajasthan, Uttar

Pradesh and Punjab. The western region includes the states of Chhattisgarh, Gujarat, Madhya Pradesh, Maharashtra, Goa and Diu & Daman. The southern region includes the states of Andhra Pradesh, Karnataka, Kerala, Lakshadweep, A & N Islands and Pondicherry. The eastern region includes the states of Bihar, Jharkhand, Orissa, west-Bengal and Sikkim. The northeastern region includes the states of Assam, Meghalaya, Manipur, Arunachal Pradesh, Mizoram, Tripura and Nagaland. The present study is all India based and it covers all regions in India. The population includes the projects in operation and the projects that have achieved financial closure.

1.12.9 Characteristics of the Sample

In India, different kinds of power projects existed. For these projects different types of inputs are required to produce power. However, all kinds of projects have been considered for the study purpose and the selected projects are included in the study sample. Table 1.6 shows the total number of projects belonging to different fuel types in India, wherein the total of public and private sector projects.

Table 1.6: Total Study Population of Projects belonging to Different Fuel Types

Fuel Type	**Organization**		**Total**
	Public	**Private**	
Coal	475	637	1112
Gas	92	103	195
Hydro	588	593	1181
Solar	4	67	71
Wind	2	47	49
Bio-mass	0	148	148
Diesel/Naphtha/Lignite/ Liquid oils	263	54	317
Total	**1424**	**1649**	**3073**

Source: CMIE investment report 2008
CMIE data base on power sector 2011
CEA 2011 database on power projects in India
Manish Kumar Urele: "A Study of Indian Power Sector-Enthralling Private investors" ICRA Limited
sikkim_teesta_rangit_basin.pdf
Database of Private Hydro Electric Projects, Dec 2010
www .cea.nic.in, Hydro Power Policy 2008 and Project Monitor
http://greenworldinvestor.com/2011/02/17/list-of-current-and-future-solar-photovoltaic-energy-and-solar-thermal-plantsprojects-in-india/
http://www.iitr.ac.in/departments/AH/pages/Testing+Hydropower_Stations.html
http://thermalpower.industry-focus.net/industry-overview/342-list-of-upcoming-thermal-plants-in-india.html
http://www.energy-business-review.com/archive/4294967287-4294939993/page/2?SearchTerms=powewr+generation+companies+in+india&btnSubmit=

From the five regions of India the total distribution of respondents of the study is given below.
http://biomass-power.industry-focus.net/
http://solar-power.industry-focus.net/
http://wind-power.industry-focus.net/

1.12.10 Sampling and Data Collection Methods and Cronbach's Alpha

The study has chosen the simple random sample method to collect data from the respondents. After identifying the targeted and working population, the study carefully planned the data collection. Questionnaire survey has been the main way of collecting data. Apart from this the data was collected through the observations and interviews with the finance managers of the responding power companies. Several questionnaires were e-mailed to the respondents and the responses obtained from the respondents. The full details of data collection are given in Table 1.7.

Table 1.7: Data Collection Process of the Study and Cronbach's Alpha

Sector Vs. Components	Public Sector	Private Sector
Target respondents	CFO, Director finance, GM finance, vice-president finance, finance manager	CFO, Director finance, GM finance, vice-president finance, finance manager
Data collection method	Survey, mailing the questionnaire to respondents, personal interview and telephonic interview, company databases, annual reports	Survey, mailing the questionnaire to respondents, personal interview and telephonic interview, annual reports
Data collection instrument	Structured questionnaire	Structured questionnaire
Crone Bach's alpha	0.645	0.807

1.12.11 Reliability: In Reliability analysis (Bohrnstedt 1977, Norusis 1997:ch.6, 13) the power project investment inflow items were first used to determine, the extent to which these items are related to each other. This is for getting an overall index of the internal consistency of the scale as a whole, and to identify items for exclusion. However, the overall questionnaire reliability of pilot study is 0.786 for this 47 items have been considered from the questionnaire and the number of cases (responded questionnaires) 169. Later on the study was modified keeping in the view the results of the pilot study. A few items were deleted and a few new items added to the final questionnaire. The calculated reliability of the pilot study is given below:

Table 1.8: Reliability Statistics of Pilot Study

Cronbach's Alpha	N of Items
0.786	47

The final form of questionnaire included 74 items and for these items, the overall α is 0.738. The number of cases is 379 and the excluded cases 0. Hence, the overall reliability (‘α’) of the questionnaire items used for final survey is 0.738. It is the value which representing the good consistency in the responses given by the respondents. This value is certainly in the region indicated by Kline (1999). So this is probably indicates good reliability.

Table 1.9: Reliability Statistics of Final Study

Cronbach's Alpha	No of Items
0.738	74

For public sector projects, Crone Bach’s alpha is 0.645 and for the private sector projects it is 0.807. Further the alpha (‘α’) of the each question in the questionnaire has been calculated wherever the analysis is made for that part of the study. Each question consists of different variables; SPSS 17.0 statistical analysis package treated those variables as number of items, while calculating reliability.

1.12.12 Modus Operandi: The study pursues both public and private projects in the power sector. The targeted respondents in those projects are the top level managers in finance department who are dealing with the project financing activities in that organization. The selected companies have been approached with prior intimation and by appointment of concerned officials. At the first step, the officials were approached over the telephone for appointment. Some gave direct appointment while some asked to send the questionnaire by e-mail.

For the secondary data most of the company’s annual reports are referred. The publications of power sector companies were collected and referred to. The other sources of academic books on project financing, journals and periodicals, published and unpublished research articles related to power project financing were also referred. Apart from these sources Planning Commission and Ministry of Power documents were studied. SEBI Red herring reports submitted by the concerned companies were also obtained from SEBI web site and studied. Finally, power sector related and power project financing related websites were also visited.

1.13 Data Analysis

The data collected for the study first sorted out and verified through the process of eliminating the uncompleted questionnaires. Then the descriptive and inferential statistics have been used to analyse the data and to draw the valuable inferences from that analysis. For this purpose, SPSS 17.0 statistical software was used. It is an advanced statistical software package to analysis the data. It enables us to do required statistical analysis within a short period of time without any calculation errors.

To prove the study hypotheses, various statistical techniques have been used. The non-parametric tests of Kruskal-Wallis H test and Mann - Whitney U test have been used for the analyses to test the relationship between project risks and project capacity and to identify the time similarity for obtaining each clearance for public and private sector projects. The data used for these analyses is scaled (Likert scale) data and it is not having normality (data normal distribution test is made). So, the study feels that, these tests are appropriate to be used.

1.13.1 Reliability of the Instrument – Cronbach's Alpha

The study on financing aspects of the power projects is explorative in nature. For drawing inferences from the analyses, it requires the primary information from different levels of the management in power companies. To get their opinions on various issues in financing projects, a research instrument (questionnaire) have been designed and executed. Here, the reliability of the instrument is tested at two points of time:

- After completion of pilot survey, the reliability was tested, and
- After completion of entire survey, the reliability was tested.

Reliability means that a measure should consistently reflect the construct that it is measuring. In other words, a person should get the same score on a questionnaire if they complete it at two different points in time. In statistical terms, the usual way to look at reliability is based on the idea that individual items should produce results consistent with the overall questionnaire. The simplest way to do this in practice is to use split-half reliability. This method randomly splits the data set into two.

A score for each participant is then calculated, based on each half of the scale. The correlation between two halves is the static compound in the split-half method, with large correlations being a sign of reliability. The problem with this method is that there are several ways in which a set of data can be split into two and so the result could be a product of the way in which the data was split. To overcome this problem Cronbach (1951) came up with a measure that is loosely equivalent to splitting data in two in every possible way and computing the correlation coefficient for each split. The average of these values is equivalent to cronbach's alpha α, which is the most common measure of scale reliability.

$$\boldsymbol{\alpha} = \frac{N^2 \mathrm{CO}\overline{\mathrm{V}}}{\sum \mathrm{S}^2 \mathrm{item} + \sum \mathrm{CO}\overline{\mathrm{V}}\,\mathrm{item}}$$

The first thing to note is that for each item on our scale, we can calculate two things: variance within the item, and the covariance between a particular item and any other item on the scale. Here, we can construct a variance-covariance matrix of all items. In this matrix, the diagonal elements will be the variance within a particular item, and the off-diagonal elements will be covariance between pairs of items. The top half of the equation is simply the number of items (N) squared multiplied by the average covariance between items. The bottom half is just the sum of all the item variances and item co variances.

The general perception is that a value of 0.7 to 0.8 is an acceptable value for cronbach's alpha ('α'). Values are substantially lower than that indicate an unreliable scale. According to Nunnally (1978) an alpha score larger than 0.6, is generally acceptable. Cortina (1993) notes that such general guidelines need to be used with caution, because the value of alpha ('α') depends on the number of items on the scale. Kline (1999) notes that although the generally accepted value of 0.8 is appropriate for cognitive tests such as intelligence tests, for ability tests a cut-off point 0.7 is more suitable.

1.13.2 Chi-Square Model

The Pearson chi-square statistic is a test to see whether the two variables are independent or not. If the significant value is small enough (conventionally *sig*. must be less than 0.05), then reject the null hypothesis. Thus, the variables are independent and gain confidence in the hypothesis that they are in some way related. The P-value is the probability of observing a sample statistic as extreme as the test statistic.

1.13.3 Garrett Ranking Technique

To identify the most influencing and least influencing factors according to their severity of influence, Garrett ranking technique (1969) has been used. This technique is used in the present study for identifying the factors which are highly and even significantly influencing the debt capital. It is scientifically very reliable technique for giving ranks to factors.

1.13.4 Mann - Whitney U Test

Mann - Whitney test is a non-parametric equivalent of the independent t-test. This test is used to test the differences between two conditions and different participants have been used in each condition. The purpose of using this technique (to identify the time similarity for each clearance between public and private projects) is: the data used for the analysis is scaling data. The opinions of the respondents are measured by using Likert scale. So the data is not satisfying the condition of normality (normal distribution test is used). Since it is felt that this is an appropriate test to be used.

1.13.5 Kruskal-Wallis H Test

The Kruskal-Wallis test is the non-parametric test equivalent to the one-way ANOVA and an extension of the Mann-Whitney test to allow the comparison of more than two independent groups. It is used when the data is not having normality and wish to compare three or more sets of scores that come from different groups. As the Kruskal-Wallis test does not assume normality in the data and is much less sensitive to outliers, it can be used, when these assumptions have been violated and the use of the one-way ANOVA is inappropriate. In addition, if the data is ordinal, then one-way ANOVA cannot be used, but this test can be used.

1.14 Chapterisation of the Dissertation

Chapter-I: This chapter discusses the introduction of infrastructure; wherein definitions, types of infrastructure, and structure of infrastructure projects are outlined. It provides a brief explanation of power sector as a component in infrastructure, present status of power sector in India, investment in power sector, etc. This chapter also gives the details of infrastructure financing, methods of financing, and risks involved in the projects. It tinted the research methodology of the study which covers research gap, research questions, objectives of the study, hypotheses, significance, scope of the study, research design, sample size and sampling technique, Cronbach alpha, and limitations of the study.

Chapter-II: This chapter mainly discusses earlier researches on project financing and their outcomes, which has helped the present study to set its objectives and to formulate hypotheses. It highlights the relationship between the methods of financing and the risks of project through the literature regarding the past researches. It also discusses the appropriateness of various financing methods to power projects, advantages and disadvantages of those methods, factors influencing investment of power projects and the factors influencing financial closure of the projects. Finally, it contains the research variables which are derived from the past researches.

Chapter-III: This chapter discusses the financing methods and sources. It contains introduction, and definitions of various financing methods. It provides detailed explanations of various financing methods, viz, project finance, corporate finance, equity finance, debt finance, partnership finance, venture capital, structured finance and leasing of infrastructure. Another part of this chapter is regarding the sources of financing. It discusses various sources like, equity, debt, mezzanine finance, SEB bonds, etc. It also provides a detailed explanation of various project risks, such as: construction, operating, technology, regulatory, political, environmental, fuel supply, and force majeure risks. It also highlights the risk mitigating mechanism.

Chapter-IV: This chapter is an overview of the power sector in India, wherein introduction, present scenario of the power sector, history, recent developments, sector reforms, and regulatory control are highlighted. It mainly focuses on the recent policy initiatives which are intended to increase the level of investment. It provides the details of generation of power, transmission and distribution. Investment in power sector is another part in this chapter, which contains public and private sectors investments, role of the government and the factors that influence investment of the projects.

Chapter-V: This chapter contains the data analyses of the study. It contains four sections. Section-I involves factors that influence the investment of power projects, wherein the introduction, factors facilitating investment and factors restricting investment, size of investment Vs. project risk are focused. Section-II discusses the relationship between financing methods and project risks, financing methods and problems in practice, suitable method of financing, and factors influencing debt finance. Section-III deals with risk analysis of power projects in India and Section-IV discusses financial closure of power projects and investors' priorities for investment.

Chapter-VI: This chapter contains only findings and suggestions of the study, wherein summary, contribution to academic research, and contribution to the power sector are included. The study findings are given under various heads, viz, investment, financing methods, project risks and financial closure.

1.15 Limitations of the Study

The study is a new venture in the field of financing the power sector in India. The study is started with an aim of identifying new opportunities in financing, which are to be explored by the projects for increasing investment. Though the study is very comprehensive in nature, it is subjected to certain limitations, like:

1. The study has not covered all components in the infrastructure sector.
2. Non-availability of the data from the projects because of confidentiality considerations. And fear of officials to provide the required information.

3. Non-availability of key respondents because of their busy time schedules, some officials were not interested to interact and to give interviews.
4. Scope of the study is wide but to cover each aspect of the study, the time and financial resources became major constraints.

1.16 Directions for Future Research

The present study covers various aspects and variables in financing power projects. All these are analysed in- depth in the current scenario. Still, there is lot of scope to do further research in the area and to apply this concept and methodology in other sectors, which are similar to this sector or wherever these are suitable.

- This concept and the analyses made in the study can be applied to other sectors in the economic infrastructure such as: telecommunication, roads and bridges, ports, construction and civil aviation, etc.
- The financing methods which are selected and tested for their suitability in these analyses, can also be tested in other sectors like telecommunication, roads and bridges, ports, construction and civil aviation, etc. Thereafter one can draw the inferences on its suitability in that particular sector.
- The study measured the level of various risks on Likert scale. This research can be extended to measure those risks quantitatively by taking the monitory values of variables which required calculating risks mathematically, so as to understand the amount of risk existed in the projects. This will help the projects to formulate better strategies to mitigate the risks and to increase the profit margins.

1.17 Conclusion

Finally, it is concluded that the financing infrastructure projects is critical because, it require large amount of funds for a long-period of time. Since financing structure differs from project to project, a separate structure should be designed based on the method of financing. The final result whether it is profit or loss should be borne by the parties involved in that project. Indian projects are using only a few types of financing methods because of investors investing norms. The amount of investment in power projects should be increased. To enhance it, the risk of the project must be reduced. Several kinds of risks are involved in power projects, but its level of influence depends on the promoters' credit worthiness and the prevailing situational factors in the project. However, for the development of power sector, the private investment should be increased, which is subjected to the level of risk. To reduce the risk, promoters should adopt a suitable method of financing.

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CHAPTER-II

REVIEW OF LITERATURE

2.0 Introduction

Electric power is an essential commodity in human life it is also the light of country development. The development of power sector enables and enriches the economic development of the country in general. The power sector is focused high in India's top priority for investing more funds. It has tremendous potential for investing funds based on its sheer size of the market and the return on investment capital. Power sector in India is in developing stage, it requires huge amount of funds. In present scenario on par with the requirement, the funds are not sufficient, it widens largely gap between demand and supply of funds. The major reason for it is lack of investors' positive intention to invest the funds in power sector due to risks and apart from other reasons. The risks should be minimized to mobilize capital for power projects, as well as the successful implementation of power projects required the risk allocation to the parties involved in the project. However, power project financing deals with the rising of funds to meet the requirements of the power projects. Power projects require large initial capital investment (which) in the case of developing countries is usually being provided by foreign investors with broad vision returns being projected over a long period of time (15-30 years).

Literature pertaining to the topic i.e. financing power projects: a study of Indian practices plays a very crucial, vital and important role for tapping more information vividly, elaborately and relatively also. Therefore, the study of literature is very much essential for any research work of any arena to a scholar. This literature gives lot more inputs to the creativity and offers more scope to study the opted topic in depth so that outcome of the result would be more fruitful and useful not only to the researcher but equally to power industry also.

Review of literature started with study objective of "to analyze the financing methods of infrastructure projects in India with regard to select components of the infrastructure sector". This study aims to fill the gap between funds requirement to power projects and its availability by using suitable method of financing in the present situation of power projects. It represents one of the theoretical and empirical researches of analyzing the impact of the risks on the selection of financing methods in a project and vice-versa.

This dissertation aims to analyse the investment influencing factors (such as: government policy initiatives, economic factors, political factors, legal factors and regulatory factors etc.), investment restricting factors, and the causes for delay of financial closure of power projects. From these analysis conclusions will be drawn to suggest acceptable means and ways to increase the investment in the sector.

An appropriately tailored and conducive institutional environment is of great importance in electricity sector while investing funds, the investors must know about the risks involved in the projects. Because the risks are the major influencing factors of the return on their investment. Here the study has identified some risks (such as financial risk, construction risk, operating risk, technology risk, regulatory risk, political risk, environmental risk and legal risk) which are mainly influencing the investment decision of investors and analyzing, its impact on inflow of funds.

Another important thing is the study attempt to analyse the relationship among method of financing, level of risk and the size of the projects. A brief analysis was made on priorities of the investors to invest their funds in power projects. Because most of the investors are from either financial institutions or the bankers and have their own preference for the projects if the project aspects are suitable to their preferences in those projects, they will like to invest. However the projects should be strong enough in all aspects especially in contractual arrangements and creditworthy promoters to mitigate the risk factors in financing.

This part of the dissertation provides experiences of past researchers and their research contributions for financing power projects. It highlighted research gaps between the various theoretical and empirical aspects of past and present practices in power project financing. It also highlighted the views of the researchers' and their suggestions on the above mentioned aspects.

2.1 Financing Methods Vs Project Risks

Financing power projects is a major strategic issue. It requires and emphasizes wide range of experience to the project promoters to select the suitable method of financing. Now a day's, several methods are in use. Each method of financing requires separate mechanism to implement based on its advantages and disadvantages in terms of its risks and returns. However the selection of suitable method of financing is important to get financial stability by reducing the volatility in financing which is caused by the risks. In view of these aspects the study quoted by several researches from various sources. Modigliani & Miller (1958) disclosed a fact, "any financing choice that is made in a competitive market and that does not change a project's cash flows and risks, cannot change its value and cost of capital. Ultimately, the overall cost of capital of the project reflects the risk that must be borne by the parties financing it". It says choice of financing method will not affect the risk of the project and cost of capital.

Further several researchers differ with the opinion of Modigliani and Miller they identified that the method of financing is influenced by the risks involved in the project and vice-versa. Schaufelberger, et.all (2003) identified that, the selection of an appropriate financing strategy for financing a project is a major challenge because a major component of risk mitigation planning depends on the selection of an appropriate financing strategy. The other researchers are opined the risk of the project will influence the selection of financing method. Gupta, & Sravat, (1998) expressed their views in their research on power project financing in developing countries "the risk profile of the projects decides the financial structure of the project". It means the risk profile of the project would well decide the method of financing. OXERA (2003) report on nuclear power project financing revealed that, "the different contractual and organisational arrangements to mitigate or transfer some risks have in turn an impact on the attractiveness of alternative financing structures for plant", it is also indicating the level of risk will influence the selection of financing method.

OXERA report highlighted the importance of “mitigate or transfer” project risks by using different contractual and organisational arrangements. Otherwise the risk will become hurdle for the use of alternative financing methods. It means risk directly influences the selection of alternative financing methods for financing power projects. This report has given the example of nuclear power project financing as evidence. Here the report revealed two different financial structures that are likely to be necessary and suitable for the construction phase and the operational phase of the project. This is indicating due to the degree of risks in different stages different kinds of financing structures are required. This because of construction phase is likely to be considerably more expensive than that of operational phase. Since the repayment of the construction costs would extend well into the future of the nuclear plant’s life, once it is being operational, then the project would be typically refinanced after the completion of the first phase i.e. a new financing structure would replace the old one. The report also mentioned that “the financing structure will have important implications for the risk allocation”.

The prominent researcher in “project finance” Etsy (2004) stated that, “the allocation of the different construction and operating risks in turns influences the selection of the financial arrangements among different options”. Here in the light of his statement it can be understood that the risks of the projects influence the selection of the financing alternatives or methods in projects.

The Indian authors Kalidindi & Singh (2009) identified that “the degree of financing from the private sector depends on, interalia, the risk profile and financial viability of the project”. Here it can be understood that the fact of “the level of the fund availability differs for each method of financing”. Some methods of financing are convenient to the private investors to get high degree of funds to the project, at the same time proper precautionary measures should be taken, to minimise the risk or risk factors.

However, the financing of power projects depends on its characteristics. “Harjot kaur” mentioned in his study “financing infrastructure projects is critical because, its characteristics are different from those manufacturing organizations”. Characteristics include the return and risk profile of the project because of it, the selection of source of financing and method of financing are critical. Matsukawa & Habeck (2007) also said private equity investors and lenders are driven by return on investment considerations, their return requirements are determined by the specific project risks and the type and structure of the financing. Apart from the project risks, return on investment is also another important characteristic of the projects.

Different methods are in use for financing power projects, such as, project financing or Special Purpose Vehicle (SPV's), corporate financing, structured financing, equity financing, debt financing, leasing of infrastructure, partnership's/joint ventures, some power companies are using both equity and debt finances. In this respect so many researchers and authors have done an outstanding research either to find out its performance or to explore its advantages for the development of power sector and other sectors in infrastructure. This part of the literature review presents the eminent researchers remarks, research findings and their opinions on these financing methods.

2.2 Project Finance

The Indian power industry has been dominated by the public sector, since beginning in India the power projects were developed mostly by the government and finance was arranged through government budgetary allocations, multilateral agency credits, bilateral credits, supplier's credits and commercial bank loans. Later on the scenario has been dramatically getting on changed because of various factors (mainly emphasizing the economic growth of the country). To arrange large amount of funds for power projects in conventional way is extremely difficult for promoters. Therefore limited or non-recourse project financing is adopted for financing public and private power projects by all most all promoters. Project finance involves setting up a legally-separate project company. The cash flows are used only from the project company itself to service debt obligations. This arrangement differs from traditional corporate financing, where the cash flows from all projects are mixed. This aggregate set of cash flows is used to repay any and all debt obligations.

According to Nevitt and Fabozzi (2000) project finance is defined as *''a financing of a particular economic unit in which a lender is satisfied to look initially to cash flow and earnings of that economic unit as the source of funds from which a loan will be repaid* *and to the assets of the economic unit as collateral for the loan''*. There are several negative shades of project finance. Nevitt (1983) discussed the negative aspects of project-finance, which include the large transaction costs associated with arranging the various contracts, high legal fees, higher debt and equity costs, and a greater array of restrictive loan covenants. In spite of those negative aspects the promoters of the projects prefer project finance because of its advantages.

Much of the literature related to project finance has addressed the rationale for using project finance as better and suitable method of financing projects than the other methods. Researchers have also empirically examined the project finance loans, determinants of project finance loan defaults, and how different types of risks affect project company capital structure. The significant thing in respect of project finance is project finance reduces the project risks (Basilio, 2010).

2.2.1 Rationale of Project Finance

Shah & Thakor (1987) provide the first theoretical work that offers a rationale for project financing rather than conventional corporate financing. The model is based on asymmetry of information between the firm and lenders. They described that "project financing can be more economically valuable than conventional financing because the cost of producing information about a single project is less than the cost of producing information about all of the firm's projects". According to the authors "project finance can enhance project value by permitting higher optimal leverage than conventional financing". Berkovitch & Kim (1990) have done a research on "project finance" and shown it in a theoretical model, i.e. "how financing assets separately reduces under-investment risk". Wiser & Kahn (1996) stated that, unlike corporate-finance, private power producers have generally financed projects on a stand-alone basis, because it allows optimal leverage and reduces the risks of the projects.

In this project-finance arrangements, the lender looks primarily unto the cash-flow and assets of a specific project for repayment rather than the assets or credit of the promoter of the facility. In project finance the lender see the strength of the underlying contractual relationship among different parties. From the developer's perspective, project-finance does provide some benefits, when it compared to corporate-finance. Several researchers have highlighted the rational of project finance. Gupta & Sravat (1998) enlighten an important thing that is “limited or non-recourse project financing is adopted for financing private power projects by almost all promoters”. Kistner & Price (1999) said that, project finance is the primary financing structure used by all Independent Power Producers (IPPs).

Nevitt and Fabozzi (2000, p. 5) claim that, “project finance can sometimes be used to improve the return on the capital invested in a project by leveraging the investment to a greater extent than would be possible in a straight commercial financing of the project.” In the research of Kleimeier & Megginson (2000) it is found that “project finance loans are different, but not always in the way expected”. Because project finance loans are limited or non-recourse and thus not guaranteed by project sponsors due to the higher perceived risks of most projects, and the project finance is more expensive than corporate loans.

The importance of project financing is elevated by Esty (2002) according to him “project finance is one method used to improve the return on the capital invested in a project by leveraging the investment to a greater extent than would be possible in a straight commercial financing of the project”. In his view the high return on capital is possible by the use of optimum level of debt capital in the project. He also identified that most of the situations, the major problem (in this project finance) is loan default by the borrowers. There are several reasons for it, some of the reasons are identified by Klompjan & Wouters (2002) and they empirically examined what factors were most associated with the occurrence of project finance loan defaults such as

1. The absence of proven technology;
2. A smaller debt service coverage ratio;
3. A sponsor with no prior project finance experience; and
4. The presence of commercial risk coverage.

However, some omissions are noticed in (which are felt important) in their study such as government equity stake in the project, multilateral agency lending, differing country-level risks, industry differences, differing loan maturity durations, project leverage, currency risk, and an off-take agreement. If they consider those factors, they may get the exact reasons for occurrence of project finance loan defaults. In spite of the problems in implementing project finance method, a majority of the project promoters show interest in using it. According to Esty (2002), the prominent reason for motivating use of project finance is "leverage increases expected equity returns, this motivation for using project finance fails to recognize that higher leverage also increases equity risk".

Esty (2003) emphasised the use of project finance, a change away from the traditional way of financing investment opportunities it is an attempt by managers to reduce total financing costs. He also mentioned that "project finance is more effective than secured debt (a form of corporate finance)" because, it eliminates all recourse back to the sponsoring firms cross-collateralize each debt obligation.

2.2.2 Suitability of Project Finance

The main difficulty of using the project finance is identifying when it works at its best in project and what kind of project conditions should be prevailed. According to the opinion of Friddle "project finance works best when the technology that is being used is a proven technology," Friddle also opined that "if there is any sort of development risk, project finance is generally not a good tool to use"(www. fliiby.com). However, the credit support for project-finance comes in large part from the revenues associated with the power purchase agreement (Wiser & Kahn, 1996). In connection with the above research of project finance, Finnerty (1995) identified factors to determine whether project finance might be an appropriate method of raising funds for a particular project. He said that at least five factors should be considered they are:

(1) The credit requirement of the lenders,
(2) Tax implications of a proposed location
(3) The impact of the project on the covenants contained in the agreements governing the sponsor
(4) Regulatory requirements and
(5) The accounting treatment of project liabilities and contractual agreements.

2.2.3 Motives for Project Finance

In contrast to Shah & Thakor and Esty (2003b) synthesized some of the earlier treatments of project finance rationale and suggests three primary motivations for using project finance.

- First, project finance reduces agency costs among owners and three related parties, such as (1) managers; (2) suppliers of inputs and buyers of outputs; and 3) debt holders.
- Second motivation is project finance reduces the opportunity cost of under-investment that results from the use of leverage. It means, "Non-recourse debt of project finance allows moderately leveraged firms to raise debt capital without increasing the leverage on their corporate balance sheets".
- The third motivation is a result of the non-recourse nature of project finance debt and the high leverage typical of most project finance investments.

However, the availability of funds to a project will depend on the sponsor's ability to convince providers of funds, so that the project should be technically feasible and economically viable. Another issue is when it is compared with traditional corporate finance; project finance is more costly due to its operational complexity (Yunbi An1 & Cheung, 2010).

If it sees from the investor's point of view, why investors make use of project finance? The answer is high leverage (it is one major reason for using project finance), which invests in ventures such as power generation, a long term investment but do not offer an inherently high return. High leverage improves the return for an investor. The other reasons for the use of project finance are tax benefits and risk limitation (Daube et. al, 2008). Subramanian, Tung, & Wang (2007) also found through their study "project finance is relatively more likely than corporate finance in industries where the ratio of free cash flow to assets is higher".

2.2.4 Advantages of Project Finance

The main advantages of project finance are, stronger legal protection against managerial self-dealing obviates the need to undertake project finance and it reduces agency costs of free cash flow (Subramanian et.al, 2007). The empirical evidence shows that project finance mitigates the agency costs of free cash flow, and the deadweight costs of bankruptcy that are encountered in corporate finance. They also show that project finance can limit tunneling ("the transfer of assets and profits out of firms for the benefit of those who control them") by contractually enhancing the verifiability of cash flows from the project.

Subramanian, et.al (2007) identified the fact regarding project finance is, companies across the world (the sample contains 6,045 deals from 40 countries) frequently employ project finance for their large investments but their importance is underscored. They have given proof to support their opinion i.e. though US corporations used project finance less often than their foreign counterparts; their investment of $34 billion in project finance in 2004 exceeded the $25 billion that venture capital funds invested in startups in that year, and was about half the $73 billion raised by US companies through IPOs in the same year (Esty, 2005).

The most important finding when examining the summary statistics in the study from the total sample obtained from 40 countries is "project finance is much less likely in the US than in the rest of the world, and in English and Scandinavian legal origin countries than in French or German legal origins". This finding shows that the likelihood of project finance is much lower in countries fully with developed legal systems and institutions is the heart of their analysis. It shows us the legal system is influencing the choice of financing method. Capital, (2002) has mentioned in his research study "in recent experience, non-recourse project financing for power generation assets has become a much less attractive financing option for power generation financing".

2.3 Corporate Financing

Corporate finance method is a traditional method of financing. The promoting company puts the funds in the project and the entire risk is should be take care by it. For example GMR raised funds for various projects. In corporate finance a company invests in many projects simultaneously and possesses growth opportunities. But the problem of this method is the company cannot easily separate project cash flows from the cash flows produced by the assets of the sponsoring company. In corporate finance the lenders can rely on the cash flows and assets of the sponsor company apart from those of the project itself.

Capital (2002) said in the context of new nuclear power projects financing "an actual financing is likely to be structured as corporate financing in which the power generating company is the borrower with the backing of the parent company of the integrated entity (a corporate structure that combines a power generation company and an electric distribution company)". Hudson, (2002) also identified preference of corporate finance among nuclear plant vendors for their new nuclear project developments. In this form of 'conventional owner financing use the balance sheet funds of a strong and integrated generation and utility company' (FINON, CIRED, LARSEN, & ROQUES, 2008).

2.3.1 Advantages of Corporate Finance

There are several advantages by the use of corporate finance. The main advantage is repayment of project debt. The repayment occurs through corporate cash flows, the corporate balance sheet provides a safety net even when the debt is allocated internally against specific assets, projects, or divisions (Esty, 2003). Subramanian, et al (2007) identified another advantage of corporate finance is "the greater verifiability of cash flows in project finance", such opportunistic behavior is more likely in corporate finance than in project finance.

Apart from the advantages several hidden disadvantages are in this method. Subramanian, et.all (2007) identified the drawback of this method is, "the cash flows in corporate finance are fully observable but only partially verifiable". As well as in corporate finance it is not possible to mitigate the problem of expropriation by the insiders. Esty (2003) disclosed "corporate-financed transactions are more susceptible to expropriation and hold-up for many reasons". They generally do not involve in joint ownership and even when they do (i.e. equity joint ventures) they are susceptible to free cash flow problems unless they raise external debt tied to the project.

2.4 Debt Finance

Debt is the major source of financing to the power projects. In India the investment in power projects are made by the government from its budgetary allocations and through the government sponsoring financial agencies. Slowly the trend has been dramatically changed, and changing too, the promoters used to bring their own funds in the form of equity. Now-a-days, projects are financed by off-balance sheet financing methods or non-recourse financing methods. In this method major part of financing is occupied by debt, and the remaining part is by equity (it is 80:20 ratio). It clearly shows the importance of debt in financing power projects. Debt is not intrinsically cheaper than equity. But getting debt funds from the lenders is not an easy task. They require so many things from project and they ask for the fulfillment of necessary things. If the creditors are satisfied by the required information and the necessary documents provided by the project, they provide the loans to the projects. Here, the difficult task to the projects is providing the required information and necessary documents to the creditors in time. Time factor plays a very crucial role in debt financing. Zhang & M.ASCE (2005) described various forms of debt finance i.e. “debt is often structured in the form of senior debt or subordinated debt”. Senior debt has higher priority than all other claims on project cash flows and assets. Subordinated debt ranks behind other unsecured loans in payment obligations. The most common type of debt financing is borrowing from financial institutions, such as banks or leasing companies. Borrowing from financial institutions is a quick and relatively inexpensive (Callahan, et. all 2007).

2.4.1 Suitability of Debt Finance

The important issue to the promoters while using different sources of financing is identifying the suitability of the debt finance to the power projects. Wu (2007) described “the market factors play a key role in debt financing and that the debt financing decisions are more or less the same across the industries”. The debt can be classified as recourse debt and non-recourse debt. Brealey, Cooper & Habib (1996), Esty (2003, 2004), Mc Guinty (1981), and Nevitt (1983) argued that non-recourse debt is typically used for financing large, capital-intensive, projects and that the leverage ratio of project companies is typically larger than that of parent companies. Also, this is consistent with the evidence that project finance is usually used for financing risky projects. Now-a-days nonrecourse debt instruments are used for debt financing of PPP (BOT) projects to ensure that lenders have no recourse against the participants in the sponsoring consortium. They must rely on the revenue generated by the project as the source for loan repayment (Schaufelberger, 2003). The study opined that debt is more suitable finance to power projects because these are more capital intensive and large projects.

2.4.2 Advantages of Debt

There are several advantages of debt finance, and are based on the form of debt regarding the advantages of subordinate debt. Devapriya, et.all (2007) referred the research of Esty, (2002) "subordinate debt assumes the risk of cash-flow volatilities and thus provide a buffer for the lenders at simultaneous filling the gap between debt and project costs". Esty (2003) also mentioned one important thing is "project debt is often more expensive than corporate debt". One more important thing he mentioned is "concentrated debt and equity ownership provide critical monitoring of managerial actions".

2.4.3 Debt vs. Equity

Sponsors of large projects seeking to raise capital consider as bank debt is cheaper than equity. According to Modigliani and Miller (1958), debt is not intrinsically cheaper than equity. Although equity requires a higher return than debt does, it also bears a greater amount of risk. The projects are mainly focusing on debt finance such as recourse debt finance and non-recourse debt finance.

2.4.4 Factors Influencing Debt

However, the choice of debt finance is influenced by several factors, those factor are differs from one industry to another. Wu (2007) referred the research study of Lu & Xin (1998) that revealed "there is a significant difference between different industries in designing capital structure, representing that industry factors must be controlled in analyzing influential factors of debt financing". The author has taken various influential factors of debt financing and he took more trouble to calculate the values of these influential factors are shown in table 2.1.

Table 2.1: Influential Factors of Debt Finance Calculation of those Factors Values

Name	Calculation
Value of secured assets	(inventory + net fixed assets) /yearend total assets
Firm size	*ln* total assets
Non-debt tax shields	Accumulated depreciation/year-end total assets
Growth	Revenue growth of core business
Asset liquidity	Liquidity ratio
Ability to generate Internal resources	Cash flow from operations/year-end total assets
Profitability	Net income/total assets
Dividend policy	Current dividend payable/current profit available for dividend
at % Of state-owned shares	Number of state-owned shares/total equity

Source: Wu (2007)

Development of domestic debt market is one important factor which influences the availability of debt. Patil Committee (2005) identified a fact in India i.e. "the domestic debt market is undeveloped". For the improvement of debt availability the report suggested that "an active bond market can increase the flow of long-term funds and reduce reliance on banks". Research work and critical analysis both of earlier scholars/eminent people in the field are gone through, it is observed that "to attract commercial loans and private sector investment, developing countries have to adopt policies that will improve the investment climate and reduce political, foreign exchange, and commercial risks" (Heron 1985). It means risk is major hurdle for the availability of debt finance to power projects.

Ballestero (2000) said that, while providing debt "the banks must be aware of lending finance. During the initial stage of the project undesirable high levels of risk are involved". His opinion is also supporting the risk as a major influencing factor. Schwabe, et.al (2009) made a survey on renewable energy project financing and they identified that the risk from debt has been repriced to higher levels because previous debt lenders may be conserving capital.

Another debt influencing factor is rate of interest. The interest rate is charged depending on both the maturity and risk of the loan. Interest rates typically rise with loan maturity. According to Schwabe et.al (2009) “interest rates for debt on renewable energy projects are unclear because debt size is small”. Unclear means the bankers can charge higher rates based on the situation. In their survey interviewees indicated that it was difficult to tell where the exact interest rates for renewable energy projects stand without execution of landmark deals. According to Wiser & Kahn (1996) “a higher interest rate require due to the increased investor risk associated with project-finance”.

Fear of assets & liability mis-match of lenders balance sheet is another factor which hinders the availability of funds to power projects. Varma (2001) mentioned the issue of borrowing from banks and FII’s “many infrastructure projects require long-term finance when bank, provides such funding, they are exposed to a maturity mismatch”, as most of their funding is through short term deposits, the maturity mismatch is partly a liquidity risk and partly an interest rate risk. Harris & Tadimalla (2008) said that “long-term financing exposes the banks to the risk of asset-liability mismatch”. It means lending short-term deposits amount to long-term loans such as power project loans lead to asset-liability mismatch banks balance sheet. To avoid the maturity mismatch while lending amount to projects the bank is aware that lending during the initial stage of the project involves undesirable high levels of risk (Ballestero, 2000). Generally those undesirable high levels of risk make volatility in cash inflows of the project, which leads to delay in repayment.

The term/duration of financing is one more factor which influences debt availability. Loan maturity (or loan term) is determined at the outset of the lending agreement (Wiser & Kahn, 1996). Dailami & leipziger (1998) says that “loan maturity plays an important role in ensuring project financibility”. However, debt markets in most Asian and Latin American countries have witnessed considerable growth in recent years. Esty (2003) identified “even though long-term bonds provide a better match with the duration of project cash flows projects lies ranging from ten to fifty years sponsors use short terms for bank debt with maturities ranging from five to fifteen years”.

Term of finance is one reason for emerging of risk in power projects. In this respect Thomas & Kalidindi (2003) revealed that, “private infrastructure projects under BOT arrangement have a complex risk profile due to several factors like lumpiness of huge investment, length of term of the loan”. Hance, (2005) identified that “reducing the length of the debt period corresponds to reducing the risk of the investment, thereby decreasing the interest rate”. Cory & Schwabe (2009) identified the “debt terms are key cost factors for developers considering debt financing to fund new project development”. Here, one thing is obvious i.e. when compared to equity investors, debt lenders have usually more stringent risk-mitigation requirements (e.g., require long-term contracts, require creditworthy off-takers, etc.) and have priority rights on project assets.

The last factor that influences debt fund is “demand at the point of time”. It is also a major factor. Generally, the fund availability to power projects is very limited, but the requirement is high in this scenario if all projects require the funds at the same time, the demand for funds will increase, this will lead to other problems of increasing interest rates and reducing term of loan, etc. To eliminate this problem the sectoral cap of lending funds to projects should be removed to the maximum possible extent. However, a history of borrowing and prompt repayments indicates to lenders that the borrower takes his obligations seriously.

2.5 Equity Finance

Equity is the amount invested by the promoters of the project. It gives the ownership rights to the promoters. Tiong (1995) and Kumaraswamy & Zhang (1999) focus on “limited ‘equity-raising’ instruments in developing countries (lack of stock markets or bonds) that, consequently, shift to financing through loans and therefore, reduce profitability”. It shows the equity as the best source of finance which increases the profitability of the project. Cory & Schwabe (2009) described that, “concentrated equity ownership gives sponsors the incentive to monitor managerial actions”. The board membership gives them the right with ability to hire and fire senior managers, and to approve important operating decisions. According to Zhang & M.ASCE (2005) equity has the lower rank and the last claim on the assets and cash flows of the project. In practice, equity levels ranging from 0 to 100 percent have been used in different types of projects. For example, power projects tend to have an equity level of 10–30 percent and also other infrastructure projects in telecom and roads are having the same percent of equity ratio.

2.5.1 Advantages of Equity

The main advantage of equity is "it is the cheapest cost of funding". But at times it is not so, as it seems to be, however, equity is actually the most costly form of funding (Callahan, et. all 2007). Another advantage is that it acts as a buffer for absorbing variability in cash flows but it is influenced by the risk profile of the project (OXERA 2003 pp 11).

Equity investors take care about the project activities and provide the guarantees against different kinds of risks such as construction, operational etc. According to Matsukawa & Habeck (2007) equity sponsors may be willing to guarantee commercial risks, such as: project development, construction, and operational risks, by providing their corporate guarantee to lenders. However, the equity is non-risky capital to the projects like power projects.

2.6 Leasing of Infrastructure

Leasing of infrastructure is a new concept in India, where as it is widely used in other countries. In power sector, the equipment provide on lease basis to the projects. It is important to reduce different kinds of operational risks and to increase the participation of private sector in power projects. Most of the infrastructure projects involves huge amount of funds, whereas the private sector participation is meager or negligible. Hence, the government takes up the task of developing and constructing such projects like, power, roads and bridges then turns off to private parties. Therefore, buying such projects is feasible to the private parties. Generally, the private parties take those projects on an operational lease for a certain period of time.

2.6.1 Suitability of Leasing

Yescombe (2002), a well known author in the field of "financing large-projects and project financing" suggested, a way in deciding whether to use lease finance or not. The project company has to assess whether the benefit of reduced financing cost due to leasing outweighs the loss of the tax depreciation or not. He also said that if the project assets are being used to provide a service to the public sector, (however) there is an issue whether lease finance should be encouraged, as the apparent lower cost produced, is obviously at the expense of tax revenues.

Leasing of infrastructure is nothing but a kind of financing method to finance infrastructure projects. Lease financial is typically used to finance relatively small, short-term asset requirements (Pederson & Gill, 1990). According to Farrell (2003), “the lessee can increase his wealth by increasing the risk of the leased asset, as long as his ex-post behavior cannot be detected by the market before signing the contract”.

Here, the important issue to be known, why leasing is a preferred method of financing, to finance the projects: the first importance is leasing generally provides 100 percent financing, companies are attracted by the minimum upfront expenses and down payments required by other financing alternatives. Secondly, leasing is a fixed expense. With the uncertainty of interest rates and inflation, it is advantageous to lock in, long term expenses and last one is leasing provides substantial tax advantages. In some cases like providing 100 percent write-off, the monthly lease payment (Catalyst Financial Group, Inc).

2.7 Partnership’s/Joint Ventures (JV’s)

Among all the major sectors in the country, power sector is especially facing the problem of fund scarcity. The present situation driven by fiscal austerity and widespread disenchantment with the performance of state-owned utilities, innovations in technology and dramatic changes in policy, an increased demand for infrastructural services facilitates by growing populations have been motivated both central and state governments tilting towards the private sector to build, operate, finance, own, and transfer infrastructure projects such as telecommunication facilities, power plants, ports and airports as well as toll roads (Klingebiel & Jeff ruster, 2000) (ADB, 2000; Ahadzi, 2001; Akintoye et al., 2003).

According to Kalidindi, & Singh, (2009) “the governments are opting the use PPPs for the development of infrastructure” the reason is to utilise the skills, innovations, and managerial capabilities of the private sector to optimize efficiency in infrastructure projects. Debande (2002) mentioned that, public private partnership (PPP) is increasingly used for the development of infrastructure (the Europe experience). In1992, the UK government introduced the private finance initiative (PFI) to promote the construction of new infrastructure, whereby a special purpose company, called “the project company”, is set up to realise the infrastructure. The main expected benefit from the PFI is the transfer of responsibility for designing, constructing, financing and operating the infrastructure to the private sector.

The aims of PPP’s are very specific and related to the characteristics of the particular sector. Vigorous and serious research has been done and doing also on PPP’s in various sectors, which adopted the PPP’s with different objectives. Chege & Rwelamila (2001) identified one of the main aims of PPP approach is to achieve value for money. It has been widely recognized, by using private finance, skills and expertism, and other related services at a cheaper cost the value for money can be attained. UN draft report (2004) mentioned about PPP’s, it is an ideal vehicle to achieve an integrated objective of “sustainable development” refers to “a process where integrated consideration of economic, environmental and social processes ensures the long-term viability of a project”.

2.7.1 Advantages of PPP’s

PPP,s have number of advantages including access to capital (ADB, 2000; Bing Li et al., 2005), increased value for money, timely completion of projects (Bing Li et al., 2005) and improved service delivery, through the use of better management practices and adoption of innovative solutions (Akintoye et. al., 2003).

In financing aspect PPP models are highly depending on debt capital. Venture capital has become an important form of financing for new businesses, as they are characterized by high risk, uncertainty (Gompers & Lerner, 1998 p.151). Harris & Tadimalla, (2008) identified “PPPs have relied heavily on commercial banks for their debt financing, and it is unclear how sustainable or how desirable this dependence will be". Angelides & Xenidis, (2009) described the critical issues regarding financing successfully in PFI (it is one form of PPP) projects as follows:

(1) Lack of strong domestic capital markets,

(2) Limited rising of institutional funds,

(3) Non-dependable project revenue streams, and

(4) Improper assessment of the value of government guarantees.

This is also well referred by Kurniawan, Ogunlana, & Motawa, (2010) in their research work and critically acclaimed it.

Designing partnership is easy, but the implementation requires much care. Malini (1999) opined that, the successful implementation of a PPP (BOT) project requires the study of financial feasibility of the project in the light of a detailed risk analysis because of uncertainties surrounding the different input variables. Connexions (2006) report mentioned the necessary pre-requisites for the implementation of PPP's they are, strong political commitment, transparency and consistency of policy, effective regulation, careful design of the contract with appropriate risk apportionment and attention to cost recovery, and clearly defined stakeholder roles, project financing, and extent of competition.

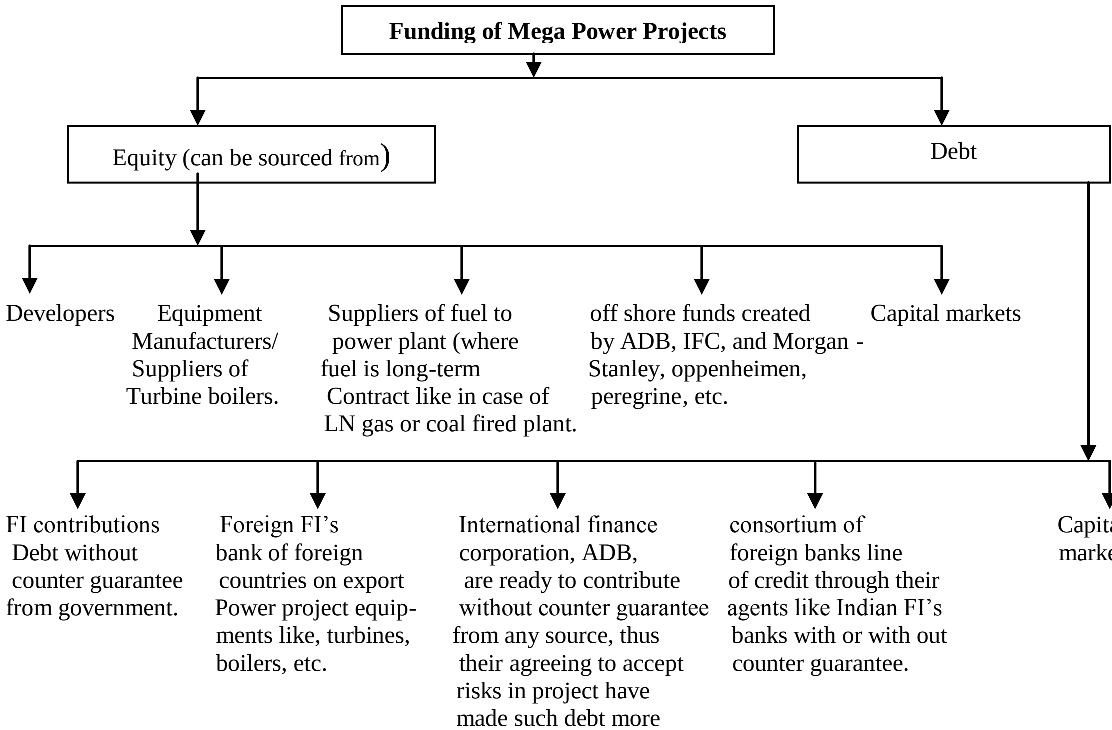
2.7.2 Problems in PPP Implementation

Akampurira, Root, & Shakantu, quoted some of research outcomes contributed by various authors on implementing PPPs. In the electricity sector implementing PPPs has been challenged by protracted negotiations (Ahadzi et al., 2004), difficulties in structuring project financing (Jyoti et al., 1998; ADB, 2000) lack of a supportive legal and regulatory framework (Blackman et al., 1999), high bidding costs (Akintoye et al., 2003; Bing Li et al., 2005), and resistance from environmentalists (ADB, 2000). Individuals or organizations take advantage of the opportunities created through varying contractual arrangements e.g. PPPs as determined by the institutional environment (North, 1990). They identified that "the success of the contractual arrangement is highly dependent on the nature of incentives that are put in place for a particular project".

Eradication of corruption is one such implementation problem regarding this UN draft (2004) where in it is mentioned that, PPPs are no more prone to corruption and discouraging such thoughts also than in other construction projects. However, one of the main causes of corruption in PPPs is the lack of a tendering process.

2.8 Sources of Financing

Most infrastructure expenditure in developing countries has been funded directly from fiscal budgets. However, several facts such as macro economic instability and growing investment requirements have shown that public financing is volatile. Private sector organizations on the other hand, have a large pool of resources from which they can seek funding, ranging from equity investors to capital markets and banks. In addition they can seek and tap funds from both local and international financial markets (Chege, 2003). Major issue in the power sector among other sectors is scarcity of investment. It is a serious threat for the expansion plans of power sector in developing countries. Project investment decisions are determined at the time of investment and little managerial discretion is involved in making decisions related to allocating funds to new investments. Sullivan (1990) said that achieving levels of efficiency similar to those in developed countries where it would reduce the financial requirements in electric power expansion. According to the author, the power projects should improve its efficiency to reduce the fund requirement to some extent. Financing mechanism of power project is quite different from that of other projects. Banerjee (1995) has given the model of funding mega power projects in India.



Source: Banerjee (1995)

Fig 2.1: Model of Funding Mega Power Projects in India.

Finnerty, (1996) mentioned that there are some traditional sources of financing to infrastructure projects, government funding (grants, loans, or loan guarantees), suppliers (principally construction firms and equipment suppliers), bilateral and multilateral agencies, back credit facilities, private placement of securities with institutional investors.

Credit enhancement is one of the sources of financing. The need for credit enhancement emerges from the perceived inability of the power purchaser (SEBs) to meet its payment obligations. The credit enhancement essentially guarantees either power purchase or debt repayment (Gupta et.all, 1998). Financing through export credit agencies is most viable route but specific international agency's overall country limit and Indian financial institutions limit is reduce their exposure (including term loans guarantees and underwriting commitments) to not more than 25 percent of their net worth to a single project or maximum of 15percent to a sector (Gupta et.all, 1998).

Dailami & leipziger (1998) stated that, in practice most private infrastructure projects completed and on-going projects in developing countries are financed with a sizable amount of foreign capital. A typical financing to a project consists of 20 percent to 40 percent equity provided by project promoters and the rest of amount is raised in the form of debt in a combination of syndicate commercial bank loans, bond issues, bridge and backup facilities and multi lateral and export credit agency loans. In 1995, about 60 percent of total cross boarder infrastructure finance was brought in the form of bank loans, 20 percent bonds, and the rest in the form of equity capital by the entry of foreign institutional investors and liberalization of domestic interest rates.

The power project financing includes a mix of equity, subordinated debt, senior debt, and guarantees (Deband, 2002). Xenidis & Angelides (2005) quoted the studies of Tiong (1994) and Kumaraswamy & Zhang (2001) which focused on limited 'equity-raising' "instruments in developing countries (lack of stock markets or bonds) that, consequently, shift to financing through loans and therefore, reduce profitability".

The mix of sources of financing involves different types namely: debt, equity, mezzanine finance, etc. As mentioned by Zhang & M.ASCE, (2005) the different kinds of financing sources are, mezzanine finance, preferred stock and debt. Mezzanine finance refers to a kind of financial instruments that are primarily in the form of debt but also share some qualities of equity capital. Mezzanine finance includes convertible bonds and preferred stock.

Preferred stock is a perpetual debt apart from the nonpayment option. Only when the project company runs into trouble, then the equity-like features of these hybrid claims kick in. Therefore, preferred stock does not reflect a proportional claim on the project's net assets.

Debt is usually more expensive and has a shorter maturity period than equity. It creates the need for emergence of long-term financial instruments which required in project finance, because the project generates no revenues during the initial stage i.e. construction phase and tends to build up cash flows slowly in the operation period. Therefore, in the early years of the operation period, the revenues may be minimal and not able to bear high payment of debt. Large payment of debt may be a heavy burden on the project that can seriously affect the normal operation of the project and even ruin the project to a greater extent. There are also other types of financial instruments such as leasing, venture capital etc, for serving the financial requirements. Since, capital markets are at different stages of development, across developing countries then domestic financing is opted by way of equity and debt and in a lesser extent mezzanine finance structures, and it becomes common source of funding for infrastructure projects (Thomas, 2009).

Another important source of finance mentioned by George, (2006) is "securitization", it is a generic, widely used, and very powerful financial tool that takes a stream of revenue over a period of time and turns it into a chunk of capital up front. Securitized debt also known as asset-backed securities it is serviced by dedicated revenue stream from ratepayers.

Regarding the investment in India, the both central and state governments have considerably failed to make credible promise due to political instability and financial constraints. In India, the development of debt market is in nascent stage. Availability of domestic financing of the required magnitude is therefore critical to the development of infrastructure in any location in the country**.** When the right conditions are prevailed, securitization can give borrowers some access to funds (Narayanaswamy, 2007). Chodhury & Charoenngam, (2009) said that "sovereign credit rating" plays vital a role to attract the funds.

Daube, Vollrath, & Wilhelm Alfen (2008) stated that the involvement of different forms and resources of capital depends on a variety of project-specific criteria, such as the investment volume, both the allocation of risks and the individual risk-return-structure of the investor. Cory & Schwabe, (2009) referred in their research on "wind levelized cost of energy: a comparison of technical and financing input variables", about the research of Harper et al., (2007) who made the research on renewable energy, stated that, wind power developers and financiers have become more efficient and creative in structuring their financial relationships, and often tailor them to different investor types and objectives. As a result two or more similar projects operated may also be used simultaneously with very different cash flows and financing arrangements.

Thomas, (2009) identified new category of funds namely pension funds, and “steady return” investors those are project equity funds which would invest directly into SPV’s - either in equity or in mezzanine products. He emphasized the need to enhance the role of insurance companies and pension funds in financing infrastructure in general.

Morris (1996) clearly discussed the financing pattern of the Dabhol Power Project (DPP), in his research on “the political economy of electric power in India”. His research on Dabhol is representing the Indian experience of financing in large projects. The total capital costs of DPP in Rs 3209 crores. Promoting companies in DPP are Enron corp., Bechtel group GE capital and electric co. During the construction phase there is a net cash inflow of $ 7189 million, the net cash outflow in the second year is $ 955 million and the estimated net cash out flow for the next 30 years period ranges from $ 74.5 million to $ 170.1 million. During the thirty first year the net cash outflow of $ 266.2 million on account of the retirement of the foreign equity for DPP, the stream of cash flows will equate an Internal Rate of Return (IRR) of 18 percent.

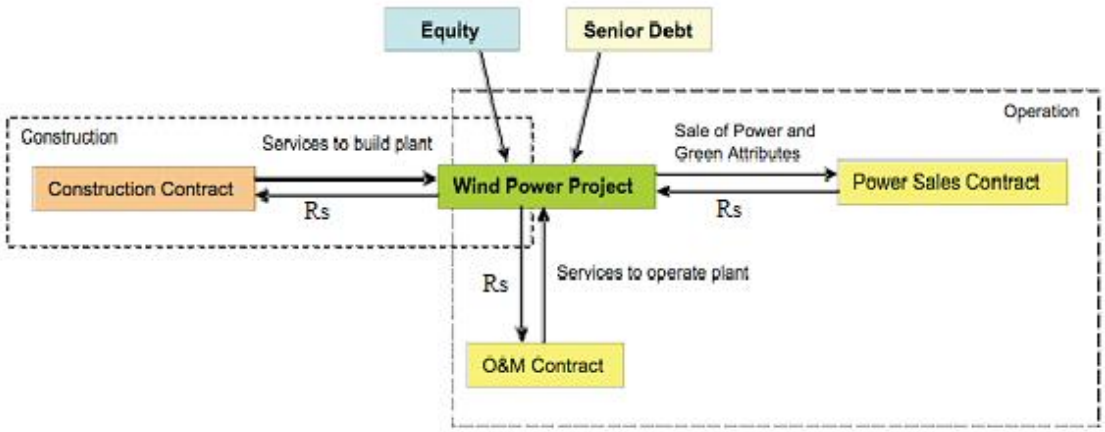
Bristow, (2010) referred and highlighted the work of Justice, (2009) on variety of possible private capital sources and their key characteristics which are summarised and tabled below.

Table 2.2: Key Investor Characteristics

Finance source	**Venture Capital**	**Private Equity**	**Infrastructure Funds and Pension Funds**	**Bank Mezzanine Debt**	**Bank Senior Debt**
Typical investment	Early-stage companies; new technologies or markets (HIGH RISK)	Companies/projects in more mature technologies (MEDIUM RISK)	Essential assets, long duration, steady cash flow e.g. conventional coal plant (LOW RISK)	Proven technology. Form of debt between senior debt and equity. Short duration (MEDIUM RISK)	Proven technology and established companies
Likelihood of RE project involvement	No	Yes	Possibly by portfolio investment in low-risk RE bonds	Project may seek MD if level of senior debt is insufficient. MD cost > senior debt but < equity	Yes
Investment horizon - yrs	4-7	3-5	7-10	Specified term of lending	Specified term of lending 15
Expected return (IRR)	>50% (HIGH RETURN)	25% (ENHANCED RETURN)	15% (LOWER RETURN)	LIBOR + 700bps	LIBOR + 300bps

Source: Giles Bristow (2010) (complied by author from sources: Justice, 2009 and Hamilton, 2009)

The author also has given the diagrammatical representation of the role of debt & equity and principal contractual arrangements governing a typical wind power project that are displayed in Figure 2.2.



Source: Giles Bristow (2010)

Fig 2.2**:** Role of Debt, Equity and Principal Contractual Arrangements Governing a Typical Wind Power Project

2.9 Factors Influencing Investments of Power Projects

Till recent past power sector was a mostly state run enterprise. However, structural inefficiencies and failure to keep pace satisfying the demands of a rapidly growing economy has forced the state to re-think its strategy. To attract commercial loans and private sector investments, developing countries have to adopt policies that will improve the investment climate and reduce political, foreign exchange, and commercial risks (Heron, 1985).

Banerjee (1995) identified that, the government of India has devised and implemented power policies which are conducive to private sector investment in the power projects. such as: i) companies which will for power generation and distribution for the first time will be entitled to 5 years tax holiday ii) customs duty on equipments of power which are being imported has been reduced to 20 percent iii) the rates of depreciation of Plant & Machinery (P&M) have been liberalized to include higher rates iv) a minimum rate of 16 percent on equity (post tax) is guaranteed based on operating Plant Load Factor (PLF) of 68.5 percent beyond this PLF, incremental return on equity will be allowed to private investors v) with the permission of the concerned state government, the private developer of power can dispose of power to other vi) foreign private developers will be allowed to participate in equity of power generating companies. PWC Report (2008) has described "in power sector large investments are needed to meet growing demand and provide universal access. The policy and regulatory framework to be pro-investment in shifting away from 'negotiated and guaranteed' to 'open and market competition'. In view of these things government should take proper measures to encourage investment in this sector.

Especially, the central government should encourage the private sector to invest more funds in power sector. The problems to the private investors for investing their funds are many, among those the major problem is lack of investor friendly environment. The other problem is government is having social concern and it is providing subsidized power in some situations free power to the public also. Because, of it the payment bills are stopped and due amount is not paid to the power producers in-time. In this respect Basilio (2010) said that, the private sector involvement would bring more funds, expertise and efficiency to the development of projects in several essential areas, which could improve the efficiency of the sector.

More recently and after a downward trend of investment from 1998 to 2003, private investment in infrastructure projects has been dramatically increasing and later too from 2004 to 2008. However, it becomes more concentrated in many sectors like energy which lead the recovery (Basilio, 2010).

In order to foster private participation, developing countries should pursue macroeconomic stability and improve their institutional framework, namely, strengthening procedures for contract enforcement and dispute settlement and developing a coherent set of policies for trade, tax and competition. This has been emphasized in several works, for instance, World Bank (1994), OECD (2006), Hainz & Kleimeier (2006), Matsukawa & Habeck (2007), Pessoa (2008) and Sorge & Gadanecz (2004).

To improve the situation government requires a suitable framework to create investor friendly environment. Regarding this Woodhouse (2005a), identified five key factors that constitute the investment climate for private investment in the power sector such as:

i. Strong public finances
ii. Viability of the sector
iii. Efficiency of fuel markets
iv. Political climate including the role of civil society and
v. The legal framework.

Another survey made by FICCI (2002, 2003) on investors, finds that 48 percent of the foreign investors opined that the prevailing regulatory system across various economic sectors in India was an average with 52 percent rating and it was below average. The survey identified the following factors, which are critical to the growth of FDI inflows in India, such as (i) political stability (ii) reduction in ground level obstacles (iii) market growth and (iv) man power. However, in the power sector funds are required for a long period of time; it will also limit the availability of suitable funds at required amount.

The willingness of the private sector to develop infrastructure projects depends very much on the legal environment, where the projects operate. To attract private sector participation in infrastructure development, the government has to develop investor friendly legal policies, regulatory framework, as well as a financial environment, conducive to investment and attractive to foreign investors (Kumaraswamy & Zang, 1999).

The Indian government has initiated several policies for the development of power sector but its performance has not reached the level of expectation, in this respect Patel Balmukund (2011) said “the power sector reforms initiated are yet to show significant results”. IEA (2003a) revealed that the Indian power sector has not been able to attract substantial private investment, in proportion to its requirements, due to its inadequate legal and commercial frameworks, and delays in obtaining regulatory approvals. To accelerate the development of power sector, reforms are proposed in three directions viz.

strengthening the regulation, improving distribution and opening bulk supply to completion and revising tariff to more economic levels.

If one observes the policy initiatives taken by the government to encourage private investment, development of domestic debt market is a major initiative. The appetite clubbed with zeal, for long-term debt instruments in the domestic market is also less. According to department of Public Private Partnership (PPP) government of India, the domestic bond market in the country is dominated by government borrowing and it leaving limited space for the private sector (www.pppinindia.com).

Patil committee (2005) revealed "an active bond market can increase the flow of long-term funds and reduce reliance on banks. The Indian corporate bond market, though one of the largest in Asia is still at an early stage of development". In connection with the use of corporate bond capital to the projects, empirical studies document relationships between the use of corporate bond financing and firms' attributes, such as size, leverage, financial stress, liquidity, growth opportunities and profitability (Houston & James (1996), Johnson (1997), Krishnaswami et al. (1998), Cantillo & Wright (2000) and Denis & Mihov (2003)). Generally, the capital to the projects in developing countries comes from the developed countries, in this process several factors influence the capital flow from the developed to developing countries, such as "higher expected returns and the growth potential of developing markets", etc (Singh, 2007).

Here the fact is the investors can choose from a basket of opportunities in various countries and across a number of sectors. To attract those investments the government should create investor friendly environment, apart from having concern of local/domestic investments. In this context Harris & Tadimalla, (2008) mentioned, "India's government had been concerned that local financial markets would be unable to support continued large growth in investment in infrastructure projects". However, underdeveloped financial markets make the private participation on infrastructure projects relatively more difficult, particularly, when domestic investors are becoming more prominent as a major source of funds to infrastructure projects (Basilio, 2010).

Government's new policies now allow project development activities to move in parallel to the power demand. They also help the projects to achieve financial closure and acquiring land and order equipment before even signing a Power Purchase Agreement (PPA). Kumar, et al, (2010) opined that the policy changes have largely helped private developers set up power projects.

If the corporate bond market compared with the government securities market, then corporate bond market is still underdeveloped with illiquid primary and secondary markets, inadequate tenors, must absence of risk management and credit enhancement instruments. The government therefore considers the policy initiatives which are identified from the research of ADB, to support financial market development, including:

i. Allowing domestic financial institutions greater leeway to invest in corporate bonds,
ii. Steadily raising the limit on foreign investment in corporate bonds,
iii. Amending the bankruptcy code to protect rights of unsecured creditors,
iv. Reducing transaction costs in issuing and trading corporate bonds by reducing the need for repeated disclosures, as well as high stamp duties and
v. Reducing the preference of banks for loans over bonds by subjecting both assets to similar mark-to-market requirements, especially for interest rate exposure.

However, despite of the government policy reforms, several financial products are not available in India or markets are illiquid. According to ADB project report (2009) regulatory and institutional problems also constrain the participation of financial intermediaries in infrastructure.

For the development of power sector the government should provide enough incentives to the private investors, but the government fulfilled it partially. According to government of India report (GOI, 2005b) some states provided better incentives for attracting private investment, and other some states have managed to maintain a sustainable investment environment for the investors.

Unlike in the past, now-a-days it is essential to offer incentives or schemes to attract the private investors to invest funds. For instance, ADB offers private investor's credit enhancement schemes (in the form of guarantees) to improve the ability to attract private capital. The first type of guarantee is a Partial Credit Guarantee (PCG), which provides coverage for both business and political risks. The second type of guarantee is a Political Risk Guarantee (PRG), which aims to facilitate investment of private capital in cases where there are sovereign or political risks" (Gatti, 2008). Logically speaking this has been keeping the investors' interest alive in the power sector where in states are providing more amenities. Another factor which is hurdle for private investment is 'risk' involved in the projects.

Ministry of Power & Central Electricity Authority Report (2009) contains the major issues of power sector such as, indigenous manufacturing capability of main plant and balance of plant equipment commensurate with capacity addition, adequate fuel availability, adequate transportation facilities for equipment and fuel, slow process of decision making and cumbersome payment procedure adopted by the utilities. And it is sincerely felt that these should be addressed by both central and state governments.

Sullivan (1990) identified some problems faced by developing countries in power sector, those are, in efficiency, subsidized electricity prices, poor management, and undue political interferences over issues of technical and financial decisions. These are creating financial crisis in developing country utilities. According to Jhirad (1990), main reason for the failure to tap/attract the foreign currency loans in most of the developing countries is the inability to implement their power expansion plans and also the less availability of local currency loans / financing. World Bank report (1997) emphatically mentioned effective sector policies are meeting the challenges of rapid economic growth. Effective sector policies are covering, interalia, infrastructure development and maintenance policies, pricing, and regulation. Major problem according to Gupta et al, (1998) is, the major problem in power sector is "poor credit rating of the state electricity boards", due to this promoters have insisted for state guarantees and Government of India (GOI) guarantees for the payment obligations of the SEBs.

There are some key factors in sector specific issues which influence the investment of the projects. In Indian context too power sector has also some specific issues which influence the investment. Shah (1997) discussed the power sector issues related to improving efficiency of power generation and distribution and cost effectiveness. And she identified un-economic supply of coal and lack of co-ordination between various power generation stations are the problems for the improvement of efficiency of power projects. She developed a cost saving model by taking in to account the schedule of power generation, transmission and procurement of coal, and it can help in attaining balance between load centers and generation stations, which results into realization of costs saving in power generation and transmission.

So the fuel linkage and the cost saving model of supply of coal are important to the power project for attracting investment. Singh (2007) mentioned in one of his studies given in the reference, on policy environment and regulatory reforms for private and foreign investment in developing countries: "A case of the Indian power sector", that there are some sector specific factors, such as policies that influence industry structure, entry, competition and pricing behaviour in the sector. These factors influence the investment decisions of investors and the financial viability of the projects along with policy and regulatory environment. Here the role of independent regulatory mechanism is very crucial to attract the investment. However, the regulatory mechanism in general includes the sound tariff setting process and transparent regulatory process.

The economic factors have its indirect impact on the availability of finance to power projects. Economic factors include rate of inflation, GDP per capita and ratios of external debt to exports, short term debt to foreign exchange reserves and reserves to imports (Dailami, & leipziger, 1998). Economic factors refer to the issues like influencing the economic feasibility of the project including the changes in domestic economic conditions of the recipient country or inaccurate project development plan due to unpredictable and precarious economic conditions. The best example of how economic factors influence the funds availability to projects is, in Pakistan's AES Pak Gen project, regional power authorities sought tariff reduction after change of government. This conflict has still not been resolved, as the company states that tariff reduction will erode its profits (The News, 2000).

Gross Domestic Savings (GDS) is the one among the economic factors contributing to the investment of power projects. Every year the GDS increases in India, either directly or indirectly helping the infrastructure sector for getting investment. The GDS are influenced by inflation, monetary policies etc. Deepak parek committee is appointed to study various aspects of infrastructure development in India in 2007, the report revealed that gross domestic savings are anticipated to rise by 1 percentage of GDP in each year of the eleventh plan (2007-11), to achieve the targeted infrastructure investment level of 8 percent of GDP by 2011/12, and thereby that bridges the gap as stated above, half of the incremental domestic savings will have to be intermediated into the infrastructure sectors. This is a huge challenge, it lies in raising significantly the financial sector's capability for intermediating financial savings into infrastructure from the current level of 15-20 percent to 50 percent at the margin. The degree, to which the financial sector mobilizes domestic savings in larger depth, should reflect greater financial development (Basilio, 2010).

As per the study of Dailami et. al (1998) to establishing links among capital flows to infrastructure and the behavior of international interest rates, domestic, reforms and liberalisation, on certain characteristics of infrastructure investments in developing countries, have identified the assessment of credit risk environment of host countries as a key element in understanding the recent surge in capital flows to infrastructure.

They have shown the relationship between the risk premier on foreign currency loans to infrastructure projects and the project specific risk attributes by using regression model. the regression results are most robust with regard to the role of inflation (*The model developed in this research study offers an intuitive perspective on the relationship between default risk premium on foreign currency loans to projects in emerging market economies and the country and project risk attributes the quantitative simulation results provided are appealing and responsible this section undertaken cross sectional / econometric analysis drawing on a sample of infrastructure projects having reached financial closure during 1994-1996 in developing countries, based on a broad data base* *containing a sample of 78 green field infrastructure projects. The authors focus on private dollar denominated loans advanced to projects in the core infrastructure sectors of power, road, telecom, transport, and water in emerging market economies, they relate this measure of the risk premium to a set of macroeconomic and project specific explanatory variables, through a semi-long linear regression analysis*). Using both simulation and econometric analysis their evidence indicates that the market demands a higher risk premium on loans to countries with high inflation.

Environmental factors are the major factors influence the investment of the project. Now a day's getting environmental clearances is major critical issue to the projects, because environmental groups are opposing firmly the power projects due to its eco-hazards. The promoters are also failing to ensure the people for the use of advanced environmental pollution control measures. Environmental factors refer to issues in conflict with established environmental regulations of the country. This comprises pollution related issues such as noise, air pollution, water pollution, and visual disturbances and those related to natural resources such as unsustainable use of natural resources including minerals, water, land, and flora and fauna. For example, in upper bhote koshi hydroelectric project in Nepal, vibrations due to construction caused house cracks, dusts, noise, and mud (Ghimire, 1998).

Financial sector regulations are other important factors that influence the investment of power projects. For easy accessibility of funds, the government must relax the financial regulations. Varma (2001) opined that, regulators should consider 'larger national interests'. Providing credit enhancement directly and transparently has the advantage for strengthening financial system.

Pension and insurance funds are the emerging sources of investment in infrastructure projects. But the availability of this fund is very less, because of its sectoral cap of investing these funds. Regarding this source of funds "Goswami" (2001) made a research and had drawn some suggestions to the concern regulatory authorities to liberalise the rules for investing this fund in private sector projects apart from the government sector projects. He built a simulation mode to examine the suitability of investing pension assets in diversified portfolios, and revealed that, balanced exposure to equity and debt can significantly improve the rate of return at acceptable levels of risk exposure. The escalating trend in expenditure in various unfunded, defined-benefit public pension programs indicates an imminent pension crisis. For ex: in the last 20 years pension expenditure by the central government for civilian employees and armed forces has grown at an average annual rate of 23 percent from Rs 2470 million in 1981 to Rs 158430 million in 2000. The growth rate is even steeper in recent years because of large-scale retirement and generous pay revisions leads to the anticipated difficulties in handling "the rising pension burden". The union government in 1998 rises the retirement age from 58 years to 60 years for its employees. In this scenario, how the large amount of pension funds can be diverted to the infrastructure sectors?. Due to insufficient funds and retirements of employees is large in size', the government has reduced its exposure to infrastructure sector in terms of investment.

At present in India, regulations stipulate that, the entire corpus of pension assets is to be invested in the public and quasi-public debt instruments. Investment in equities or private debts is not at all permitted, except for a group superannuation schemes and individual retirement annuities offered by LIC of India. Such conservative investment norms have happened in the performance of pension schemes resulting in poor rates of returns. The low rates of returns have prompted many to advocate for relaxing the investment norms. Patel (1997) argued that exampled pension funds usually earn a higher average return up to 14 percent. Whereas Srinivas & Yermo (1999) opined infavour of relaxing the investment norms for pension funds is good to offer the retirees better rate of return. They argued that, the net welfare gain from a liberal investment regime measured against market bench marks is an important consideration for pension funds. The government appointed "Malhotra Committee" (1994) to study about insurance and pension funds. The committee recognized the need for better investment performance from pension funds and suggested some changes in the asset allocation composition.

More radial suggestions have come-up from the OASIS (2000) which exclusively examined the pension system being commissioned by the ministry of social justice and empowerment, government of India. OASIS (1999) advocates for complete abolition of the guaranteed return from pension funds and favour relaxation of the investment norms. Secondly, the committee proposes radical changes in private corporate debts and equities including international equities. OASIS, (2000) has also outlined that the liberal, multi-option investment norms for pension funds consistent with the risk tolerance level of the participant.

Table 2.3: Multi-Option Investment Norms for Pension Funds

Particulars	Safe Income	Balanced Income	Growth
Government Papers	➢ 50 %	➢ 30 %	➢ 25 %
Corporate Bonds	➢ 30 %	➢ 30 %	➢ 25 %
Equity : Domestic	➢ 10 %	< 30 %	< 50 %
Equity :International	-	< 10 %	< 10 %
Total	100 %	100 %	100 %

Source: OASIS (2000)

This study results suggest that, in one hand the all-equity portfolios through provider have superior rate of returns, and involves substantial risk taking. On the other hand, the balanced portfolios offer somewhat less returns than the all-equity strategy but the returns are still much higher than the bench mark strategy. Finally, this study is an "efficient portfolio diversification can significantly enhance rates of return from the pension schemes". It strongly supports privatization of EPF/EPS programmes.

The author of this research developed simulation model to examine the relative merits of different asset allocation policies for the proposed individual retirement savings accounts. He has taken "Investment in Inflation Protected Treasury Securities (IIIT's) as the bench mark strategy". The alternatives are it is assumed that the investment of 100 percent of workers annual contribution in IIIT's or in equity, or 60 percent in equity and 40 percent in IIT's. Alternatively investment strategies will involve investing in equities and debts with different exposure styles.

However, ADB Project report (2009) report revealed that, long-term investors, such as pension and insurance, have a limited presence in the Indian market due to regulatory restrictions.

An investor survey made by FICCI (2002) finds that, 48 percent of the foreign investors felt that the prevailing regulatory system across various economic sectors in India was average with 52 percent rating it is below average.

Project specific factors are the major influencing factors for the investment in power projects. Project size, leverage ratio, distinguishes the projects in different sectors (Dailami et al, 1998). Kwak (2002) made a research on various infrastructure projects in developing countries, and opined that projects which are lack of adequate resources, technical expertism and managerial skills, therefore, project design standards, specifications, and construction methods must be carefully selected so that they will be appropriate to the local financial resources, required during phase wise the implementation of the project and its subsequent operations. Ramamurti (2003) described that, it is necessary to shaping large infrastructure projects on sound commercial principles in an enabling policy and regulatory environment. It makes the projects for easy access to the funds.

Another researcher Singh, (2007) opined that, the project specific factors include a number of contractual issues (such as Power Purchase Agreement (PPA), fuel supply agreement, land acquisition, environmental issues, etc.) influence the investment decisions made by the investors, and these are linked to the legal framework of the country. Power purchase agreement is the most important determinant of the investment of funds. Power purchase agreement defines the rights and duties of investor and the state electricity board regarding power purchase, and it distributes the projects' risks and benefits. PPAs are highly complex, technical documents which entail major, long-term financial obligations for governments (Bosshard, 2002).

Country’s specific factors influence the foreign investment in power sector. Singh (2007) identified country’s specific factors viz macroeconomic fundamentals, growth potential and political stability etc. These factors mainly influence a country’s risk premium.

2.10 Factors Restricting Investments (Negative Factors)

Some factors negatively influence the investment opportunities of power sector such factors are similar in all developing countries. Political influence is a major factor among those factors, in developing countries especially in India. Some political parties have been influencing the government while taking policy decisions and they resist the investor friendly decisions in the country. Regarding political influence and other factors Sullivan (1990) described, **"**Inefficiency, subsidized electricity prices, poor management, and undue political influences over technical and financial decisions making are producing a financial crisis in developing country utilities".

Some political decisions deliberately cause for much delay in operating projects (especially getting various project clearances) which leads to the increase of overall project cost by increasing investment cost and construction costs. It is also mentioned by Reinstra & Nijkamp (1997) in their research identification. According to their opinion, "the high fixed investment costs and the long construction and planning periods may make an investment very unattractive for private investor because in the beginning of the project lot of capital is needed".

The credibility of the off-takers majorly influences the investor's investment decisions to invest funds in power projects. The most important thing to power projects to attract funds from investors is, the financial ability/capable of off-takers to make payments to the project in time, it will attract the funds from the investors. Unfortunately, the poor credit rating of the state electricity boards is one of the reasons for not improving the investment level in power projects in India (Gupta et. al, 1998).

The private sector participation in power projects is less and it occupies only 30 percent in the total investment in India. It is because of declining the interest of investors to invest funds in power projects. There are several reasons for declining the interest of private participants such as, so many requirement have to be satisfied to get the approval for establishing power project, lengthy bureaucratic processes (i.e. administrative hurdles and hierarchal elements) and non-transparent project approval processes, etc. Regarding this, the well known researchers in the field of public private partnership, Akampurira, Root, & Shakantu,: described the factors as major constraints to private sector participation in power projects, they are, "the predictability of the investment environment as a significant consideration for investors, the clarity surrounding regulatory and legislative processes, the willingness of all participants to adhere and respect the outcomes of these processes". The authors identified new factors which determine private sector involvement in infrastructure, in addition to the risk profile of the project such as:

1. The development status of the enabling legal and regulatory environment
2. Market structure (natural monopoly vs. multiple potential providers)
3. Macroeconomic conditions,
4. Financial, technical and institutional capabilities of the host government and relevant state-owned enterprises
5. Availability and quality of information required by investors to conduct due diligence undertakings
6. Tendering process utilized (structured vs. unstructured, competitive vs. direct assignment) and
7. Liquidity of local financial markets.

Institutional related challenges e.g. lengthy bureaucratic processes coupled with poor coordination between government departments non-transparent project approval processes are also restricting the investment of power sector (Blackman et al, 1999). "Chege" (2003) identified some barriers for the private sector involvement such as (i) policy and regulatory concerns (ii) weak domestic capital markets and (iii) high transaction and bidding cost.

Some policy initiatives, legal factors especially lengthy legal processes for settlement of various loan agreements and price reforms taken by the regulatory authorities also influence the investment. According to Morris (1999) the reasons, for private investment could not have raised are "the policy, legal, and institutional clarity, besides the price reform necessary for private sector entry into infrastructure on a large scale had not come". He also identified that the problem for financing infrastructure projects is "subsidies". Policy makers and analysts complain against the subsidies to reduce, but removal of subsidies is not possible without political will/consent. Hence, reforms are getting slowed down.

In view of private investment to highlight the Infrastructure Financing Facilities (IFFs), Klingebiel & Ruster (2000) in a study made by them as pointed out two sets of reasons, (for why IFFs have often fallen short of their intended objectives) they are:

(i) Lack of a conducive environment for private participation in infrastructure due to underprivileged sector policies, unstable political environment, a poor macro-framework and inadequate financial sector policies and

(ii) Faulty design of the facility itself inconsistent objectives, instruments, and pricing of instruments, sectors targeted.

The study clearly shows that the unfavorable investment environment restricts the IFFs to invest funds in projects. From this it can be understood that, the private creditors or the investors are willing to provide their funds, but the government is not taking proper measures to create a "investors friendly environment". Woodhouse (2005a) identified five key factors that constitute the investment climate for private investment in the power sector (i) strong public finances (ii) viability of the sector (iii) efficiency of fuel markets (iv) political climate including the role of civil society and (v) the legal framework.

Project finance is emerged as a main financial instrument for bringing private capitals into the provision of power projects. The structure of various options of Private Sector Participation in power projects (PSP) is given in Fig: 2.3.

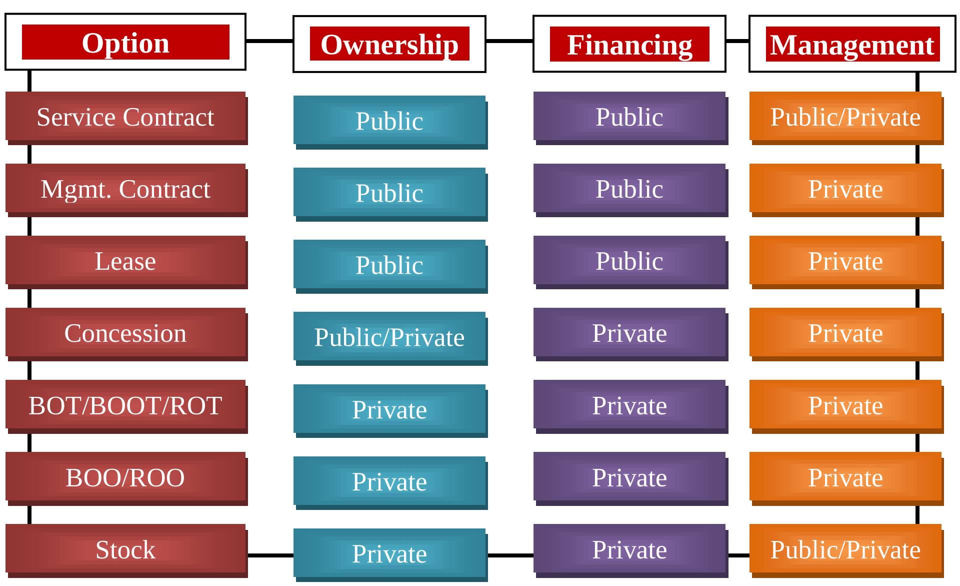


Fig 2.3: Structure of Various Options of Private Sector Participation in Power Projects

Corruption is one determinant factor for investment in power projects. Especially, the foreign investors invest their funds in a particular country based on the country position in the corruption index given by World Bank. Kwak, (2002) referred that, the World Bank definition on corruption as "the abuse of public office for private gain". Inevitable politics interference coupled with lack of transparency and lack of regulatory institutions, bribery and corruption are widespread in international development projects resulting in ineffective use of development resources. In Thailand, Mahitthirook (2000) estimated that 10 percent of the project cost is lost to corruption. Jamison et.all, (2005) identified the factors in countries that increased risk for commerce and direct investments are:

(1) Corruption

(2) Efficiency of the legal system

(3) Deleterious economic policy

(4) Inadequate accounting and governance practice, and

(5) Detrimental regulatory structures.

A world bank public policy for the private sector note confirms that "the energy sector, with its complex mix of public and private actors and often enshrined centers of monopoly power, is prone to corruption" (Bosshard, 2002).

Project risk is another major factor influencing the investment of power projects. Askar, (2002) identified major problem and risk areas of BOT projects. They are off-take arrangement, supply arrangement, environmental laws, force majeure, and high development costs.

2.11 Government Policy Initiatives

The government policy towards infrastructure finance is vital for the development of infrastructure projects. According to Klingebiel & Ruster (2000) governments have mainly used one of three mechanisms to provide financial support to infrastructure projects via provision of (i) direct financial support through subsidized loans (senior subordinate), equity contributions or grants (ii) provision of contingent supports such as political risk, minimum revenue, construction cost overrun or debt refinancing guarantees, and (iii) government sponsored infrastructure financing facilities. In India the government has introduced some reforms in the policy, legal and administrative framework to attract private investment. The Indian government also sponsored the establishment of the Infrastructure Development Finance Corporation (IDFC) that broadly speaks about stimulating private and long-term local funding for infrastructure projects.

The government encourages the projects through its policy making, and the promoters of projects approach the government for the help of either relaxing the financial regulatory regime for projects or providing fiscal incentives direct subsidies or other form of government support to attract private capital. According to Varma (2001) the possibility of private financing of infrastructure in India is fairly bright. Apart from the subsidy and credit enhancement, he suggested relaxation of financial sector regulations. And he has also highlighted most of the problems in infrastructure financing arising due to weaknesses in the sectoral regulatory structure.

Laws and regulations have been enacted in many countries to facilitate private finance in public infrastructure development for improved quality, efficiency, and cost effectiveness. The Indian government has taken several steps for encouraging private investment in infrastructure sector especially in power sector. Zhang & M.ASCE (2005) described that privatization (private finance) can improve public infrastructure development. He supported his arguments from the following:

(1) The private sector is less bureaucratic and more operational efficient than the public sector and, therefore, can make timely decisions for better allocation and utilization of resources

(2) Additional funds from the private sector overcome governmental budgetary restraints

(3) Expertise, managerial skills, and innovative technologies from the private sector are better utilized

(4) Involvement of the private sector reduces government monopolies and increases competition in public works and services

(5) The market mechanism increases the incentives toward efficiency in public organizations and

(6) Sensible Public-Private Partnerships (PPPs) minimize the competitive inequities between public and private sectors.

Financial incentives play a major and vital role in attracting private investments. In order to attract needed private investments in risky or financially unviable projects, governments have to offer enough incentives and support measures to the private sector. Fernando et.al, (2005) have mentioned several incentives given by government such as:

- Grants,
- Subsidies,
- Tax-exemptions,
- Revenue and foreign exchange guarantees, and
- Sovereign guarantees against force majeure and political risk, among others.

Chodhury et.al, (2009) made a study in four countries on power projects, they identified that, the constitutional laws of the four countries provided various forms of government support. Such as tax exemption subsidies, equity participation revenue guarantee and some risk absorbing strategies to attract private investment.

2.11.1 Major Policy Initiatives

In 2007, the major initiative has been taken by the government, such as the appointment of Parek committee (2007) for studying various issues (including financing issues) in infrastructure development in India. The committee believes that, the financing system will be constrained by two sets of factors: macroeconomic and institutional constraints.

2.11.1.1 The Macro-Economic Constraints: These are: *Nature of savings* (gross domestic savings) *Availability of risk capital* (The need for developing the market for other forms of risk capital such as mezzanine financing, subordinated debt and private equity) *Capacity to absorb capital inflows* (It may be observed that India has a large external debt capacity. India could borrow an additional $ 120 billion in the next five years and yet maintain its external debt to GDP ratio at the current level (about 15 percent), which is considered sustainable. Even if a one third of this capacity is used for financing infrastructure, it would cover about 10 percent of the infrastructure financing gap envisaged over the next five year period)

2.11.1.2 Institutional Constraints: They are: Commercial banks constraints, Insurance companies' constraints (eligible investors such as insurance companies have invested limited amounts in private infrastructure development. This can be attributed to regulatory restrictions, underdeveloped corporate bond markets) specialized NBFCs constraints and Infrastructure focused central PSUs constraints.

2.11.2 Patil Committee Recommendations

The Committee recommended some suggestions to the government for its plan of action in the form of policy initiatives which are classified under the following major heads.

2.11.2.1 Development of Domestic Debt Capital Market: to develop the domestic debt capital market, which is currently, at a nascent stage, the following initiatives would be necessarily Patil committee recommendations: Patil committee recommendations for the development of corporate bonds and securitization market.

2.11.2.2 Tapping the Potential of Insurance Sector: Indian insurance companies, though they can however, (they) cannot play a significant role in financing infrastructure projects, particularly those sponsored by private companies as of March 2006, the gross investment by insurance companies was Rs 529,484 crores, out of which the mandated investment in infrastructure sector was Rs 54,620 crores (10.3 percent of total).

2.11.2.3 Enhancing Participation of Banks, Financial Institutions (FIs) and Large NBFCs: In infrastructure financing banks, FIs and large NBFCs play a vital role in infrastructure financing through originating, underwriting and distributing risk. In view of the enormous infrastructure funding requirement, larger financing by banks, FIs and large NBFCs needs to be facilitated.

2.11.2.4 Facilitating Equity Flows into Infrastructure: *Liberalizing buyback regulations:* In many infrastructure projects, the buyback mechanism is used indirectly to finance suppliers in the following manner. Equity is allotted to the vendors, suppliers, etc at the initial stage as a consideration for the supply of raw materials / machines received from them. When the project becomes operational and the company begins to get sufficient cash flow to pay for these materials / machines, then buyback of these equity shares becomes necessary.

2.11.2.5 Inducing Foreign Investments into Infrastructure: To attract foreign funds into India's infrastructure sector, some measures are suggested. Steps for improving Foreign Institutional Investors (FII) participation currently, in 100 percent debt schemes, individual limits are allocated to FIIs in a manner that results in low absolute limits for each FII, weakening their incentive to actively utilize their respective limits.

The committee recommends significant amount of infrastructure investment is required in order to sustain and improve upon the current high GDP growth rate. The committee, however, believes channeling the flow of domestic and foreign financial savings in large scale to infrastructure sector requires a judicious mix of different policy interventions which balance the growth and stability objectives.

2.12 Project Risks

To take the investment initiatives by the private parties the risk of the projects appears as a hurdle. Myers (1984) defined risk as the volatility of the value of the firm's assets. The degree of investment by private sector depends on degree of risk involved in the project. The risks influence at different stages of the projects. The investment is always connected with the risk involved in projects (Bradu). Project risk is found in all stages of the project life and affects the present, and the future, profitability, of the project (Svanikier). The literature on risk is confirmed that the risk is inherent in non-recourse financing. It is quite opposite to that of the more traditional asset based financing methods (Farrell, 2003). In some industries, such as telecom, power generation etc, technological risks are relatively less (Chen, Kinsinger & Martin, 1989). However, large projects have many other aspects of risk including political, regulatory, country risks, etc.

2.12.1 Types of Risks

According to Tinsley (2000) risks are classified as: project completion risk, material and fuel supply risk, operative (technology, cost-based and management-based risks), environmental, political risk, force majeure, interest and legal risk. Grimsey & Lewis (2002), Akintoye, et.al (2005) mentioned various kinds of risks such as:

- Technical risk,
- Construction risk,
- Operative risk,
- Financial risk,
- Force majeure,
- Political risk,
- Environmental risk, and
- Project failure risk

Yescombe (2002) also mentioned various kinds of risks in his book “principles of project finance” and they are: commercial risks (consideration of appropriateness of the project, project completion risk, environmental risk, operational risk, income risk, supply of raw materials and energy, force majeure risk and project contracts compliance risk), financial risks (inflation risk, interest rate risk and exchange rate risk) and political risks (investment risk, risks of changes in legal system and quasi-political risks).

There are three levels of risks for PPP/PFI projects. They comprise macro level risks; meso level risks and micro level risks. Wibowo et.all (2005) classified the risks into project-specific risks (e.g., lengthy right-of-way acquisition process, construction cost, and time overruns) and sector-specific risks (e.g., unpredictable future tariffs, change in legislation). Matsukawa & Habeck (2007) said that, project risks may include construction risks (engineering feasibility, cost overruns, costs of delay, for example), operating risks (demand or revenue risks, tariff mechanisms, operating cost overruns, equipment performance), macroeconomic risks, legal and regulatory risks for investments in the country generally and with respect to the specific infrastructure sector. Risk is therefore a key driver of the cost of debt. Creditworthy companies or projects pose less risk and will pay lower interest rates than high-risk projects (UKERC, 2007).

In view of legal risk, Basilio (2010) said legal creditor rights are “important determinant” of private credit development. He found countries with higher legal risk measured by the index of creditor rights and the number of days to enforce a contract has a higher probability of a Multilateral Development Agencies (MDA) participation in a PPP project. Benkovic et al (2011) have given the "Serbia" experience, the level of legal and regulatory risks is fallen down fell due to the efficiency of the government is constrained by the lack of capacities in the public administration.

Financial risk is a major influencing factor of the choosing the financing alternatives of the project. Assessment of financial risk improves (GDP), lower inflation, low external debt and more developed financial markets in countries with larger economic size (Basilio, 2010). The research of Rao & Rao (2010) on power projects financing, observed "political risk and financial risk involved in all power projects, the financial risk arises due to the inefficient strategies which are used to design the capital structure of the project".

Regarding the regulatory risks Chowdhury et.al (2009) said that a consistent regulatory policy is required even with multiple changes of government parties.

The degree of political risk may affect infrastructure investments. Gupta et al (1998) identified "the country/political risk, rates very high in the mind of the investors". Due to this risk investors are not interested to invest more funds. Steps may be taken to eliminate/minimise political risk. To mitigate this risk, Hainz & Kleimeier (2006) provide a way that is loan contract, i.e., "through the inclusion of multilateral or national development banks in the syndicate". To prove it they developed double moral hazard problem model. This study provides empirical support for the notion that multilateral development banks act as "political umbrellas".

Political Risk Insurance (PRI) and partial risk guarantees and partial credit guarantees offered by multilaterals can also play an important role for investments in developing countries. Matsukawa & Habeck (2007) said, risk mitigation instruments facilitate the mobilization of private debt and equity capital. Concerning political risk, the number of checks and balances is also an important determinant of the degree of private sector participation, which is higher for countries with better governance quality (Basilio, 2010).

Regarding the political risk, Benkovic et. al (2011) have given that the experience of "Serbia" political risk is relatively lower because of the forming of a pro-European government; however, relatively high risk remains due to the Kosovo proclamation of independence in February 2004, due to the uncertainty and delays in the negotiations on the Serbian accession to the EU, as well as due to increasing dissatisfaction of citizens with low standard of living.

In power projects, it is important to identify the risk factors which cause various kinds of risks. If the risk factors are found in the project then the further measures can be taken to minimize the risks in the project. In their recent study, Vaaler, James, & Aguilera (2008) found that risk factors at multiple levels substantially affected the capital structure of project firms. Project firms located in countries with common law legal systems, stronger creditor rights, and wealthier economies generally had higher leverage, indicative of lower project risk. Industry and/ or country experience by project sponsors led to higher use of debt in subsequent projects.

However, the literature says that risk is common in every method of financing, but the question is how to reduce it? The answer for this can be suggested in several ways. So many risk mitigation techniques are available to moderate the risk. Dorian, suggested ways to reduce the risks, such as: "seeking managerial control during the initial stages, ensuring that the local partners have a significant equity interest, adopting a two-tier negotiation policy (i.e. work with the central government both the local and the central government had some influence on the project and the revenue distribution), explicitly defining the terminology used in all contracts".

Miller & Lessard (2000) said that "The sponsor can further decrease the risk of the project by entering in to a variety of contracts". Esty (2002) suggested that "by isolating the asset in a standalone project company, project finance reduces the possibility of risk". According to Farrell (2003) "through recourse financing", it is important to the project sponsor because there is a direct relationship between recourse and the sponsor's debt to assets ratio and risk. Matsukawa & Habeck (2007) opined additional risk analysis is necessary to evaluate a single-asset, Greenfield private infrastructure project. Chowdhury et al (2009) identified that government's explicit guarantee reduce or eliminate the risks involved in IPP projects, such as financial risk is reduced through government loan guarantees, and demand risk is reduced by minimum off take guarantee. The government should choose “hell or high water” off-take agreement, escrow mechanism and trustee as a legal strategy for its purchase agreement. However, the basic instruments of risk allocation in project financing are project contracts (Yunbi An1 & Cheung, 2010).

From the investors point of view to escape from risks, the investors should carry out technical, legal and financial due diligence on the specific technology deployed, various elements of the project development process itself to assess the degree and type of risk presented by a project and its likely impact on both costs and revenues **(**Bristow, 2010).

The other dimension of reducing the risks of the project is by using suitable a method of financing. Project finance is one of the means for mitigating or spreading risk among different partners. There are several methods for financing power projects and by using selected methods among them the risk of the project can be reduced. Widely used method of financing to reduce the project risks is project finance. Kistner & Price (1999) revealed “a major incentive for many investors is the fact that project finance undertakings (e.g., IPP projects) can be made to stand alone as a self-financing entity, so that the investor can benefit from its success and can be isolated from its failure”. Project finance allows the (potential) investor to transfer specific risk to the lender of the debt. Etsy (2004) said, “the standard corporate finance approach is often analysed as an ineffective way for the lenders to control risks associated with a company’s project, given that managers are more likely to subsidies the new investment from other corporate assets rather than to risk bankruptcy of the company as a whole, by defaulting on the financing for the new investment”. However, the allocation of the different risks in turns influences the selection of the financial arrangements among different options (Etsy, 2004).

In risk management, identifying the risk mitigating instruments is very important. The risk mitigating instruments may be in the form of project securities or government securities, contractual agreements and risk insurance etc. project must be sufficiently “bankable” to enable the providers of risk mitigating instruments to properly assess the risks. Generally, the risk management takes different shapes, risk management via organizational form is more appropriate for situations where the financial instruments do not exist or are expensive to purchase, (Esty, 2002). UN report (2006) revealed that, the risk mitigating instruments for renewable energy projects are, secure contracts (such as PPA, EPC contract, O&M agreement and fuel supply agreement), equipment warranties, insurance products and various national government guarantees are the most utilized risk management instruments to facilitate the construction and operation of renewable energy projects.

Vimmerstedt (1998) identified the relationship between risk and the size of the power project. It revealed that risks are very less for small geothermal projects which are less than 5 MW and risks are high for big geothermal projects in Latin America, the Caribbean, and the Philippines where the study has been made.

2.13 Financial Closure

Financial closure refers *"The date at which all project contracts and financing documentation are signed, and conditions precedent to the effectiveness of the lenders commitments have been satisfied or waived"* (Yescombe, 2002 pp 312). The conditions precedent are effectively a checklist of documents the lenders require as the basis for their financing; when these are provided the lenders are obliged to advance funds. According to Gatti (2008 pp 384) financial closure refers "the phase in which all contract conditions of the financing established between the arranger bank and the pool of lenders are definitively closed".

It occurs when the legal documentation for all project agreements is in place, all permits have been obtained from government, and all financing documents (debt and equity) have been executed. In most cases the lender makes the initial disbursement of funds soon after financial closing. Several clearances are required for financial closure of a project viz.

2.13.1 Water Availability: Water will become increasingly scarcity component, this has no matching substitute. The recent closure of the 2GW Chandrapur power project is due to inadequate water supply and it is not a one-off issue and should be viewed and reviewed seriously by investors. We strongly believe that investors can no longer ignore environmental and water related issues, as they have tended to do in the past. Water is mainly used resource in the cooling tower (80 percent), ash and slurry washing (15 percent) and the boiler feed (5 percent). While coal-based power projects aim to reuse 100% of their water, some quantity of water, of course would be waste during reprocessing. The additional water needed is called make-up water. It is estimated that a 1GW power project uses about 70m liters of make-up water per day (Kumar, et al 2010).

2.13.2 Equipment Procurement: Kumar et al (2010) identified that in private sector utilities had equipment procurement skills within a short period of time, where as that is a short fall in state/public sector. They also identified that, project implementation issues have been considerably reduced due to the emergence of new power equipment suppliers, both local and global. Power plant equipment is typically customized in terms of the calorific value and sulphur, moisture and ash content of the coal. The boiler is designed to handle coal with a specific calorific value and may not operate efficiently if a different quality coal is used. As a rule of thumb, the boiler can handle a variation in calorific value of 10-15percent. The calorific value of the Indian domestic coal is typically around 3,000 Kcal/kg, well below 5,000 Kcal/kg for imported coal (a difference of over 65 percent). This may lead to operational inefficiencies and lower average Peak Load Factor (PLF). This may lead to an additional squeeze on margins (Kumar, et al 2010).

2.13.3 Transportation: Port capacity and rail wagon availability may restrict imports Arun Kumar et al (2010) opined that a steep rise in coal imports will put pressure on India’s port handling capacity and the associated inland rail/road transportation.

2.13.4 Land Acquisition: Land acquisition consists of three types 1) forest, 2) government and 3) private. For forest land concessionaire need to acquire same quantum of land and give it back to state government. Private land acquired by concessionaire directly and government land in the easiest way to acquire, generally it takes 12 - 18 months for possession of government land (Kumar, et al 2010).

2.13.5 Environmental Clearance: Environmental factors are the major factors influencing the investment of the project. Nowadays getting environmental clearances is a major issue to the projects, because environmental groups are opposing the power projects due to its environmental hazards, and due to the fear of eco-imbalances. The promoters are also failing to ensure the people for the use of advanced environmental pollution control measures. Environmental factors refer to issues in conflict with established environmental regulations of the country. This comprises of, pollution related issues such as noise, air pollution, water pollution, and visual disturbances and those related to natural resources such as unsustainable use of natural resources including minerals, water, land, and flora and fauna. For example, in upper bhote koshi hydroelectric project in Nepal, vibrations are due to construction caused house cracks, dusts, noise, and mud etc (Ghimire, 1998).

ADB Report (2001) report identified that, there is a need to develop bankable versions of the financing methods, which is ideally backed by the security of customer accounts rather than government guarantees or public sector assurances. This report reveals that, in order to reach financial closure, governments have often accepted commercial risks that should have been assigned to the private sector. Banks or other financial institutions require project finance assessments to conduct full risk analysis, including technical/ engineering assessment of the project to reach financial closure (Kurniawan, Ogunlana & Motawa, 2010).

Delay in financial closure occurs due to failure to manage equity capital, in time, delay in debt syndication, and sudden increases in cost of debt. The reasons for failure to manage equity capital in time are: dispute among equity partners, poor response from equity investors, (due to recession in economy, inadequate legal and regulatory environment) and adverse changes in the parent organizations of promoters. The reasons for delay in debt syndication are: failure to find sufficient financial institutions / banks, high risk aversion of lenders and lenders not comfortable with project proposals. The reasons for sudden increase in cost of debt are: government induced changes in interest, fluctuations in foreign exchange, liquidity crisis in market and fluctuations in financial / capital markets (Thomas et. al, 2006).

2.14 Investors' Priorities

Always the investors prefer and emphasise more to the projects which have financially strong promoters and strong contractual agreements with participants. However, the investment in power projects mainly depends on the investor’s perception of risk which is involved in the project. And also the requirements of the investors must be fulfilled by the project. Primarily the investors give their preference to the projects which are having a strong “feasibility (technical, economic, financial, institutional and environmental analysis) and competency and creditworthy project promoters”.

The second priority is credit or loan security. In recent days the loans which are provided by the banks are non-recourse loans it required secured by the project assets. According to Wikipedia “the loans are most commonly non-recourse loans, which are secured by the project assets and paid entirely from project cash flow, rather than from the general assets or creditworthiness of the project sponsors”. Bosshard (2002) said that “financial institutions will usually require some guarantees from the parent company when they fund private power projects”. The reason for the investors asking the guarantees is to reduce the risk of financing to power projects.

The third priority of the investors is the input supply (supply agreement) and output purchases (power purchase agreement) guarantees. Peterson (2010) said that, “in fact, provided that the project developer is reliable and boasts a sufficient track record, the strength of the PPA is the foundation on which a bank will base its entire deal”. It is true that most of the investors considered strength of the project's PPA and the credit quality of the PPA's off taker must be rock-solid (Friddle, 2010).

The fourth priority of the investors is reducing risks in project. According to IDFC the ability to finance the projects is subject to a number of risks, contingencies and other factors, some of which are beyond our control, including availability of liquidity, general economic and capital markets conditions and our ability to obtain financing on acceptable terms, in a timely manner. However, risk should reduce to get the investors attention towards investment of funds in power projects.

Prospective investors might secondly consider resource-assessment liabilities. Here Friddle (2010) had given an example of investors preferences in solar power project investment, “a finance application package for a solar project of any size must include a series of vital documents (in addition to the PPA), ranging from an operations and maintenance agreement to an equipment-supply agreement to an independent engineer's report".

Further JeanB¨ & RolfW¨ Ustenhagen (2009) revealed that "experienced investors will ask for the overall direction of policy is good the key thing about policy to stimulate their interest, however, is signal intent and consistency". How policy impacts on investments depend on the attitude of the investors.

The government support to the project is also other factor which preferred by the investors. Chodhury et al (2009) mention in conclusions of their study, the law of the four countries provided various forms of government support. Such as tax exemption subsidies, equity participation revenue guarantee and some risk absorbing strategies. The results are initiative and the study leads to government's consideration on following legal factors that influence strategies for financing in IPP projects.

The most complicated issue in many BOT projects is land acquisition. Many projects are delayed and some are dropped due to cumbersome bureaucratic procedures in land acquisition. They also mentioned that the proper assistance from government is necessary to achieve timely acquisition of land. They also mentioned that strong domestic capital markets will enable the private developers and investors to borrow money for non-recourse projects from financial institutions, and eventually to 'float off' the projects on local stock markets.

2.15 Conclusion

The development of infrastructure leads to the development of economy of the country, in this process the power sector contribute is more in the country's GDP. The critical issues for the development of the power sector are: designing the financing structure of the power projects, raising the funds by using suitable method of financing. The study is aimed to adopt identifying the suitable method of financing to power projects, at different levels of risk conditions. Through the review of literature, it is identified the fund gap between financial requirement of the project and the availability of sources in the market. The other thing found is the risks of the project always influence the selection and use of the financing method and sometimes the availability of financing sources influence the selection and use of the financing method. The other important thing identified is a need to develop bankable versions of financing models ideally backed by the security of utility owners' accounts rather than government guarantees.

Literature says risks often influence the inflow of the funds, it majorly effects the investment decisions of the private investors i.e. the degree of financing from the private sector depends on, the risk profile of the project. Finally, it is concluded that for the development of power sector, long-term domestic financing sources must be developed, in PPP.s the transfer of responsibility to the private sector should be accomplished through deregulation or well-established contractual arrangements and the government should encourage the private sector to invest more funds in power sector.

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CHAPTER-III

FINANCING METHODS AND SOURCES

3.0 Introduction

Financing power projects is a strategic and critical issue. The Indian power industry has been dominated by the public sector. Earlier in India the power projects were developed mostly by government utility firms and financing was arranged through government budget, multilateral agency credit, bilateral credits, supplier credits and commercial loans from banks. “To arrange large funds for power projects in the conventional way has been extremely difficult for promoters and therefore non-recourse project financing has been adopted for financing private power projects by all promoters. Therefore, the constraint of resources and the paucity of funds lead to privatization of power projects in India” (Rao, 2010). Some time the availability of funds depends on the method of financing so the selection of the method is very important. There are several methods of financing for power projects globally. They are:

- Project financing,
- Corporate financing,
- Equity financing,
- Debt financing,
- Leasing of infrastructure,
- Public private partnerships (PPP’s), etc.

However, any financing choice/strategy that is made in a competitive environment does not change a project’s cash flows. Ultimately the overall cost of capital of the project reflects the risk that must be borne by the parties financing it (Modigliani & Miller, 1958). The detailed explanation of various financing methods which are used to finance the power projects in India is given below.

3.1 Financing Methods

There are several methods for financing power projects. They are:

3.1.1 Project Finance

In project finance based on non-recourse debt, each new project is separated from the developers' other assets. Different entities are created to share the risks of the project for the construction and the operations stage, and without interactions with the parent company's balance sheet, the main sponsor for the project. A "Special Purpose Vehicle" (SPV) is the borrower and the asset is on its balance.

Project finance comprises the financing of a particular project mainly based on the project's cash flow. Once a project's revenue stream has been identified, innovative finance techniques can assist in capitalizing the value of the future project revenues to fund the investment. The financing of the power projects on project finance is in a nascent stage in India.

3.1.1.1 Definition

There is no single agreed upon definition for project finance. Finnerty, (1996, p. 2) defines Project Finance (PF) as: *"The raising of funds to finance an economically separable capital investment project in which the providers of the funds look primarily to the cash flow from the project as the source of funds to service their loans and provide the return of and a return on their equity invested in the project"*.

While Nevitt and Fabozzi (2000, p. 1) define it as: *"A financing of a particular economic unit in which a lender is satisfied to look initially to the cash flow and earnings of that economic unit as the source of funds from which a loan will be repaid and to the assets of the economic unit as collateral for the loan"*. In contrast to corporate finance, the lender does not consider the overall financial strength or balance sheet of the sponsor as a prerequisite to lending for a project, but primarily rely on the revenue stream generated by the project itself. And the International Project Finance Association (IPFA) defines project finance as *"the financing of long-term infrastructure, industrial projects and public services based upon a non-recourse or limited recourse financial structure where* *project debt and equity used to finance the project are paid back from the cash flow generated by the project".* Although none of these definitions uses the term "non-recourse debt" explicitly (i.e., debt repayment comes from the project company only rather than from any other entity), they all recognize that it is an essential feature of project finance.

Finnerty, John. D. (1996) said that, to determine whether project finance is an appropriate method of raising funds for a particular project, at least five factors should be considered (1) the credit requirement of the lenders, (2) Tax implications of a proposed location (3) the impact of the project on the covenants contained in the agreements governing the sponsor (4) regulatory requirements and (5) the accounting treatment of project liabilities and contractual agreements. In project finance, a Special Purpose Vehicle (SPV) is created.

3.1.1.2 Why Investors Make Use of Project Finance?

Project finance can be used when a particular facility or a related set of assets is capable of functioning profitably as an independent economic unit. Project finance refers to the development of a stand-alone project on a non-recourse or limited recourse financing structure, where debt and equity used to finance the project are paid back from the cash flows generated by the project. High leverage is one major reason for using project finance. High leverage improves the return for an investor. Other reasons are tax benefits and risk limitation. (Daube, et al 2007).The decision to use project finance is a change away from the traditional way of financing investment opportunities reflects an attempt by managers to reduce total financing costs (Esty, 2003). Project finance provides a useful financial engineering technique for the private sector to finance the project outside their balance sheet (Zhang, & M.ASCE, 2005). Project finance can be beneficial to a company with a proposed project when (1) the project's output would be in such strong demand that purchasers would be willing to enter into long-term purchase contracts and (2) the contracts would have strong enough provisions that banks would be willing to advance funds to finance construction on the basis of the contracts (Finnerty, 1996). Project finance creates value by reducing the agency costs associated with large, transaction-specific assets, and by reducing the opportunity cost of underinvestment due to leverage and incremental distress costs (Esty, 2002). Project finance solves two financing problems: 1) it reduces the cost of agency conflicts inside project companies; and 2) it reduces the opportunity cost of underinvestment due to leverage and incremental distress costs in sponsoring firms.

Typically, project finance is used for capital-intensive infrastructure investments that employ established technology and generate stable returns, preferably returns that are denominated in or can be easily converted to hard currencies. Project finance is not good at funding high-risk investments with uncertain returns, so it is rarely used to fund research and development spending, new product introductions, advertising campaigns, or other potentially high return intangible investments. Project finance works best when the technology that is being used is a proven technology. Friddle said that “if there is any sort of development risk, project finance is generally not a good tool to use”.

3.1.1.3 Requirements for Project Finance

A project has no operating history at the time of the initial debt financing. Consequently, its creditworthiness depends on the project’s anticipated profitability and on the indirect credit support provided by third parties through various contractual arrangements. As a result, lenders require assurances that (1) the project will be placed into service, and (2) once operations begin, the project will constitute an economically viable undertaking. The other requirement is the sponsor’s ability to convince providers of funds that the project is technically feasible and economically viable. (Finnerty, 1996)

3.1.1.4 Features of Project Finance

One of the main features of project finance is the spread of risks between all parties involved. Project finance is off - balance sheet financing. In the past, the possibility inherent to project finance of not including debts in the sponsor’s balance sheet was considered as an argument in favour of this instrument from the private contractor’s point of view. Another feature of project finance is limited recourse financing.
The key features of project finance are:

1. Legal separation from sponsors' other assets of what is most typically a single large asset constituting a new, self-contained, well-specified investment by the sponsor(s) (FINON, CIRED., LARSEN, & ROQUES, 2008).
2. It is provided for a "ring-fenced" project (i.e., one which is legally and economically self-contained) through a special purpose legal entity (usually a company) whose only business is the project (the "Project Company").
3. It is usually raised for a new project rather than an established business (although project finance loans may be refinanced).
4. There is a high ratio of debt to equity ("leverage" or "gearing")—roughly speaking, project finance debt may cover 70 –90 percent of the cost of a project.
5. There are no guarantees from the investors in the Project Company ("nonrecourse" finance), or only limited guarantees ("limited-recourse" finance), for the project finance debt.
6. Lenders rely on the future cash flow projected to be generated by the project for interest and debt repayment (debt service), rather than the value of its assets or analysis of historical financial results.
7. The main security for lenders is the project company's contracts, licenses, or ownership of rights to natural resources; the project company's physical assets are likely to be worth much less than the debt if they are sold off after a default on the financing (Yescombe, 2002).

3.1.1.5 Advantages of Project Finance

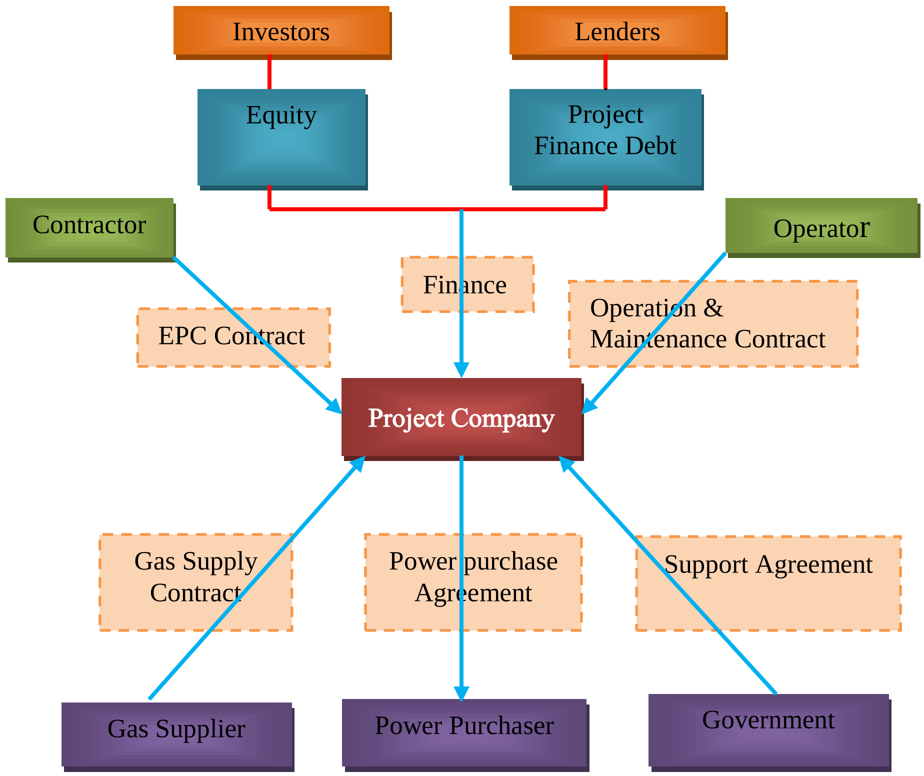
Project finance can be beneficial to a company with a proposed project when 1) the project's output would be in such strong demand that purchasers would be willing to enter in to long-term purchase contracts 2) the contracts would have strong enough provisions that banks would be willing to advance funds to finance construction on the basis of the contracts (Finnerty, 1996). Project finance creates value by reducing the agency costs associated with large, transaction-specific assets, and by reducing the opportunity cost of underinvestment due to leverage and incremental distress costs (Esty, 2002).

The other advantage is that sometimes it can be used to improve the return on the capital invested in a project by leveraging the investment to a greater extent than possible in a straight commercial financing of the project. Project finance solves two financing problems: 1) it reduces the cost of agency conflicts inside project companies; and 2) it reduces the opportunity cost of underinvestment due to leverage and incremental distress costs in sponsoring firms (Esty, 2002).

3.1.1.6 Financing Power Projects through Project Financing

The Indian power industry has been dominated by the public sector. Earlier in India the power projects were developed mostly by government utility firms and financing was arranged through government budget and other sources. To arrange large funds for power projects in the conventional way is extremely difficult for promoters and therefore limited or non-recourse project financing is adopted for financing private power projects by all promoters. However, for financing power projects the promoters of the project will arrange the “Special Purpose Vehicle” (SPV) in that the available funds will deposit which are received on non-recourse basis, with that funds the project will be financed until the completion.

The model structure of project finance of independent power project is shown in Fig: 3.1



Source: E.R.Yescombe (2002)

Fig 3.1: Independent Power Project Financing Structure.

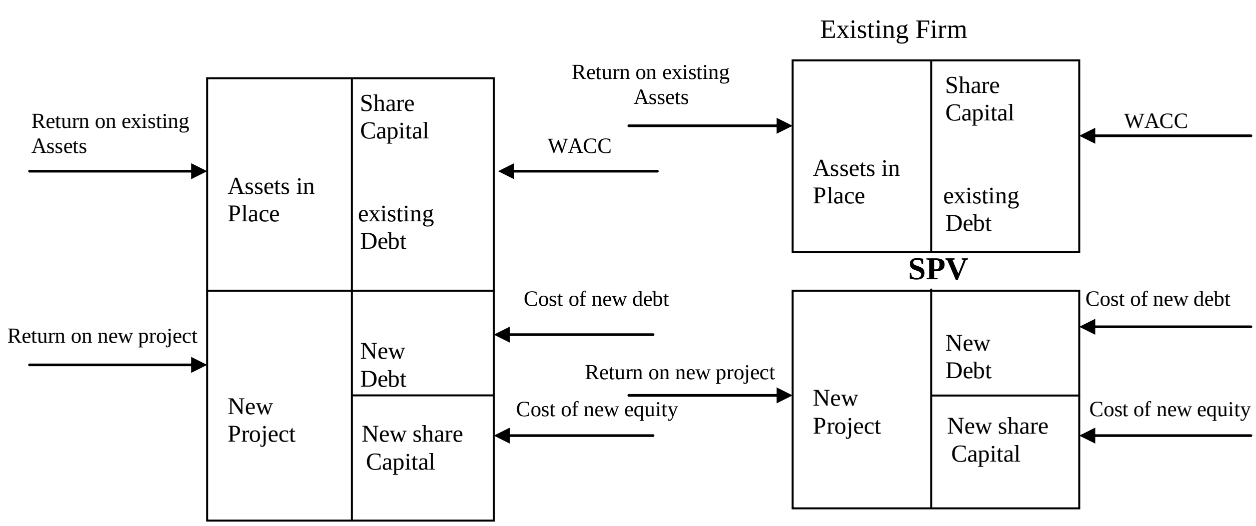
3.1.2 Corporate Finance

There are two main approaches to finance a project such as: corporate finance and project finance. Between the polar extremes of corporate and project finance lie a multitude of hybrid options. The crucial feature of corporate finance is the importance of the project developer and its direct involvement in taking the risk of the project onto its own books. Under such an arrangement the new asset (the power plant) remains an integral part of the sponsor's entity, and hence of the sponsor's balance sheet. Therefore, from the financial perspective, the critical aspect of corporate finance is that neither the new asset nor the liabilities to the creditors financing the new asset are legally separated from the remainder of sponsor company's assets and liabilities. Implicitly, new creditors purchase an option on cash flows from the company's other assets because managers are more likely to subsidize the new investment from other corporate assets than to risk bankruptcy of the company as a whole by defaulting on financing for the new investment.

The critical point in the modern finance perspective is that corporate finance is not asset-specific but represents the sponsor company's general borrowing. It is therefore driven by the sponsor's general financing situation as its terms are based on the sponsor's credit rating and leverage in addition to pure investment factors. In the context of nuclear power projects, Capital, (2002) said, "an actual financing (for new nuclear power stations) is likely to be structured as corporate financing in which the power generating company is the borrower with the backing of the parent company of the integrated entity (a corporate structure that combines a power generation company and an electric distribution company)". In recent experience, non-recourse project financing for power generation assets has become a much less attractive financing option for power generation finance. Hudson, (2002) also observed preference among nuclear plant vendors for corporate finance for new nuclear developments in the form of 'conventional owner financing using the balance sheet of a strong and integrated generation and utility company'.

The essential differences between project finance and corporate finance are given in Chapter –I.

The comparison of these two methods given in Figure 3.2



Source: Gatti, 2008, pp 12.

Fig 3.2: Comparison of Corporate Financing and Project Financing Strategies.

The above figure shows that, in corporate finance the new project is a part in the sponsoring company. It is reasonable to assume that when a company finances a new project on balance sheet (corporate financing), creditors and shareholders will establish the cost of new debt or cost of new equity based on two factors:

1. The soundness and profitability of the venture that management intends to launch
2. The soundness and profitability of the company that will realize the new venture (often the more important factor).

In fact, if the new venture were to fail and thus were unable to repay capital and interest, creditors could demand reimbursement from cash flows generated by other, already-existing business. But in project finance only the cash flows will be used to service the debt.

The limited leverage is an important drawback of any corporate finance funding arrangement (OXERA, 2004). Leverage in corporate financing is likely to be as low as 50 percent, with a substantial amount equity required for the project. Some possible benefits of leverage, including low capital commitment and high debt tax shields.

3.1.3 Leasing of Infrastructure

‘Lease’ means a transfer of the right to possession and use of goods for a term in return for consideration, but a sale, including a sale on approval or a sale or return, or retention or creation of a security interest is not a lease”. Most of the infrastructure involves a huge amount of funds where as the private participation in terms of fund is very low. Hence, the government takes up the task of developing and constructing projects like, roads and bridges afterward turns off those projects to private parties. Since buying such projects will be feasible, the private parties take it on an operational lease for a period of time. A lease is a contract by which control over the right to use an asset is transferred from one party (the lessor) for a specified time in return for a rental payment to cover the lessor's costs of ownership. Leasing services can be provided by financial institutions such as commercial banks and farm credit services.

In a lease finance structure, the equipment being financed is owned by the lessor (lender) rather than the lessee (borrower). The lessee pays lease rentals instead of interest and principal payments (debt service) on a loan, but other things being equal (e.g., assuming the implied interest rate for the financing included in the lease rental payments is the same as the loan interest rate), payments under a lease or a loan should be the same. It should be noted that in this context leasing means a lease of equipment to the project company as a way of raising finance. This has to be distinguished from a property (real estate) lease in a BLT/BLOT structure, which is one way of giving the project company control of the project instead of full ownership, but does not imply the provision of any finance. The merit of linking lease finance with project finance comes from the use of tax benefits. In some countries (e.g., The United States, the United Kingdom, and Japan) lessor can take advantage of accelerated tax depreciation through their ownership of the equipment that is the subject of the project finance.

3.1.3.1 Forms of Lease Finance

There are three methods by which governmental entities may finance equipment and facility acquisitions using lease financing. The methods are direct financing through a leasing company or bank, Certificates of Participation (COPs) and leasehold revenue bonds.

3.1.3.1.1 Direct financing: Some leasing companies and banks act as lessor and provide direct lease finance. The leasing company or bank purchases the property and then leases the property back to the governmental unit. Direct financing by the lessor is essentially a private placement and, consequently, interest rates tend to be significantly higher than those available on either publicly sold COPs or lease revenue bonds.

3.1.3.1.2 Certificates of participation**:** As an alternative, lease finance can be arranged through the public sale of certificates of participation, sometimes referred to as COPs. Each certificate holder owns a beneficial interest in the lease. Certificate holders, in the aggregate, essentially constitute the lessor. Certificates of participation are a newer form of lease finance that are gaining popularity with issuers and have gained acceptance by investors. Although the documentation is significantly different than for revenue or general obligation bonds, the sale of the securities involves a process that is essentially the same.

3.1.3.1.3 Leasehold revenue bonds**:** The third method of lease financing is through the sale of bonds secured by lease payments ("lease revenue bonds"). This method requires that the property and/or equipment be purchased by a not-for-profit corporation or governmental agency. The not-for-profit corporation or governmental agency issues bonds secured by the lease and serves as lessor of the property. Just as cities establish industrial revenue bond authorities to serve as a conduit issuer of industrial revenue bonds, governmental entities can establish not-for-profit-corporations to serve as a conduit issuer for lease financing (www.munibondadvisor.com/MOLeaseFinancing.htm).

3.1.3.2 Terms of the Lease Financing

It is expected that the lessor and the lessee will take opposing views concerning how leases should be structured and a compromise must be found. The following is a partial list of lease contract items to consider:

I. *Timing of lease payments*. Since lease payments are typically made in advance, timing of these payments (monthly, annually) will alter the pattern of project cash inflows and outflows during the year.

2. *Security deposit*. Although security deposits are primarily a feature of operating leases, their presence in a financial lease increases the cost of the lease. Both the size of the deposit and whether it bears interest should be considered.

3. *Origination or service fees*. When the lease contract is initiated, a service fee may be applied at a percentage of the value of the leased asset. Fee charges increase the effective interest costs of the lease.

4. *Duration.* Extension of the lease term directly affects the amount of each lease payment. The longer the lease the smaller the lease payment other factors are being constant. Tax laws place effective limits on the term of some lease contracts.

5. *Purchase option.* Under the “fair market value” purchase option, purchase price determination is delayed until the lease terminates. In the case of a vehicle lease, a “Terminal Rental Adjustment Clause” (TRAC) may provide the lessor with the option to

adjust the lease rental upward to recover the difference between the projected and actual value at the termination of the lease.

6. *Penalties.* Failure of the lessee to perform under the terms of the lease contract may trigger a penalty fee, or in extreme cases nullify the lease. Under a non-cancelable lease, a penalty may arise due to lessor or lessee action to cancel. Additionally, a prepayment penalty would occur when the lessee attempts to pay off the lease before maturity. Late payment penalties are also likely to be imposed on the lessee. Clauses that accelerate the lease payment schedule may be quite severe.

7. *Flexible lease options.* Several factors that may add financial flexibility to the lease are trial periods, provision of nonfinancial services of the lessor, and sharing of delivery, installation, and licensing expenses.

8. *Lease rate.* A fixed-rate lease may be preferred by the lessee due to the predictability of each payment. In exchange, the lessor may be willing to accept a variable-term lease arrangement to compensate for the risk associated with changing borrowing costs (Pederson & Gill, 1990).

3.1.4 Partnerships/Joint Ventures (JVs)

Neither a purely public nor a purely private infrastructure development approach is likely to be sustainable in the long-term. A purely public approach may cause problems such as: slow and ineffective decision-making, inefficient organizational and institutional frameworks, and lack of competition and efficiency, which is collectively known as government failure. On other hand, a purely private approach may causes problems such as: inequalities in the distribution of infrastructure services. To overcome both government and private failures, a Public-Private Partnership (PPP) approach emerged. In other words due to fiscal austerity and widespread disenchantment with the performance of state-owned utilities, innovations in technology and policy, many governments are turning to the private sector to build, operate, finance, own, and transfer power plants (Klingebiel, & Jeff Ruster 2000).

However, the essence of a public-private partnership arrangement is the sharing of risks. After observing these models in other countries, the Government of India (GOI) have brought out a policy and set guidelines for starting projects through PPP route. The central government agencies and state governments involved in initiating PPP based infrastructure projects.

3.1.4.1 Definition

"An arrangement between two or more entities that enables them to work cooperatively towards shared or compatible objectives and in which there is some degree of shared authority and responsibility, joint investment of resources, shared risk taking, and mutual benefit". **- HM Treasury (2000)**

"public-private partnership" refers to forms of cooperation between public authorities and the world of business which aim to ensure the funding, construction, renovation, management and maintenance of an infrastructure of the provision of service".

– European Commission (2004)

"public-private partnership" refers to arrangements where the private sector supplies infrastructure assets and services that traditionally have been provided by the government. In addition to private execution and financing of public investment, PPPs have two other important characteristics: there is an emphasis on service provision, as well as investment, by the private sector; and significant risk is transferred from the government to the private sector. PPPs are involved in a wide range of social and economic infrastructure projects, but they are mainly used to build and operate hospitals, schools, prisons ,roads, bridges and tunnels, light rail networks, air traffic control systems and water and sanitation plants.

– **International Monitory Fund (2006)**

3.1.4.2 Private Partnerships

Fundamentally, PPPs introduce, as a minimum, private management into public service through a long-term contractual bond between operator and a public authority. One of the main aims of PPP approach is to achieve value for money and it has been widely recognized that by using private sector finance, skills and expertise, services can be procured at a cheaper cost and value for money can be attained.

The term PPP found wider application in 1997 under the new labor government in the UK. This report identified other terms that are being used internationally to represent the partnership between the public and private sectors embodied in the PPP approach.

• Private Participation in Infrastructure (PPI), used by the World Bank (CF data base) and within the development-financing sector; also adopted for the South Korean PPI program.

• Private-Sector Participation (PSP), also used within the development-financing sector.

• P3, used in North America.

• Privately-Financed Projects (PFP), used in Australia.

• P-P partnership (to avoid confusion with the term "purchasing power parity", a method of comparing currency exchange rates, and also referred to as PPP.

• Private Finance Initiative (PFI), originating in UK but now also used in Japan and Malaysia (PPIAF 2009).

India has seen rapid growth in recent years in its program of infrastructure public-private partnerships. Despite the surge in demand for finance, local financial markets coped well over the period to 2007—and even offered better terms as they became more used to the PPP model. PPP program has grown rapidly in the past five to six years; in 2002–06 more than 150 PPP deals closed, compared with 66 in the previous seven years. This growth was mainly in the transport and urban infrastructure sectors. In power sector this concept slowly implementing it has to take good pace.

3.1.4.3 Objectives of Public-Private Partnerships

Public-private partnerships must demonstrate that the following objectives are met in a balanced way to reflect the best interests of all stakeholders:

1. To ensure government services are delivered in the most economical, effective and efficient manner.
2. To create opportunities for private sector growth and to contribute to the overall economic development.
3. To ensure the best interests of the public, the business sector and the community are served through an appropriate allocation of risks and returns between partners.

3.1.4.4 The Advantages of the PPP's

1. The department doesn't have to find the money beforehand to pay for works; rather, the successful bidder receives payment for works/services over a 25/30 year period; there is continuing commercial incentive for efficiency throughout the various stages of work;
2. The private sector brings new and innovative ideas to projects
3. Appropriate risks are transferred to the private sector.

3.1.4.5 Forms of Public-Private Partnerships (PPPs)

A number of methods have been explored in international infrastructure privatization, including asset sale, contracting out, deregulation, build/operate/transfer (BOT), and other types of public-private partnerships (PPPs). The term BOT has generated a string of related acronyms that reflect variations of governmental interest, preference, and industrial characteristics in procurement approach: operations and maintenance (OM) buy–build–operate (BBO), build–lease–transfer (BLT), build–own–operate (BOO), build– own–operate–maintain (BOOM), build–own–operate–transfer (BOOT), build–transfer (BT), build–transfer–operate (BTO), design–build–finance–operate (DBFO), design–build–operate– maintain (DBOM), develop–operate–transfer (DOT), lease–develop–operate (LDO), modernize–operate–transfer (MOT), rehabilitate–own–operate (ROO), rehabilitate–operate–transfer (ROT), and transfer–own–transfer (TOT), rehabilitate-lease-transfer (RLT) or rehabilitate-rent- transfer (RRT), build-rehabilitate-operate-transfer (BROT), build-lease-own (BLO) (Zhang, Xueqing., M.ASCE 2005).

BOT generates a special purpose vehicle for project finance. Private Finance Initiative (PFI) is another form of PPP. Public-private partnership projects were first launched in 1992, in the form of the Private Finance Initiative (PFI). However, the degree of the involvement of public and private sectors in PPP models is different that is based on the risk involved in the project. The degree of private and public sectors involvement is given in figure 3.3.

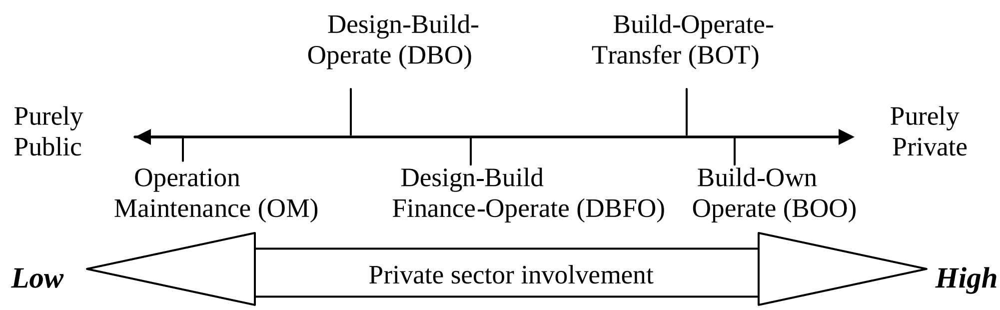


Fig 3.3: The Degree of Private and Public Sectors Involvement in PPP's

Project finance has emerged as a main financial method for bringing private capitals into the provision of power projects. The recent trends in private financing of public infrastructure projects in South Africa and the options for private sector participation in infrastructure provision are given in the Table 3.1

Table 3.1: Private Financing of Public Infrastructure Projects and the Options for Private Sector Participation

Option	**Asset Ownership**	**Operations of Maintenance**	**Capital Investment**	**Commercial Risk**	**Duration**
Service Contract	Public	Public and private	Public	Public	1-2 years
Management contract	Public	Private	Public	Public	3 - 5 years
Lease	Public	Private	Public	Shared	8 - 15 years
Concession	Public	Private	Private	Private	25 - 30 years
BOT	Private of public	Private	Private	Private	20 - 30 years
Divestiture	Private (or) private of public	Private	Private	Private	Indefinite (May be instead by license)

Source: World Bank (1997b), Simon Maxwell and mark Robinson 2006.

3.1.4.6 Why the Move to Private Participation in Infrastructure (PPI): Physical infrastructure projects have been traditionally financed with public funds and operated by public entities. Due to fiscal austerity and widespread disenchantment with the performance of state-owned utilities, many governments are turning their projects to the private sector and establishing under the partnership mechanism in terms of build, operate, finance, own, and transfer. In industrialized countries, the move to PPI is towards restructuring or unbundling integrated industry structures, introducing competition and choice (particularly in the electricity and telecommunications industry) and regulating these parts of the infrastructure sector where elements of natural monopolies exists. In the developing world the picture is more mixed and reflects the different levels of achievements in institutional, regulatory and policy developments (Klingebiel, et.al, 2000).

Especially, in power sector in addition to the poor service delivery characteristics of many state owned utility companies and an increased demand for infrastructural services by growing urban populations, lead to search for alternative infrastructure delivery mechanisms like public private partnerships (ADB, 2000; Ahadzi, 2001; Akintoye et al., 2003).

PPPs are long-term contractual arrangements that harness the skills and resources of both private and public sectors in the delivery of public services or the development of public infrastructure (Akintoye, et al., 2003). Through these mutual partnerships, a number of advantages should accrue including access to capital (ADB, 2000; Bing Li et al., 2005), increased value for money, timely completion of projects (Bing Li et al., 2005) and improved service delivery through the use of better management practices and adoption of innovative solutions (Akintoye, et al., 2003).

In order to harness the advantages offered by PPPs in the electricity sector, many countries have undertaken sector reforms involving implementing new supportive regulatory and legal frame works, unbundling state owned utilities into generation, transmission and distribution entities, establishing independent regulators to oversee the sector and ultimately allowing private sector participation in the provision/ delivery of electric power to the population (ADB, 2000).

Despite this, implementation of PPPs in the electricity sector has been challenged by protracted negotiations (Ahadzi et al., 2004), difficulties in structuring project financing (Gupta, et al., 1998; ADB, 2000) lack of a supportive legal and regulatory framework (Blackman et al., 1999), high bidding costs (Akintoye et al., 2003; Bing Li et al., 2005), and resistance from environmentalists (ADB, 2000). This has led to a reduction in private sector interest and investment in the development of infrastructural facilities in developing countries stemming from the nature of the institutional environment.

3.1.4.7 PPP Model

The organizational aspect of PPPs seems to have at least two dimensions. The first dimension is finance: how the public and private entities engaged financially in PPPs. The other dimension is organizational: how tightly organized is the relationship between public and private entities.

The models used to facilitate PPPs will accordingly be dependent on a range of factors. These include the sector in which the project takes place, the risks associated with that project, whether the infrastructure is capable of generating revenue itself or will always be provided at a net cost to government (annuity), whether there are opportunities for non-government use of the infrastructure, whether there are aspects of the project owned or controlled by government, whether there is competition as to the infrastructure and the need to regulate access and pricing.

According to Gonzales (2003) a careful structuring of terms and conditions of the financing deals could pave a way to the formulation of a workable model. A consistent regulatory policy is therefore, required even with multiple changes of government parties. In public private partnership project, though most of the stakeholders are from private side and may be one or two bodies from public side such as central government, state government and/or government owned agency, but they have profound role and can influence financial structuring (Chowdhury, et.al, 2009).

3.1.5 Venture Capital

A venture capital firm can be described as, a vehicle where investments of equity and equity related sources are distributed to private companies which are not listed on a stock exchange. (Berwin, 2006 p.11) Furthermore, the term venture capital can also be referred to as ‘private equity’. It is simply expressed as investments made by institutions, firms or other investors in companies in their early stages. The venture capital process involves mainly three large actors, the investor, the venture capitalist and the investee company (Isaksson, 2006 p.6, 15).

Now a days, venture capital has become an important form of financing for new infrastructure projects, which are characterized by high risk, uncertainty and most likely to have several years of negative earnings. In those situations it is not likely to receive traditional bank loans (Gompers & Lerner, 1998 p.151). With venture capital, the venture capitalist invests in the investee companies for a limited period of time, usually 3-10 years depending on industry and company situation.

Additionally, by providing risk capital investors are also expecting to get their initial investment times a multiple in return. Hence, investments in private companies are commonly in a long-term perspective. Furthermore, the initial investment in a company is often targeting a certain phase in which the investor is being specialized in. Together investors create an important value chain in which different investors provide equity capital in different phases of the company. The different phases are commonly referred to as seed financing (i.e. capital provided in the business initial phase) start-up financing **(**i.e. development of products), expansion financing **(**investment for further growth & expansion), and buyout (reconstruction) (Sahlman, 1990 p.479; Isaksson, A. 2000 p.7).

State-owned investors have primarily influence on the venture capital industry. Larger investors can engage in both direct investments to companies, or indirect through private equity funds and investment companies. (Isaksson, 2010 p.13) In indirect investments through venture capital firms/funds the state-owned investor often takes the role of a limited partner (SVCA, 2008 p.7).

A common structure of venture capital firms are organized that of a limited partnership. The limited partnership refers to a fund with different participants, where the limited partners provide capital and the venture capitalist firm acts as general partner of the fund (Sahlman, 1990 p.487). Common limited partners are often state-owned investor and financially strong individuals with capital to invest. Thus, the venture capitalist, fund managers are responsible for the debts that exceed the responsibility of the limited partners and the distribution of capital to portfolio companies, the investee (Berwin 2006).

3.1.6 Equity Financing

Equity is a part of ownership in the management of a particular firm. Equity investors may be those who are solely interested in a return on their investments, such as public shareholders and institutional investors, or those who have direct interest in project operation, such as: general contractors, designers, and operation and maintenance firms (Tiong, 1995a). An equity drive is necessary to collect start-up funds to be invested in infrastructure projects, livestock, and operating capital. An equity drive can be conducted in one or two steps there can be an initial equity drive for members to indicate an interest and provide capital followed by a second drive during which a majority of equity will be raised, or there could be only one opportunity to invest (Saxowksy et al. 1998).

Equity capital is the share of promoter, in the total investment of the project. It is characterized by the use of corporate credit and general assets of a corporation, typically a project, as the basis for credit and collateral. The important fact about equity is it appears that equity would be the cheapest cost of funding. The hidden fact is equity is actually the most costly form of funding. In either the public or nonpublic arena, there can be voting and nonvoting stock. Voting stockholders get a right to decide the things to be done in the company; nonvoting stockholders do not. Whereas, preferred stock has fixed dividend and its dividend is paid before the common stock dividends (Callahan, et. al, 2007).

3.1.7 Debt Financing

In present scenario, debt is the major source of financing, because, all power projects are adopting non- recourse method of financing. Currently all infrastructure projects are using 75 percent of debt funds in the total capital structure. Leverage in corporate financing is likely to be as low as 50 percent, with a substantial amount equity required for the project. Due to this disadvantage of corporate financing, some projects are adopted exclusively debt method. The required amount of debt can be obtained through the innovative financing instruments, such as: simple subordinated debt, convertible debt,

debt with stock warrants, mezzanine finance, external commercial borrowings and debt with an additional interest payment above the coupon rate contingent upon financial performance exist (Ahluwalia,). The debt includes secured and non-secured loans.

When a project is considered for debt financing from external sources, firms will decide methods of incorporation and the structure of debt contracts based on the decision whether the project will be financed separately or not. For example, firms may elect to finance infrastructure projects as a separate investment, which is not supported by the firm's balance sheet. Due to corporate balance sheet constraints the necessity for separate project financing could arise. Under such circumstances, if a project is financed as a separate legal entity then project finance principles may be followed instead of conventional corporate finance. Generally sponsors of large projects seek to raise more capital of bank debt because it is cheaper than equity. According to Modigliani and miller (1958), debt is not intrinsically cheaper than equity. Although equity requires a higher return than debt does, it also bears a greater amount of risk. Once the return is adjusted for risk, the returns to debt and equity effectively must be the same in a well-functioning capital structure.

A sponsor that is considering a new project can proceed along with many dimensions in financing the project. It must choose the proportion of debt and equity. While the sponsor as equity holder will bear most of the risk of the project, some risk will nonetheless be borne by the project’s debt holders. Debt will provide flexibility to a sponsor with the ability to transfer at least part of the risk of a project. The extent of this transfer can be increased by raising debt in a non-recourse form, which limits the revenues and assets that are used to service the debt to select project (Miller & Lessard, 2000). Generally the important thing to the project is it’s “dependence on debt financing” it should reduce its reliance on debt otherwise it will be treated as ineffective project.

3.1.7.1 Forms of Debt Financing

There are four types of debt financing to infrastructure projects viz, borrowing, corporate bonds, trade debt, and customer deposits. The most common type of debt financing is borrowing from financial institutions, such as: banks or leasing companies, because it is quick and relatively inexpensive.

3.1.7.1.1 Borrowing

Whenever the projects require the funds they simply go to the financial institutions or the commercial banks to take the loan. Because, inexpensive source when it compared with other sources. Financial institutions borrow money at one rate and lend it out at a higher rate. The spread between the cost and the amount charged for the borrowing shows how financial institutions make money. They do not set out trying to figure out how to make money on a defaulted loan. An organization that does plan to make money on a defaulted loan or places borrowers in a position where they can't retire their debt is known as a predatory lender. However, the repayment is big problem to the both parts borrower and lender. To ensure prepayment of the loan, financial institutions consider what is referred to as the four Cs of lending: Credit, Collateral, Cash flow, and Character. The credit component is concerned with the borrowing and repayment history of the borrower. Financial institutions like to see that the borrower has borrowed money in the past and has made timely payments. A history of borrowing and prompt payments indicates to lenders that the borrower takes his obligations seriously.

3.1.7.1.2 Corporate bonds

The second type of debt financing is corporate debt or bonds. A bond is a security sold to an investor. It is a contractual obligation between the issuer and the holder. The issuer promises to make interest payments to the holder at specific dates and to return the principal at a certain date (maturity). Bonds must be registered with the securities and exchange.

3.1.7.1.3 Trade debt

Trade debt financing is a fancy phrase for extending accounts payable. The objective here is to delay payment of the payables beyond the sales and accounts receivable collection cycles. At first glance, this method of financing appears to be a cheap source of money. However, be aware of two concerns. Many vendors offer prompt-pay discounts, often between 1 percent and 3 percent of the bill. Ignoring this discount can cost the client an additional 12 percent to 36 percent per year.

3.1.7.1.4 Customer deposits (Retainers)

Customer deposits are similar in concept to financing the project with trade debt. The difference is that instead of extending trade debt, the project is financed through customer deposits (a type of liability). One example of this type of debt financing would be today's small residential building contractors. Typically such contractors require a payment before beginning work and subsequent payments as construction progresses. Final payment is required on completion (Callahan, et. al, 2007).

3.1.7.2 Factors Influencing Debt Financing

However, there are several factors that influence the debt financing to power projects such as: project risks, demand for funds at the point of time, term of financing, interest rates, and fear of assets and liability mis-match of financial institutions.

3.1.7.2.1 Project risks: risk of the project has the major influence on debt financing in power projects in india. To overcome this problem the projects should prepare thorough plans about all activities before going to aproach creditors. The promoters should get all clearances either statutory or non-statutory, intime. They should convence and take the acceptance from the people at the plant location for land acquisition and they should provide good compensation and other rehabilitation arrangements. This will avoid major risk of the projects.

3.1.7.2.2 Demand for funds at the point of time: it means the demand for debt funds in the market. It also has major influence on the debt availability to handle this problem and to get sufficient of funds intime. The domestic capital market should be developed. An active bond market can increase the flow of long-term funds and reduce reliance on banks.

3.1.7.2.3 Term of financing: generally creditors provide finance for short period of time, but power projects require long term loans. The maturity period of loan influence the interest rate charged by the banks. Interest rates typically rise with loan maturity. To get long term loans at less interest rates project should provide strong security arrangements.

3.1.7.2.4 Interest rates: it is the rate on the amount which is charged by the financial institutions and bankers. The interest rate charged by the lenders depends on both the maturity and risk of the loan. To reduce interest on debt, the promoter's creditworthiness will help.

3.1.7.2.5 Fear of assets & liability mis-match of financial institutions: "Many power projects require long-term financing, when bank provide such funding, they may exposed to a maturity mismatch", (imbalance of assets and liabilities amounts of bankers balance sheet) with this fear banks hesitate to provide loans. To overcome this problem, it is better to take short-term loans and making prompt payment.

However, there is a close relationship among all variables. Interest rates linked with term of financing and demand of funds at the point of time. The term of financing closely relates to assets and liabilities mis-match" of the financial institutions. If the power companies fail to repay the loan especially short-term loans intime, it will lead to the problem of mis-match of assets and liabilities of financial institutions and banks. To reduce the impact of the above mentioned factors on the debt and to ensure debt is freely available to the power project, the government should provide the funds, provide the credit guarantees to get the funds from the creditors and remove the sectoral caps of lending to power projects. To attract commercial loans and private sector investment, the government should take policies that will improve the investment climate and reduce the risks which affect the projects.

3.2 SOURCES OF FINANCING

Financing sources includes equity (permanent capital), debt (temporary capital), and mezzanine finance (quasi-equity) are main sources for financing in infrastructure projects. Equity has the lower rank and the last claim on the assets and cash flows of the project. Debt is often structured in the form of senior debt or subordinated debt. Senior debt has higher priority than all other claims on project cash flows and assets.

Subordinated debt ranks behind other unsecured loans in payment obligations (Zhang, & M.ASCE et.al, 2005).

Debt come from all India financial institutions (AIFIs) like PFC, REC, IDFC banks and the corporate debt market, etc. Assuming that the overall funds requirement during Eleventh Plan may be to the tune of Rs. 9,75,000 crore, the total debt required will be about Rs. 6,82,500 crore assuming a debt : equity ratio of 70:30. The debt shall need to be tapped from various domestic and international sources which shall include direct market borrowing, banks and AIFIs, PFC, REC, multilateral/ bilateral credits, ECA/ ECB/ syndicated loans,etc (Garg, 2007).

The other important sources of financing are: fixed rate debt markets they are LIC's quasi - public markets, public pension funds, private pension funds and other financial institutions. International capital market, supplier credits, governmental assistance, world bank loans, inter American development bank, and local sources of capital, IFC and Multi lateral Investment Guarantee Agency (MIGA) (Finnerty, 2007). Innovative financing instruments, such as: simple subordinated debt, convertible debt, debt with stock warrants, and debt with an additional interest payment above the coupon rate contingent upon financial performance exist (Ahluwalia,).

Equity has the lower rank and the last claim on the assets and cash flows of the project. Debt is often structured in the form of senior debt or subordinated debt and Mezzanine finance. It refers to a kind of financial instruments that are primarily in the form of debt but also share some qualities of equity capital. Mezzanine finance includes convertible bonds and preferred stock (Zhang, & M.ASCE et.al, 2005). Infrastructure investments are typically upfront, with a high degree of asset specificity and risky revenue stream stretching many years into the future (Dailami, et.al, 1998). The established Indian companies have successfully raised foreign currency denominated debt from international markets. The counter guarantee from the government helped the sponsors gaining more debt from other financial institutions (Chowdhury, et.al, 2008). The Indian debt market remains dominated by public borrowing, which accounts for 96.02% of the total domestic market borrowings. Private financial institutions and corporate entities constitute just 3.98 percent of the capital mop up from the domestic debt market.

The classification of various sources of project finance is given in Fig 3.4:

Sources of finance

- Promoters Equity
- Debt financing
  1. Commercial banks
  2. Tax free Bonds
  3. Mezzanine Debt
- Mobilizing foreign currency resources
  1. Multilateral agencies
  2. Export credit agencies
  3. Specialised infrastructure funds
  4. Inflows from expatriates
  5. External commercial borrowings
  6. Syndicate credit
  7. Credit enhancements
  8. Line of credit
  9. Foreign currency loans from FI's
  10. International capital markets
  11. Fixed rate Bonds
  12. Floating rate Notes
  13. ADR's / GDR's
  14. Foreign currency convertible Bonds
  15. FII's
  16. Financial swaps
- Official sources of infrastructure
  1. Multilateral development Bonds
  2. Export credit agencies
  3. Investment Insurance
  4. Payment guarantees
  5. co-Financing
  6. Political Risk guarantees
- SEB Bonds
- Others
  1. Subsidies and guarantees
  2. Foreign Aid & Donations
  3. Lease & hire purchase finance by financing Intermediaries
  4. Investment by FII's

Fig 3.4: Classification of Various Sources of Finance in Infrastructure Sector.

The above given sources of financing have their own importance, and the selection of a particular resource depends upon the financing structure and the requirement of funds. In India, almost all sources are used by various projects in different time horizons. Securitization is another kind of financing source to power projects. A key point is that securitization is much more than a mechanism for amortizing stranded costs associated with electric power market restructuring. Rather, it is a generic, widely used, and very powerful financial tool that takes a stream of revenue over time and turns it into a chunk of capital up front. In UK securitization tools and techniques are being employed in a number of different jurisdictions and in a variety of applications to resolve timing issues in finance, as well as to increase leverage or reduce the cost of capital (or both) (George, 2006).

3.3 Risks in Power Project Financing

Risk is the major element in power projects. The investment in power projects mainly depends upon risk profile of the projects. The important risks involved in power projects are:

- Construction risk,
- Operating risk,
- Market risk,
- Interest rate risk,
- Regulatory risk,
- Political risk,
- Technology risk and
- Environmental risk, etc.

Here, the important thing to understand is liberalization has affected the way of financing power plants. After the liberalization different sources of finance are available, due to this the risks are not highly considerable issues while financing projects. At the same time, firms are also seeking new strategies to hedge their risks. However, the development of power projects in India is in a nascent stage and the developers have to face many risks involved in these projects. These risks are generally present in the projects but in India, it needs special consideration, because, credibility to meet the contractual obligations by state owned monopolies (power purchaser, fuel supplier and transporter) is very poor.

Due to the risks the private investments not reached up to the expected level. In India the share of private participation in tenth five year plan for power sector is 31.47 percent, in Eleventh Plan the government estimated 27.83 percent it is 3.64 percent less. The risk should be reduced further to address the problems which are arising in power sector financing.

There are different kinds of risks involved in the power sector companies, some risks are homogeneous some are heterogeneous, which depends upon the conditions, policies, investment decisions of the power companies. The study considered only selected risks which are mainly influencing the selection of financing methods, they are:

3.3.1 Construction Risk**:** Construction risk refers to unexpected developments during the construction period that lead to time and cost overruns or shortfalls in performance parameters of the completed project. It relates to delays in completion and cost overruns. Construction delays may be caused by technical difficulties, by poor management, or by a combination of both. Apart from this, the land expropriation & acquisition problems, default by concession company, late design changes, poor quality of workmanship, excessive contract variations are the other reasons. Sometimes this risk arises due to the non availability of the funds at right time and at the right amount.

Construction cost overruns can be mitigated by contractual undertakings, e.g. the infusion of additional equity by the project sponsor, other equity participants, or standby equity participants. Completion guarantees should be arranged for reducing pre-completion risks. Fixed price lump sum contract reduce the likelihood of cost overruns being the responsibility of the project company. For the projects which are establishing costal belt proper soil test should be made.

Project sponsors can shift a portion of the construction risk to the contractor through Engineering, Procurement, and Construction (EPC) contracts that provide for turnkey responsibility, with penalties for delays and shortfalls in performance parameters of the plant on completion.

The contractor is the company (or consortium of companies) that wins the tender for the design and construction of a given plant on the basis of a fixed-price turnkey contract, often known as EPC—Engineering, Procurement, and Construction. Contract obligations are taken on by the main contractor (who commits directly to the SPV) and are later passed on to consortium members. Among these players, there may also be an operator or operation and maintenance contractor who steps in after construction is complete.

The main contractor is normally responsible for damages resulting from delays in completing the facilities. In addition, the contractor is required to pay penalty fees (liquidated damages) if the plant does not pass performance tests on certain key variables at guaranteed levels (Gatti, 2008 pp8).

3.3.2 Operating Risk: Operation risk relates to the cost of operating the completed facility. Operating risk is usually low for infrastructure projects that rely on a tested technology, as is the case with most power plants. Protecting a reliable fuel supply or dispatch priority, the benefits are significant in operating risk. Once the project has been completed and is demonstrated to be operating to specification, a new risk phase begins that of long-term operation. The operating risks can be shared through long term supply contracts for necessary raw material supply at a predictable price and by arranging take-or-pay contracts and take-and-pay contract. An O&M contract with an experienced operator provides the greatest comfort to lenders in this respect, especially if this is with a sponsor.

3.3.3 Technology Risk: it arises due to the breakdown of the technology used in the project. Even if the project passes its performance tests, there may still be concern about the long term risks if it involves new technology. Lenders are always reluctant to lend against a project that is using new and untried technology, whose performance cannot be checked against existing references. The problem is that the new technology risk is unquantifiable and cannot be covered from the EPC contractor. It can be handled by the proper contractual arrangements with the technology producer.

3.3.4 Regulatory Risk: Regulatory risk arises due to regulatory actions. The projects interface with various regulatory authorities throughout the life of the project, making them especially vulnerable to regulatory actions. In general, regulatory risk is best handled by establishing strong and independent regulatory authorities that operate with maximum transparency of procedures within a legal framework that provides investors with credible recourse against arbitrary action. Apart from this, the vendor should implicitly accept to bear it by signing up a turnkey contract without provision of revision of the price in case of unanticipated regulatory difficulties.

3.3.5 Political Risk: Infrastructure projects have high visibility, and there is always a strong element of public interest. This makes them vulnerable to political action that can interrupt or upset settled commercial terms. These risks can be partially mitigated through political risk insurance offered by multilateral organizations, such as: the multilateral investment guarantee agency, or bilateral investment protection agreements.

The insurance is available for political risk. Such insurance has been a prominent aspect of risk engineering in large infrastructure deals both for the benefits of direct insurance coverage and from the perceived value of an endorsement from the public insurers (Fight, 2006).

3.3.6 Environmental Risks*:* The environmental issues of a project may raise various contractual, legal, and wider political risks. The possibility of pre-existing pollution at the site will be an issue under the EPC contract, and the EPC contractor is of course required to construct the project to meet environmental standards on emissions, etc. The promoters should take all necessary precautions for reducing pollution and other hazards in that location with the help of advanced technology. They should develop the green belts surrounding the projects, promoters should adopt ash management techniques including filling empty coal mines with bottom ash can reduce the burden of ash.

3.3.7 Fuel Supply/ Input Supply Risk: Fuel or raw materials are likely to be the main operating cost for a project selling an output product (as opposed to providing a service), whether under an off-take contract or into the open market. Security of the input supplies, on an appropriate pricing basis, is therefore an important building block for any type of financing in the project. Usually it can be handled by arranging a long-term input supply contract with the input suppliers.

3.3.8 Financial Risk: It arises due to the inefficient strategies which are using to design the capital structure of the project. The reasons for high level of this risk are: increase in interest rates, fluctuations in currency exchange rates, inflation, and bankruptcy of project partner. To reduce the interest rate risk the projects should take large amount of funds for a long period of funds. The promoters should increase their credit worthiness which helps to get loans at a cheaper rate. Apart from this by using futures, forward and swap contracts this risk can be reduced.

- ***Futures contracts:*** In a project financing, interest rate futures can be used to protect against funding costs and currency future to protect against foreign exchange rate fluctuations.

- ***Forward contracts:*** Forward contracts on foreign exchange are used for hedging existing or anticipated currency exposures. Long term foreign exchange agreements can be used by project companies for managing the currency risk arising from multi currency transactions.
- ***Options:*** A call option gives the buyer a maximum price (the strike price) and a put option gives the buyer a minimum price (the strike price) at which the underlying product can be sold. Project companies can therefore, use calls and puts to control input and output prices. The cost of this protection naturally is equal to the option price.
- ***Swaps:*** Swaps can mitigate financial risks. There are currency swaps, interest rate swaps and commodity swaps. An interest rate swap can create a source of lower cost debt or higher yielding assets, and provide access to an unavailable source of funds. A commodity swap can be used to manage the price risk of the outputs and inputs for a project.

3.3.9 Force Majeure Risk: A force majeure event is something that affects the ability of one party to fulfill its contract, but which is not the fault of, and could not reasonably have been foreseen by, that party. If the product or service is not being delivered because of force majeure, no payments are due from the off-taker or contracting authority. A party subject to force majeure remains liable to make any monetary payments due under the contract. If force majeure makes it permanently impossible for the contract to be carried out, it is canceled (Yescombe, 2002).

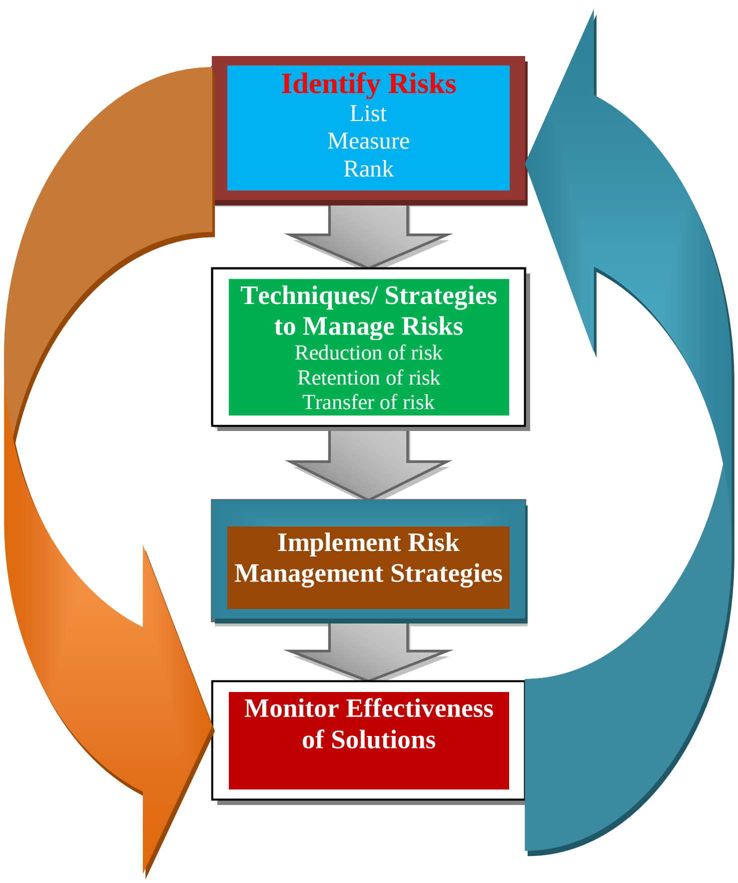
3.4 Strategies to Handle the Risk

There are some major risks which are identified and described by various project participants such as: financial, construction, technology, environmental, regulatory risks etc. These risks are not common to all kinds of projects; it varies from project to project based on its size. These risks cause for several problems in the projects. Therefore, the risks should be reduced or minimised in the project. To mitigate these risks a separate risk mitigating structure should be developed by each project.

3.4.1 Risk Mitigating Mechanism**:** risk sharing is an important way of reducing the risk of power projects. Once the projects risks are identified, the likelihood of its occurrence assessed and its impact on the project determined, the sponsor must allocate those risks to the parties involved in the project. The risk management options are: absorb the risk, lay off the risk with third parties, (such as: insurers, and allocate the risk among contractors and lenders) and retention of risk. However, for the successful implementation of power projects the risk allocation is necessary. It will also mobilize capital for power sector investment. In reality, risk allocation is based on the negotiating power of the different parties.

3.4.2 Risk Mitigating/Management Model

The project should identify the risk mitigating measures. The important techniques/ strategies to manage risks are reduction of risk, retention of risk and transfer of risk. The risk mitigating framework designed by IAEA given in Figure: 3.5.



Source: IAEA (2001)

Fig 3.5: Risk Mitigating/Management Framework

The above diagram shows the risk management frame work of power projects. It consists of risk identification, risk managing strategies and risk monitoring. In the first step, risks should be listed. It means identifying various kinds of risks involved in the project. Then, measuring the level of risk; it is nothing but quantifying the risk. Finally, ranking the all risks based on level of existence. The second step includes identifying risk mitigated techniques or strategies such as: reduction of risk, retention of risk and risk transfer. Reduction of risk involves at least two dimensions. The first one is to reduce the likelihood (or frequency) that an event occurs and second, to reduce the consequences of an event, if it does occur.

Retention of risk**,** as the business evolves, the owner identifies sources of risk that can be reduced or transferred to others, but a degree of risk inevitably remains. This risk may be understood by the owner and accept as being reasonable tradeoffs for the possibilities of high returns. In fact this 'accepted' or retained risk is the real reason that owners are involved in the business in the first place. It should be recognized that risk could actually be increased in a particular process by the actions taken to reduce risk in some other projects. This would also create unintentional retention of risk. Reduction of unintentional retention of risk is one of the underlying goals of step one in the risk management framework presented in figure 3.5. The unintentional retention of risk basically bypasses the risk management process and rational decision-making.

Risk transfer means that the original party exposed to a loss is able to obtain a substitute party to bear the risk. These transfers occur by contract, through the use of financial market instruments, or by terms and conditions of sale and delivery of products and services. In some cases, the degree of risk is reduced through a transfer if the risk-accepting party has portfolio effects, such as for insurance contracts where a pooling of risk takes place.

The important aspect of the monitor and feedback process is explicit recognition of where the responsibility lies for overseeing the risk management program. Use of diagnostic information and reporting systems, coupled with regular in-house risk management meetings and periodic reviews by outside experts will help ensure that company risk management policies are followed in general (IAEA 2001).

Another model of risk mitigation for public and private partnership method of financing is given below. Public private partnership is an important method, but it involves high level of risk. However, to mitigate the project risk, mutual understanding between public private parties is required. The mechanism of public and private risk sharing is given below.

3.4.3 Private Sector Risk Sharing Mechanism

The private sector risk arises due to several factors such as: project specific, country specific and sector specific. However, private party retains the primary liability for the risk under the contract.

3.4.3.1 Pass through to third parties: Builder bearing the construction/completion risk, facility operator bearing operating risk, material supplier bearing input quality risk, market/demand risk with financiers, etc.

3.4.3.2 Insurance: It covers issues of project risk, like, owner's liability, some force majeure events, owner's asset risks, business interruption, some policy risks such as convertibility of local currency, etc.

3.4.3.3 Financial market instruments: These instruments mitigate risks which arising from inflation, interest rates, foreign exchange rates, etc.

3.4.3.4 Diversifying project portfolios: Premiums accumulated from unmaterialized risk on one project may sustain liabilities accumulated when risk materializes on another

3.4.4 Public Sector Risk Sharing Mechanism

3.4.4.1 Research before issuing tenders: The research is made through specify desired project outcomes, taking account of government policy, apply 'public interest' test to the project, ensure legal ability to contract with the private party, construct the 'public sector comparator' to determine the factors (such as infrastructure and service delivery options, technologies available etc) which constitutes value for money. Identifying and facilitating necessary government approvals is another step in this research. Those approvals are, planning, environmental, land related, etc. Then problems of land acquisition should be anticipated. If any problem arises while acquiring land that should be identify and resolve.

***3.4.4.2 Strategic planning, development of regulatory framework*:** They are strategic long term industry planning and development of economic regulatory framework.

3.4.4.3 Follow best practice tender and evaluation procedure: Those procedures need to develop a clearly defined bid criterion, create a framework to handle probity issues, construct clear and informative bid documents, which enable bidders to assess risk so that they may quantify and price that risk and adopt appropriate evaluation procedure to ensure bids financially robust. So that bidders may avoid aggressively valuing the risk, simply to win the bid. Thereby, they compromise for long term value for money.

3.4.4.4 Reducing scope for unintentional risk take-back: This is through preventing unnecessary involvement by government in the design and construction or in the ancillary service delivery processes and care during contract monitoring stage to prevent any take-back of operating risk.

3.4.4.5 Insurance: To the extent possible cover through insurance, where it represents good value for money.

3.5 Conclusion

The method of financing is very important to attract the investments and to reduce the risk of the projects. Various methods are used to financing power projects. All methods are not similar to the projects which are in various sizes. According to the size of the project the risk may be changed. To mitigate the risks a suitable method of financing is required to each project. From this part of the study it is identified that, project finance is suitable to mitigate the project risk in India. However, equity & debt method is also used in enormous way. This chapter provided the details of various financing methods, its suitability and its advantages. The suitability of the financing method depends upon how a particular method is good in reducing the project risk. This study identified various sources of finance which are used for power projects. Among all debt is found as enormously used source in India. In fact, the selection of these sources mainly depends upon its cost of capital and risk involved in the projects. This part of the study also provided the risk sharing mechanism models for allocating or mitigating the risks to various parties involved in the project. However, the selection of appropriate method of financing (based on the pros and cons of the financing methods) is required to the promoters to be used in the project, to reduce the risk.

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CHAPTER-IV

INDIAN POWER SECTOR - OVERVIEW

4.0 Introduction

India ranks as world's sixth energy consumer accounting for about 3.5 percent of the world's total annual energy consumption, but, per capita consumption of energy is very low at 631kwh as compared to world consumption of 2873 kWh, which needs to be increased to meet the goals of economic and social development. To increase the per capita consumption the Indian government need to extend its help to 600 million Indians access to electricity usage, which are still not having electricity at all. Here the fact is 80% of Indian villages have at least an electricity line, moreover just 44 percent of rural households does not have access to electricity because of various reasons. These things lead to cap the generation capacity of utilities in India where the enough resources are available to generate required amount of power. If it is seen India's electricity generation growth rate is 6.7 percent p.a, which is far below than the developed countries. (wikipedia.org/wiki/Economy_of_India).

There is lot of opportunities to explore in power generation to tap these opportunities several hurdles should be overcome. Political, environmental, economical, technical and financial factors stand as hurdles to explore the available opportunities in power sector. To overcome these factors government should take policy initiatives and provide incentives to developers. However, power has a characteristic of commercialization; it is an inherent advantage to it. This advantage made the current state of the power sector as an extremely vital for major support to the growth of the Indian economy, significantly faster than in the past, and also it made the power sector to account for 10 percent growth or more than of it to support the expected GDP growth rate of around 9 percent per annum. Presently the power sector contribution to Indian GDP is 2.4 percent p.a, it is expected to increase at a significant level.

4.1 Present Scenario of Power Sector

The development of power sector in India was witnessed from 1897, when the first power project of 265 KW was set up. Since then, the power sector has come a long way having crossed 100,000 MW generation capacities in the year 2006. India‘s power generation capacity (excluding captive) stood at 1,32,329 MW in March 2007. Over 55 percent of the capacity lies with the state-owned utilities, while central utilities hold 34 percent of the capacity, private sector contributes the remaining 11 percent. In the total power generation thermal power is 86,015 MW, hydro power is 34,654 MW, nuclear power is 3,900 MW and non- conventional energy is 7,761MW. During the 10th plan a mere 51.52 percent of the original target of 41,110 MW was achieved. Plan wise growth of the electricity generation can be seen from Annexure-II.

The Indian government made a step for restructuring the sector and formulated important electricity acts such as: the Indian Electricity Act, 1910, the Electricity (supply) act, 1948 and the Electricity Regulatory Commissions Act, 1998. The Electricity Act 2003, enacted by the parliament of India. The main features of the Electricity Act 2003 are: private transmission licensees, distribution licensees would be free to undertake generation, transmission at the central and state level. Generation is being delicensed and captive generation is freely permitted. This leads to the involvement of private sector into the power projects to increase the investment (GOI, 2005b).

Regarding the investment the International Energy Agency (IEA) estimates that India would require US $665 billion as investments in the power sector during the period 2001-2030. However, the power sector has been suffering from serious problems which were identified as much as ten years ago. Though a number of corrective measures have been taken, they have yet to yield the desired results. The major hurdle for the fast growth of the sector is that no state electricity board is recovering the full cost of power supplied with the result that makes continuous losses on their total operations. These losses cannot be made good from state budgets, which are themselves under severe financial strains, and the result is that the SEB’s are starved of resources to fund expansion and typically end up even neglecting essential maintenance. The annual losses of SEB’s at the end of ninth plan are estimated at Rs 24,000 crores.

According to the National Electricity Policy, total village electrification is to be made by 2010. Peak demand at the end of Eleventh Plan and Twelfth Plan is projected as 1, 57,107 MW and 2, 12,759 MW respectively. The government has taken an initiative for facilitating the development of few ultra mega power projects of about 4000 MW capacity each under tariff based competitive bidding route using super critical technology and also merchant power plants. More than 80,000 MW of new power capacity is currently under construction in India. Most of this capacity addition will see the light of day in the 12th five-year plan beginning April 2013. The 12th Plan envisages a total capacity addition of nearly 1,00,000 MW. At present, the installed power capacity from all sources of power is a little over 1,80,000 MW. The coming five-year plan target will require investment of Rs.1 trillion ($230 billion), the same as the investment for the ongoing 11th plan period (2007-2012).

4.2 History

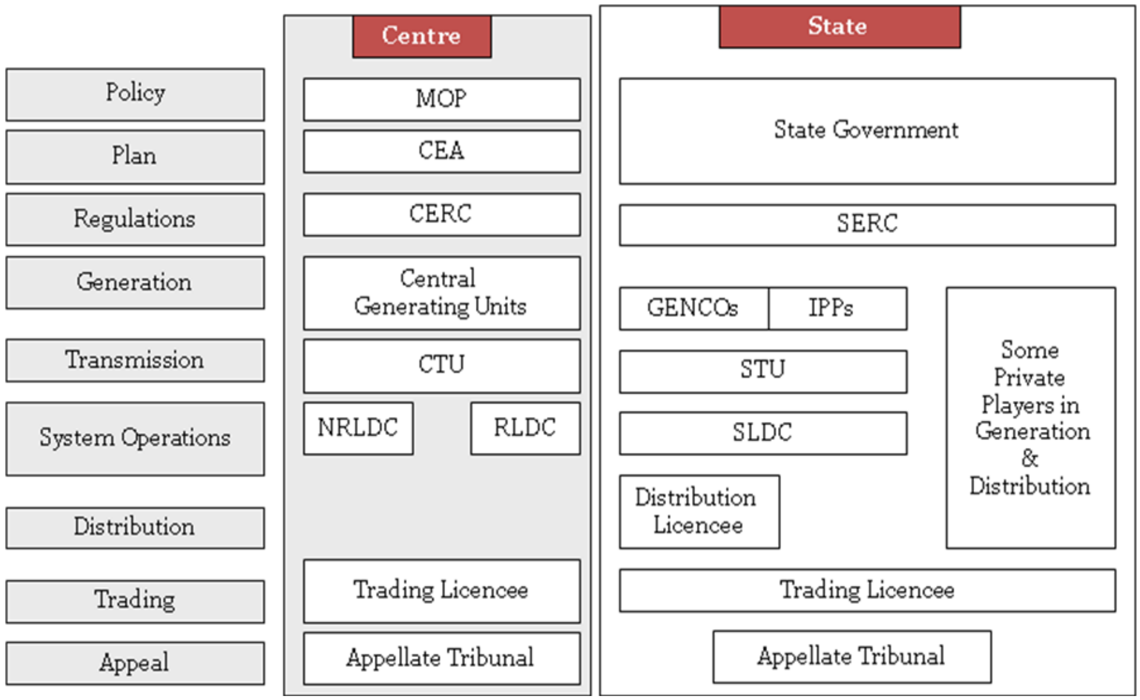
At the time of independence in 1947, India had power generating capacity of a 1,362 MW. Power was not available in villages or rural areas, and only a few urban centers had electricity. Generation and distribution of power was carried out primarily by private utility companies. After independence, electricity was made subject to the concurrent jurisdiction of the state and central governments, although parliament was given the ability to exercise pre-emptive power. The electricity (supply) act, 1948 of India (the "electricity supply act") created the institutional framework under which the industry was developed. In the mid 1970s, it was recognized that relying solely on the SEBs for power development was leading to power shortages and large inter-state imbalances, particularly in light of the uneven distribution of coal and hydroelectric resources throughout the country. To supplement the efforts of the states, the central government increased its role in the generation and transmission of power. NTPC and National Hydro Power Corporation, Ltd. (NHPC) were created in 1975 by the central government to establish thermal and hydro generating plants and to install associated interregional transmission systems. In the same year, the Central Electricity Authority (CEA) was established in its present form to develop a uniform national power policy. Additional power generating companies were established later.

The Electricity Act 1948 was enacted to give direction to the development of the electric power industry and resulted in the creation of the central electricity authority to oversee this development. The electricity act, notably its emphasis on state control over the industry continued unchallenged till the 1980s, due to a combination of an ideological commitment to socialism and the emergence of interest groups, especially the beneficiaries of huge power subsidies, who were predominantly part of a politician-bureaucrat-industrialist-rich farmer nexus.

The first signs of change in the policy regime with regard to the power sector emerged in the early 1980s, ironically under the stewardship of Indira Gandhi. The result was the acceptance that private sector participation would have to be encouraged if India was to save off a serious power crisis that not only dampened India’s growth prospects, but actually threatened to cripple the economy. This process of liberalisation gained further momentum in the mid 1980s under the leadership of Rajiv Gandhi, whose vision for India’s development was driven by rapid assimilation of modern technology, which required the dismantling of administrative controls over the economy, widely viewed as obsolete.

It is not particularly well known that in India, reforms in the power sector were actually initiated before those in the telecom sector. If progress in the subsequent implementation of power sector reforms has not been as smooth as with telecom, it is largely for reasons discussed above. The most visible manifestation of the new liberalised environment during the 1980s was the invitation to foreign power producers (called independent power producers –IPP–) to set up power plants in the country. The arrangement was for the IPPs to sell power to the State Electricity Boards (SEBs) at a unit price adjusted for cost of capital and exchange rate risks, especially since much of the fuel used was to be imported (Anantaram, 2010).

4.2.1 Structure of the Power Sector



Source: Anantaram, 2010

Fig 4.1: Structure of Power Sector in India.

4.2.1.1 Central Electricity Authority (CEA)

CEA is a statutory body constituted by the central government under the erstwhile Electricity (supply) Act, 1948 and continued under the electricity act, 2003 (which has since repealed inter alia the E(S) act, 1948). The authority has the responsibility of formulating the national electricity plan in accordance with the national electricity policy, once in five years. CEA remains the main technical advisor of the government, the regulatory commissions. It is also required to specify inter-alia the technical standards and safety requirements for construction, operation and maintenance of electrical standards and electrical lines.

4.2.1.2 Appellate Tribunal for Electricity

Under the provisions of section 110 of the electricity act, 2003, the appellate tribunal for electricity has been established at Delhi which will hear appeals against the orders of the adjudicating officer or the appropriate regulatory commission under the act. The tribunal has become operational from 21st July, 2005.

4.2.1.3 Central Electricity Regulatory Commission (CERC)

CERC is a statutory body constituted under the provision of the erstwhile electricity regulatory commissions act, 1998 and continued under electricity act, 2003 (which has since repealed inter alia the ERC act, 1998). The main functions of the CERC are to regulate the tariff of generating companies owned or controlled by the central government, to regulate the tariff of generating companies other than those owned or controlled by the central government, if such generating companies enter into or otherwise have a composite scheme for generation and sale of electricity in more than one state, to regulate the inter-state transmission of energy including tariff of the transmission utilities, to grant licences for inter-state transmission and trading and to advise the central government in formulation of national electricity policy and tariff policy.

4.2.1.4 State Electricity Regulatory Commission (SERC)

The SERC as a statutory body responsible for determination of tariff and grant of license at intra-state level was envisaged in the erstwhile Regulatory Commissions Act, 1998 and has been continued in the Electricity Act, 2003 (which has since repealed inter alia the ERC act, 1998). Main responsibilities of the SERC are to determine the tariff for generation, supply, transmission and wheeling of electricity, whole sale, bulk or retail sale within the state; to issue licences for intra-state transmission, distribution and trading; to promote co-generation and generation of electricity from renewal sources of energy etc.

4.2.1.5 Central Transmission Utility (CTU)

CTU as a statutory body was conceived in section 27 A of the erstwhile Indian electricity act, 1910 and has been retained in the electricity act, 2003 (which has since repealed inter-alia the Indian electricity act, 1910). The functions of the CTU are to undertake transmission of energy through inter-state transmission system and discharge all functions of planning and coordination relating to inter-state transmission system with state transmission utilities, central government, state governments, generating companies, etc.

4.2.1.6 State Transmission Utility (STU)

STU as a statutory body was conceived in section 27 B of the erstwhile Indian Electricity Act, 1910 and has been retained in the Electricity Act, 2003 (which has since repealed inter-alia the Indian Electricity Act, 1910). The functions of the state transmission utility are to undertake transmission of energy through intra-state transmission system and discharge all functions of planning and coordination relating to intra-state transmission system with central transmission utility, state governments, generating companies, etc.

4.2.1.7 National Load Dispatch Centre (NLDC)

The Electricity Act, 2003 has provided for constitution of the national load dispatch center for optimum scheduling and dispatch of electricity among the regional load dispatch centers. The constitution and functions of NLDC are being notified by the central government.

4.2.1.8 Regional Load Dispatch Centers (RLDC)

Section 25 of the electricity act, 2003 requires the central government to make regional demarcation of the country for the efficient, economical and integrated transmission and supply of electricity and in particular to facilitate voluntarily inter-connection and co-ordination of facilities for the inter-state, regional and inter-regional generation and transmission of electricity. To ensure integrated and power system in each such region, the Regional Load Dispatch Centre (RLDC) has been envisaged as an apex body. The RLDC is responsible inter-alia for dispatch of electricity within the regions, monitoring grid operations, etc.

4.2.1.9 State Load Dispatch Centers (SLDC)

Corresponding to the RLDC which is operate at the regional level, the SLDCs functioning at the state level with the responsibility of ensuring integrated operations of the power system in state (Ministry of Power).

4.3 Recent Developments in Power Sector

To supplement public sector investment, the government took steps in 1991 to attract private investment in the power industry. The government permitted 100% foreign ownership of power generating assets and provided assured returns, a five-year tax holiday, low equity requirements, and for some private generators, counter-guarantees against non-payment of dues by SEBs.

In 1992, the central entity known today as the Power Grid Corporation of India Limited (POWERGRID) was established to construct, operate and maintain inter-state and interregional transmission systems. These entities are collectively referred to as the Central Power Sector Utilities (CPSUs) and are directly accountable to the ministry of power (MoP). The other companies under the direct control of the MoP are the Power Finance Corporation (PFC) and the Rural Electrification Corporation (REC). The Power Trading Corporation of India limited (PTC) was formed in 1999 to allow surplus power supplies to be efficiently traded to utilities with deficit power supplies.

The Electricity (supply) Act, 1948 of India created the institutional framework under which the industry was developed, which was not substantially modified until the recent formulation of the Electricity Act, 2003 (the EA 2003). The Supply Act led to the creation of the SEB’s state government agencies with the sole responsibility for generation, transmission and distribution of electricity within each state. Most states established SEB's; the smaller states and union territories, established Electricity Departments (ED’s) to manage and operate power systems. The Ministry of Power (MoP) and the ministry of non-conventional energy sources of the government are primarily responsible for the development of the power industry in the country. The MoP is responsible for overseeing India's power industry. Its duties include perspective planning, policy formulation, monitoring the implementation of power projects, training and manpower development and the administration and enactment of legislation in regard to thermal and hydro power generation, transmission and distribution.

However, these reforms still did not address the problem of poor financial health of the SEBs, and power shortages persisted. Transmission and Distribution (T&D) losses were high, due to inadequate metering, obsolete equipment, and theft. T&D losses were estimated to be 32.9 percent on average for the nation in fiscal year 2001. The government introduced the Accelerated Power Development and Reforms Programme (APDRP) in fiscal 2001. In order to improve the financial health of the SEBs, the government implemented the scheme for one time settlement of outstanding dues (the "one time settlement"), which settled the outstanding dues of the SEBs payable to the CPSUs, and set up a system to facilitate the full payment of subsequent billings. Most recently, the EA 2003 was adopted, which consolidated all existing laws governing the industry, created a program for restructuring the SEBs, and introduced greater competition and access into certain segments of the industry.

4.4 Reform Status key Developments

1. In 1991, to supplement public sector investment, the government permitted 100 percent foreign ownership of power generating assets and provided assured returns, a five-year tax holiday, low equity requirements, and for some private generators, counter-guarantees against non-payment of dues by SEBs. As a consequence, since 1991, a total capacity of around 7400 MW from 37 private power plants has so far been commissioned. Another capacity of around 4500 MW from 12 projects is reported to be under construction.
2. However, these reforms still did not address the poor financial health of the SEBs, and power shortages persisted. Transmission and distribution ("T&D") losses, estimated to be 32.9 percent on average for the nation in fiscal 2001, were especially high, due to inadequate metering, obsolete equipment, and theft.
3. In 2001, the government introduced the accelerated power development and reforms programme ("APDRP") to bring down T&D losses to 10 percent through various central, state and local level initiatives and to improve the performance of generating stations through renovation and modernization.

4. In order to improve the financial health of the SEBs, the government implemented the scheme for one time settlement of outstanding dues (the “one time settlement”), which settled the outstanding dues of the SEBs payable to the CPSUs, and set up a system to facilitate the full payment of subsequent billings.
5. Most recently, the EA 2003 was adopted, which consolidated all existing laws governing the industry, created a program for restructuring the SEBs, and introduced greater competition and access into certain segments of the industry.
6. The ministry of power has also stated a goal ‘mission 2012: power for all’ to achieve objective of having reliable, quality power at optimum cost that is commercially viable to achieve a GDP growth rate of 8 percent.
7. There has been a 35 percent reduction in SEB losses since FY01, generation companies are now recovering 100 percent of their dues and capacity addition during the tenth plan is expected to be 92 percent of target.
8. The government has announced major policy initiatives like national electricity policy and draft national tariff policy.

In the reform scenario some important enactments of power sector are given below.

- The Orissa Electricity Reform Act, 1995 (Orissa Act no. 2 of 1996)
- The Haryana Electricity Reform Act, 1997 (Haryana Act no. 10 of 1998)
- The Andhra Pradesh Electricity Reform Act, 1998 (Andhra Pradesh Act no. 30 of 1998)
- The Uttar Pradesh Electricity Reform Act, 1999 (Uttar Pradesh Act no. 24 of 1999)
- The Karnataka Electricity Reform Act, 1999 (Karnataka Act no. 25 of 1999)
- The Rajasthan Electricity Reform Act, 1999 (Rajasthan Act no. 23 of 1999)
- The Delhi Electricity Reforms Act, 2000 (Delhi Act No.2 of 2001)
- The Madhya Pradesh Vidyut Sudhar Adhiniyam, 2000 (Madhya Pradesh Act No. 4 of 2001)

4.4.1 The Electricity Act 2003

An act to consolidate the laws relating to generation, transmission, distribution, trading and use of electricity and generally for taking measures conducive for the development of electricity industry, promoting competition therein, protecting interest of consumers and supply of electricity to all areas, rationalization of electricity tariff, ensuring transparent policies regarding subsidies, promotion of efficient and environmentally benign policies, constitution of central electricity authority, regulatory commissions and establishment of appellate tribunal and for matters connected therewith or incidental thereto (Ministry of Law and Justice, the Electricity Act, 2003).

The Electricity Act 2003 (EA 2003) was approved by the Indian parliament in May 2003 and notified with effect from June 2003. The EA 2003 is a central unified legislation and seeks to replace the multiple legislations that governed the Indian electricity sector. The EA 2003 consolidates all the existing legislations and provides for further material reforms in the sector. The most significant reform initiative under the EA 2003 is the move towards a multi buyer, multi seller system as opposed to the current structure which permits only a single buyer to purchase power from generators. In addition, under the EA 2003, the regulatory regime is more flexible, has a multiyear approach and allows regulatory commission's greater freedom in determining tariffs, without being constrained by rate-of-return regulations. Under the EA 2003, the penal provisions for dishonest use of electricity have been tightened and special courts have been envisaged for speedy dispensation of justice.

The main objective of this act is to introduce competition, protect consumer's interests. The act provides for national electricity policy, rural electrification, open access in transmission phased open access in distribution, mandatory SERCs, license free generation and distribution, power trading, mandatory metering and stringent penalties for theft of electricity.

It is a comprehensive legislation replacing Electricity Act 1910, electricity supply act 1948 and electricity regulatory commission act 1998. The aim is to push the sector onto a trajectory of sound commercial growth and to enable the states and the centre to move in harmony and coordination.

The Electricity Act 2003 had a positive effect on the entire sector, including generation. Overall, this legislation has liberalized generation and freed it from licensing. The requirement of techno economic clearance has been removed. In addition, the recently announced national tariff policy makes it mandatory that all future requirements of power should be produced through a competitive bidding mechanism instead of cost-plus route. (www.indiainbusiness.nic).

4.4.1.1 The Salient Features of the Electricity Act

1. 'Unbundling' the generation, distribution and transmission of power sector.
2. Complete liberalisation of the generation sector to allow private sector participation.
3. Removal of FDI limits on generating companies and capital equipment manufacturing companies, with the result that 100 percent equity participation is permitted.
4. Permitting 'open access' whereby consumers above 1 MW of power could choose their own suppliers and power producers were allowed to sell beyond provincial markets in an effort to create a nation-wide market for power.
5. Permitting 'merchant sales' whereby power producers could sell excess power over and above what was contracted to SEBs, at market determined rates.
6. Regularising the supply chain, especially for coal, whereby thermal power producers could enter into binding long term arrangements with domestic coal producers. Import of fuel and feedstock were also liberalised as were foreign exchange regulations for domestic power producers seeking to augment supplies by purchasing coal mines or rights in oil and gas fields abroad.

Reactions to the electricity act have been mixed with critics arguing that the legislation did not go far enough, especially in enacting the radical reform that was needed to pull the Indian power sector out of its low growth rate trap that had hobbled it for the past five decades. On the other hand, its proponents argued that any reform in a sector as sensitive as the power sector in India can only be incremental and point to the tremendous obstacles that power sector reform has had to face, even 12 years after sweeping reforms were enacted in the rest of the economy.

4.4.2 The impact of the new legislation and the way forward

While the legislation enacted was certainly forward looking, responses from the private sector have followed a wait-and-see approach, given India's long autarchic tradition, characterised by a high level of government control over the economy and the recent experiences of IPPs in India during the 1990s. However, the green shoots of private sector participation (both Indian and foreign) are beginning to emerge, especially in the power equipment sector, where India is seen as being among the two most promising markets in the world, along with China (Anantaram, 2010).

4.5 Regulatory Controls

In India, control over the development of the power industry is shared between the central and the state governments. The ministry of power is the highest authority governing the power industry in India. The CEA, a statutory organization constituted under the electricity supply act, is the technical branch of the ministry of power assisting in technical, financial and economic matters relating to the electricity industry. The CEA is responsible for giving concurrence to schemes involving capital expenditure beyond a certain limit as fixed by the government from time to time, and it is also responsible for the development of a sound, adequate and uniform power policy in relation to the control and utilization of national power resources. The central electricity regulatory commission constituted under the electricity regulatory commission act 1998 is an independent statutory body with quasi-judicial powers. Its main functions include the formulation of policy and the framing of guidelines with regard to electricity tariffs. Several states have set up state electricity regulatory commissions (SERCs) and others are in the process of setting them up. The SERCs are engaged in regulating the purchase, distribution, supply and utilization of electricity, tariff and charges payable, as well as the quality of service. State governments have set up state electricity boards at the state level, which are responsible for ensuring that the supply, transmission and distribution of electricity in such states is done in the most economical and efficient manner. These state electricity boards are required to coordinate with power generating companies, as well as the government entities that control the relevant power grids. Some states have amalgamated their respective state electricity boards to form regional electricity boards, to ensure that the electricity supply, transmission and distribution policies are consistently applied. Private sector companies operating in the electricity supply, transmission and distribution industry report to the ministry of power, as well as their respective state electricity boards and their state electricity regulatory commissions.

4.6 Recent Policy Initiatives

The government has formulated several policies for the development of the power sector in India. The important policies are given below.

4.6.1 National Electricity Policy

The national electricity policy aims at achieving the following objectives:

- Access to electricity - available for all households in next five years.
- Availability of power - demand to be fully met by 2012. Energy and peaking shortages to be overcome and adequate spinning reserve to be available.
- Supply of reliable and quality power of specified standards in an efficient manner and at reasonable rates.
- Per capita availability of electricity to be increased to over 1000 units by 2012.
- Minimum lifeline consumption of 1 unit/household/day as a merit good by year 2012.
- Financial turnaround and commercial viability of electricity sector. (www.indiainbusiness.nic)

4.6.2 Foreign Direct Investment Policy

Automatic approval (RBI route) for 100 percent of foreign equity is permitted in generation, transmission, and distribution and trading in power sector without any upper ceiling on the quantum of investment. During the period April 2000 to April 2009, power sector has been able to attract FDI amounting to US $ 3.23 billion.

4.6.3 Mega Power Policy

In October 1998, the government announced a policy aimed at utilizing economies of scale and producing power at the most economical locations. Under this policy, subject to satisfying certain conditions, thermal power projects with a capacity of 1,000 MW and above (or hydro projects with a capacity of 500 MW and above) and selling power to more than one state are granted “mega power project” status, and allowed certain fiscal benefits, such as the duty-free import of capital goods and a ten-year income tax holiday. Mega power projects in both the public and private sectors can avail of the benefits of this policy. An Inter-Institutional Group (IIG) comprising senior representatives from the lenders and ministry of power has been constituted to jointly appraise such projects and facilitate financial sanction in a time bound fashion. Nineteen power projects with a total capacity of about 14,000 MW have since achieved financial closure and they are in operation. A green channel has been constituted in the ministry of power to facilitate statutory clearances for the developers.

4.6.4 Independent Power Projects (IPP’s) Policy

The power sector in India could best be described as characterised by policy stasis between 1947 and the mid 1980s. Even the decision to invite IPPs to set up power plants in India was done on an ad-hoc and case-by case basis and was not part of any comprehensive policy shift. The positive environment created by the electricity act and the proactive role-played by the ministry of power in helping private projects achieve financial closure have led to a revival of the IPP model. (www.indiainbusiness.nic).

Dabhol power project, India

The first privatized independent power producer (IPP) project in India. The government of India and ministry of power had invited Enron Development Corporation (EDC) to set up this project. Dabhol Power Company (DPC), a special purpose vehicle worked as a nodal agency for bringing together private investors and concerned government agencies for the project. It was a 2,015 MW project which would be connected to Maharashtra State Electricity Board (MSEB) grid through 440 KV transmissions.

4.6.5 Ultra Mega Power Projects (UMPP’s) Policy

Development of ultra mega power projects has been identified as a thrust area. These are very large sized projects, approximately 4,000 MW each involving an estimated investment of about Rs. 16,000 crore. These projects will meet the power needs of a number of states/ distribution companies located in these states, and are being developed on a build, own, and operate basis. The Power Finance Corporation, a Public Sector Utilities (PSU) under the Ministry of Power, has been identified as the nodal agency for this initiative.

These projects will be set up at Sasan in Madhya Pradesh, Mundra in Gujarat, Akaltara in Chhattisgarh, Karvar in Karnataka, Ratnagiri in Maharashtra, Krishnapatnam in Andhra Pradesh, and in Orissa. For the Orissa project, three sites- Hirma, Derabahai and Bhashma have been short-listed.

The initial development work (land acquisition, water linkage, EIA studies, preparation of project report, etc.) is being done through SPV companies, with initial funding provided by the Power Finance Corporation (PFC). Each company will be a fully owned subsidiary of PFC. These projects will be awarded on the basis of competitive bidding. The bidding will be based on the first year of tariff quoted. These projects will entail a total cost of Rs. 750 billion. They are likely to be financed at debt-equity ratios of 70:30. The cost of power from these projects is estimated to be about Rs. 2.50 to 2.75 per unit (www.indiainbusiness.nic).

Table 4.1: The Present Status of UMPP's in India

Project	Location	Investment Amount	Investment Providers
Sasan ultra mega power project(UMPP) 3,960 MW	Madhya Pradesh	Rs. 20,000 crore (US$ 4 billion) with a debt-equity ratio of 75:25,	The lenders for the project are a consortium of almost 14 banks led by State Bank of India, the largest bank of the country. major lenders including India Infrastructure Finance Company Ltd (both domestic and its UK-based outfit), Power Finance Corporation, Rural Electrification Corporation, Punjab National Bank, Life Insurance Corporation of India, Axis Bank and IDBI Bank, among others.
Coastal Gujarat Power Limited (UMPP)	Mundra, Gujarat		Tata Power has arranged a $1.8 billion loan from a consortium including multilateral lenders like International Finance Corp (IFC) and Asian Development Bank (ADB) as well as Export-Import Bank from South Korea, while a syndicate of domestic lenders led by SBI Capitals will extend a Rs 5,550 crore debt for the Rs 17,000 crore Mundra UMPP. The developer has brought up Rs 4,250 crore as its own share of equity for financing the Rs 17,000 crore project.
Chhattisgarh Sarguja Power Ltd (UMPP)	Akaltara, Chhattisgarh		The financial closure process for the project has been initiated
Karvar ultra mega power project (UMPP)	Karnataka		The financial closure process for the project has been initiated
Ratnagiri ultra mega power project (UMPP)	Maharashtra		The financial closure process for the project has been initiated
Coastal Andhra Power Ltd (UMPP) 4000MW	Krishnapatnam, Andhra Pradesh	Rs 17,500 crore, 75:25 debt-equity ratio	IDBI Bank was the lead arranger of the Rs 13,125 crore debt with Power Finance Corp acting as joint lead arranger. A consortium of over 15 banks and financial institutions are participating in the financing arrangements," the statement said. The consortium includes Rural Electrification Corp, LIC, Uco Bank, Union Bank, Andhra Bank, Corporation Bank, Punjab National Bank, Indian Overseas Bank, Andhra Bank, State Bank of Bikaner and Jaipur, State Bank of Hyderabad, Vijaya Bank, Punjab and Sind Bank, Yes Bank and Indian Bank.
Jharkhand Integrated Power Ltd., UMPP, 3,960 MW	Tilaiya, Jharkhand	Rs 24,000 crores (US$ 5 billion). debt to equity ratio of 75:25	The financial closure process for the project has been initiated
Coastal Tamil Nadu Power Limited. (UMPP)	Cheyyur , Tamil Nadu		The financial closure process for the project has been initiated
Orissa Integrated Power Limited (UMPP)	Sundergarh District in Orissa		The financial closure process for the project has been initiated

4.7 Power Generation in India

The ministry of power started functioning independently with effect from 2nd July, 1992. Earlier it was known as the ministry of energy comprising the departments of power, coal and non-conventional energy sources. India ranks world's sixth energy consumer accounting for about 3.5 percent of the world's total annual energy consumption, but per -capita consumption of energy is very low at 631kwh, as compared to world consumption of 2,873 kWh, which needs to be increased to meet the goals of economic and social development.

The all India installed power generation capacity as on 31st Jan 2008 was 1,41,080 MW comprising of 90,896 MW thermal, 35,208 MW hydro,4,120 MW nuclear and 10,856MW R.E.S the central sector's share in generation has gradually increased from 12 percent in 1979 to 34 percent as on 31.01.2008 (See Annexure – III for plan wise and mode wise electricity generation). On the other hand the share of the state sector has declined from 82.5 percent to 53 percent while the share of private sector has gone up from 5.2 percent to 13 percent during the same period. State government utilities capacity is 74,453.76 MW, central government utilities capacity is 47,350.99 MW and private sector utilities capacity is 19,275.09 MW (Ministry of Power, annual report 2007-08). As on 31st October 2011 total installed capacity is 1,82,689.62 MW thermal (coal+gas+disel) plants constitute 1,19,040.98 MW (65.2 percent) of the installed generation capacity, followed by hydro power 38,706.40 MW (21.2 percent), from nuclear energy 4,780.00MW(2.6 percent) and from renewable sources 20,162.24 MW (11.0 percent).

The committee estimated capacity addition of private sector in eleventh plan is 3,263 MW in hydro and 7,497 MW in thermal the total is 10,760 MW. The private investors have responded to the policy initiatives very positively. As a result, out of 20,897 MW envisaged under private sector during 11th Plan (2007-12), work on the addition of 19,897 MW is actively progressing and 1,000 MW has already been added to the energy basket of the country. In addition, a large number of IPPs have applied for coal linkage totaling to nearly 1, 87,000 MW. They are in simultaneous coordination with states for acquiring land, water and other inputs for setting up these projects. (www.indiainbusiness.nic)

The overall generation, power supply and capacity addition (thermal+ nuclear + hydro) in public utilities in the country over the years is as under:

Table 4.2: The Total Power Generation of India during 1990-91 to 2010-11

Year	Generation (BUs)
1990-91	264.3
1995-96	380.1
2000-01	499.5
2001-02	515.2
2002-03	531.6
2003-04	558.3
2004-05	587.4
2005-06	617.5
2006-07	662.52
2007-08	704.40
2008-09	723.793
2009-10	771.551
2010-11*	597.6

*Up to December 2010
Source: Ministry of Power (2008), Power: the building block of the economy: Annual report 2007-08: government of India.
http://www.powermin.nic.in/JSP_SERVLETS/internal.jsp

Growth in electricity generation during ninth five year plan was 3 percent per annum. During April to October, 2005 growth rate recorded was 5.2 percent; against this during the same period in 2006-07 growth in generation has been 7.3 percent. Currently the energy peak shortage reduced to 8.8 percent from 9.8 percent.

Table 4.3: The Power Supply Position of India from 1997-98 to 2010-11

Year	Energy Requirement (MU)	Energy Availability (MU)	Energy Shortage (MU)	Energy Shortage (%)
1997-98	424505	390330	34175	8.1
1998-99	446584	420235	26349	5.9

1999-00	480430	450594	29836	6.2
2000-01	507216	467400	39816	7.8
2001-02	522537	483350	39187	7.5
2002-03	545983	497890	48093	8.8
2003-04	559264	519398	39866	7.1
2004-05	591373	548115	43258	7.3
2005-06	631554	578819	52735	8.4
2006-07	690587	624495	66092	9.6
2007-08	737052	664660	72392	9.8
2008-09	777039	691038	86001	11.1
2009-10	830594	746644	83950	10.1
2010-11*	638067	582163	55904	8.8

*up to December 2010
Source: Ministry of power (2008), Power: the building block of the economy: annual report 2007-08: government of India.
Annual Report 2009-10

The above table 4.3 shows the shortage of the power in India. The demand for power is increasing day by day in India. If see the shortage of power increasing continuously from the year 2003-04 to till now. During April-December 2009, the peak demand shortage is also high in India, because of insufficient installed capacity. The statistics of peak demand and the peak shortage of power are given in Table 4.4.

Table 4.4: Peak Demand Status of the Indian Power Sector from 1997-98 to 2010-11

Year	Peak Demand (MW)	Peak Met (MW)	Peak Shortage (%)
1997-98	65435	58042	7393
1998-99	67905	58445	9460
1999-00	72669	63691	8978
2000-01	78037	67880	10157
2001-02	78441	69189	9252
2002-03	81492	71547	9945
2003-04	84574	75066	9508
2004-05	87906	77652	10254
2005-06	93255	81792	11463
2006-07	100715	86818	13897
2007-08	108866	90793	18073
2008-09	109809	96785	13024
2009-10	116281	101609	15157
2010-11*	119437	107286	12151

* Up to December 2010
Source: Ministry of Power, Annual report 2010-11, Government of India

According to central electricity authority's sixteenth electric power survey, peak demand is expected to increase by a staggering 77 percent to 1,57,107 MW by 2012. Similarly, the energy requirement is also expected to increase by 274 percent to 9, 75,222 MU by 2012. It is estimated that a capacity addition of over 1,00,000 MW units by 2012 to bridge the supply deficit and keep up with the increasing demand (www.indiainbusiness.nic). To overcome this problem the government has to take measures to increase the capacity of power generation. It requires huge amount of funds which is not possible by the government, hence the private investment is required. There are several hurdles for the investment of private sector, and to overcome that government has to take the initiatives to create investor friendly environment. To reduce the gap between the power requirement and availability, government of India planned a series of ambitious power projects known as Ultra Mega Power Projects (UMPP), each with a capacity of 4,000 megawatts or above. As of July 2009, 14 UMPPs have been planned. Of the four UMPPs awarded earlier, reliance power bagged three at Sasan in Madhya Pradesh, Krishnapatnam in Andhra Pradesh and Tilaiya in Jharkhand. Tata power has been awarded the Mundra UMPP in Gujarat. It may be observed that all the four projects went to private developers.

However, the capacity addition of private sector is not up to the expected level. We can observe this from the Table 4.5.

Table 4.5: Total Capacity Addition (Central, State and Private) of Indian Power Sector from 2002-03 to 2010-11

(MW)

Years	**Central**		**State**		**Private**		**Total**	
	Target	***Achieved***	***Target***	***Achieved***	***Target***	***Achieved***	***Target***	***Achieved***
2002-03	1170.00	1210.00	1147.10	1100.10	1792.00	548.00	4109.10	2858.10
2003-04	4175.00	3035.00	874.54	816.62	152.80	100.00	5202.34	3951.62
2004-05	3630.00	2710.00	1442.92	1168.92	172.60	70.00	5245.52	3948.92
2005-06	3470.00	1420.00	2081.92	1488.00	1382.60	660.80	6934.52	3568.80
2006-07	7370.00	3890.00	6876.92	1671.00	3519.80	1291.80	17766.72	6852.80
2007-08	4840.00	3240.00	6449.00	5273.00	750.00	750.00	12039.00	9263.00
2008-09	2410.00	750.00	2359.20	1821.20	2761.00	882.50	7530.20	3453.70
2009-10	3402.00	2180.00	4980.00	3118.00	6125.00	4287.00	14507.00	9585.00
2010-11	7884.00	2580.00	6905.20	2509.00	6652.00	5121.00	21441.20	10210.00*

Source: MOP: Annual Reports 2003-04,2004-05, 2005-06, 2006-07,2007-08, 2008-09, 2009-10

* From April 2010- Feb. 2011

As against the 11th plan target of 78,700 MW set by the planning commission, the CEA has assessed that a total capacity of 62,374 MW is likely to be commissioned with a high level of certainty during the 11th plan period. A capacity of 19,582 MW has already been commissioned till 31.01.2010 and a capacity aggregating to 42,792 MW is likely to be commissioned with a high level of certainty during the balance period of the 11th plan. In addition, projects totaling to 12,590 MW are being attempted for commissioning on best efforts basis during the eleventh plan period. (See Annexure –IV for plan wise capacity addition).

4.8 Transmission and Distribution

The government initiatives like accelerated power development and reform programme and unbundling exercises in many states have led to formation of transmission companies and distribution companies. The total T&D transformer capacity was over 7, 52,000 MVA and T&D line length was over 64, 16,251 ct. km as on march 2005. The biggest problem in the sector in India is the Aggregate Technical and Commercial (AT&C) losses. In the year 2006-2007 these losses have been estimated to over 35 percent. The crux is that agriculture is not principally responsible for the nearly Rs 30,000 crore annual losses incurred by SEBs. Typically, SEBs underplays transmission and distribution losses by overestimating agriculture consumption. Without this cushion, T&D losses are estimated at about 50 per cent in Delhi, Orissa and Haryana and over 40 per cent in Andhra Pradesh, Rajasthan and Maharashtra. Of the total energy generated, barely 40 per cent is billed, while 20 per cent is lost in theft and another 20 per cent in technical losses. Remaining 20 percent is unaccounted and considered as consumption for agriculture.

4.8.1 Transmission

The transmission system planning in the country, in the past, had traditionally been linked to generation projects as part of the evacuation system. Ability of the power system to safely withstand a contingency without generation rescheduling or load-shedding was the main criteria for planning the transmission system. However, due to various reasons such as spatial development of load in the network, non-commissioning of load centre generating units originally planned and deficit in reactive compensation, certain pockets in the power system could not safely operate even under normal conditions. This had necessitated backing down of generation and operating at a lower load generation balance in the past. Transmission planning has therefore moved away from the earlier generation evacuation system planning to integrate system planning.

While the predominant technology for electricity transmission and distribution has been Alternating Current (AC) technology, High Voltage Direct Current (HVDC) technology has also been used for interconnection of all regional grids across the country and for bulk transmission of power over long distances.

4.8.2 Distribution

Distribution despite being of crucial importance in the entire electricity supply chain, remained neglected area and thus, resulting in huge AT&C losses. High technical losses in the system are primarily due to inadequate investments over the years for system improvement works, which has resulted in unplanned extensions of the distribution lines, overloading of the system elements like transformers and conductors, and lack of adequate reactive power support.

The commercial losses are mainly due to low metering efficiency, theft & pilferages. This may be eliminated by improving metering efficiency, proper energy accounting & auditing and improved billing & collection efficiency. Fixing of accountability of the personnel / feeder managers may help considerably in reduction of AT&C loss. With the initiative of the government of India and of the states, the Accelerated Power Development Programme (APDP) was launched in 2001, for the strengthening of sub-transmission and distribution network and reduction in AT&C losses.

However, the T&D and AT&C losses are high in India. Several factors are contributing for these losses ex: technological, power theft, inefficient staff at field level, etc. the government has taken several steps to curb these losses. However, those measures had not been given good results. Transmission and distribution losses are still remain substantially higher than the global benchmarks, at approximately 33 percent in 2010

(CRISIL research 2009). The overall T&D and AT&C losses in India are given in the table 4.6 from the year 2003-04 to 2007-08.

Table 4.6: All India Transformation, T&D and AT&C Losses (in Percent)

Year	T&D losses(DMLF CEA)	AT&C losses(PFC)
2003-04	32.53	34.78
2004-05	31.25	34.33
2005-06	30.42	33.02
2006-07	28.65	30.62
2007-08	27.20	29.45
2008-09	25.47	27.74
2009-10	NA	27.15

Source: http://www.cea.nic.in/reports/monthly/executive_rep/oct11/1-2.pdf

4.8.3 Creation of National Grid

POWERGRID is working towards achieving its mission of establishment and operation of regional and national power grids to facilitate transfer of power within and across the regions with reliability, security and economy, on sound commercial principles.

The exploitable energy resources in India distributed, like coal resources are abundant in Bihar/Jharkhand, Orissa, West Bengal and hydro resources are mainly concentrated in northern and north-eastern regions. As a result, some regions do not have adequate natural resources for setting power plants to meet their future requirements whereas, others have abundant natural resources. Demand for power continues to grow unabated. This calls for optimal utilization of generating resources for sustainable development. Thus, formation of national power grid is an effective tool to achieve this as various countries have adopted the model of interconnecting power grid not only at national level but also at international level.

4.8.4 Power Grid Corporation of India Limited (POWERGRID)

Power Grid Corporation of India limited was incorporated on October 23, 1989 with an authorized share capital of Rs. 5,000 crores as a public limited company, wholly owned by the government of India. POWERGRID started functioning on management basis with effect from August, 1991 and it took over transmission assets from NTPC, NHPC, NEEPCO and other central/Joint sector organizations during 1992-93 in a phased manner. In addition to this, it also took over the operation of existing regional load dispatch centers from CEA, in a phased manner, which has been upgraded with state of-the-art Unified Load Dispatch and Communication (ULDC) schemes. According to its mandate, the corporation, apart from providing transmission system for evacuation of central sector power, is also responsible for establishment and operation of regional and national power grids to facilitate transfer of power within and across the regions with reliability, security and economy on sound commercial principles. Based on its performance POWERGRID was recognized as a Mini-Ratna company by the government of India in October 1998. POWERGRID, notified as the central transmission utility of the country, is playing a major role in Indian power sector and is also providing open access on its inter-state transmission system.

4.9 Opportunities and Challenges of Indian Power Sector

1. Over 90,000 MW of new generation capacity is required in the next seven years a corresponding investment is required in transmission and distribution networks.
2. Large demand-supply gap: All India average energy shortfall of 7 percent and peak demand shortfall of 12 percent.
3. The implementation of key reforms is likely to foster growth in all segments:

    Unbundling of vertically integrated SEB’s

    “Open access” to transmission and distribution network

    Distribution circles to be privatized

    Tariff reforms by regulatory authorities

4. Opportunities in generation for: coal based plants at pithead or coastal locations (imported coal) natural gas/CNG based turbines at load centers or near gas terminals

5. Hydro power potential of 150,000 MW is untapped as assessed by the government of India.

6. Opportunities in transmission network ventures - additional 60,000 circuit km of transmission network expected by 2012, total investment opportunity of about US$ 200 billion over a seven year horizon

7. 100% FDI permitted in generation, transmission and distribution - the government is keen to draw private investment into the sector with incentives like income tax holiday for a block of 10 years in the first 15 years of operation waiver of capital goods import duties on mega power projects (above 1,000 MW generation capacity).

The national electricity plan of India aims to provide access to electricity to all households by 2010 and to meet all shortages by 2012. This will require an investment of Rs.9,000 billion (approximately USD 200 billion) at 2002–03 prices. The National Electricity Policy (NEP) stipulates power for all by 2012 and annual per capita consumption of electricity to rise to 1,000 units from the present level of 631 units. To fulfill the objectives of the NEP, a capacity addition of 78,577 MW has been proposed for the 11th plan. This capacity addition is expected to provide a growth of 9.5 percent to the power sector (http://en.wikipedia.org).

India possesses a vast opportunity to grow in the field of power generation, transmission, and distribution. The target of over 1,50,000 MW of hydro- power generation is a main challenge to the Indian power sector. By the year 2012, India requires an additional 1,00,000 MW of generation capacity. There is still a peak demand shortage of around 14.8 percent and an energy deficit of 8.4 percent in the country. A huge capital investment is required to meet this target. This has invited number of power generation, transmission, and distribution companies across the globe to establish their operations in the country under PPP programmes. There are great opportunities in transmission network ventures, an additional 60,000 circuit kilometers of transmission network is expected by 2012 with a total investment opportunity of about US$ 200 billion (www.pppinindia.com). Ministry of power has envisaged the establishment of an integrated national power grid in the country by the year 2012 with an inter-regional power transfer capacity of about 37,700 MW.

Despite of the positive intention displayed by successive governments in reforming the power sector, there are certain serious shortcomings within the power sector in India, both structural and administrative, which it is hoped will be addressed soon:

(1) Transmission capacity lags behind generation capacity, with the result that the power generated often cannot be evacuated. This has created considerable opportunities for the private sector and several domestic companies like Larsen and Toubro, Reliance infrastructure and kalpataru transmission systems, as well as foreign companies such as Areva T&D, are ramping up capacity for producing transmission equipment in India.

(2) Supply of coal and gas to the private sector is yet to be completely streamlined, though the government has constituted a high-power committee to address this issue, which is expected to turn in its recommendations shortly. This is a relatively minor problem given that foreign firms can source fuel from abroad, subject to foreign exchange clearance.

(3) Land acquisition is a problem. It has been recommended that the CEA purchase land of suitable size, which generation companies could bid for. Progress on this count has been tardy.

(4) The problem of 'open access' persists, as does the merchant power facility, both permitted by the Electricity Act. Given that power is a concurrent subject, states retain the authority to deny open access. For example, the two most industrialized states in India, Maharashtra and Gujarat, allow both open access and merchant sales, while Karnataka, a fairly advanced state and India's information technology hub, not having this policy. The power ministry of India has recently tabled a parliamentary note, mandating open access. The granting of open access is expected to greatly enhance interest among private power-generating companies.

(5) The financial situation of most SEBs is still parlous and so generating companies are still anxious about recovering payments on power sales to these boards, though the federal government underwrites some of these sales. The present arrangement is that any financial bailouts of the SEBs is deducted from the allocations made to the respective states, thereby adding pressure on states to be more responsible in ensuring effective metering of supplies and minimal transmission and distribution losses.

(6) A bigger problem to reform is the resistance of SEBs to unbundling, fearing that unbundling would make it easier to identify the source of financial losses. SEB's are also

reluctant to part with exclusive rights to T&D, widely seen as the most lucrative businesses in the sector, despite the abolition of exclusive privilege by the electricity act. Private sector companies are aggressively petitioning the government to be allowed entry into T&D as well, so as to be able to provide end-to-end solutions to consumers. A resolution of this issue in favour of greater private sector participation in T&D is expected soon (Anantaram, 2010).

4.10 Investments in Indian Power Sector

Financing power projects is critical and strategic issue, because its characteristics are different from other sectors. It requires large amount and long-term funds which involve high amount of risks. In present scenario, on par with the requirement the funds are not available, it makes large gap between demand and supply of funds. The reason for it is lack of investors' positive intention to invest the funds in power sector, due to lack of investor friendly environment and high level of risk involved in the projects. This makes the power projects to face the scarcity of funds. Apart from this several other factors are influencing the debt finance to power projects. Irrespective of all these the debt is the major source of financing to the power projects.

The investment in infrastructure during the 10th plan was Rs 8, 87,794 crore which constituted 5.07 percent of GDP. This included Rs 1, 75,203 crores of investment by the private sector. The first major step towards encouraging private investment in the power sector was taken in 1991 by providing a legal framework through an amendment of the existing electricity (supply) act, automatic approval (RBI route) for 100 percent foreign equity is permitted in generation, transmission, distribution and trading in power sector without any upper ceiling on the quantum of investment. The investment achieved in Indian power sector in 8th plan was Rs 6,16,750 crores, the target for 9th (1997-02) plan was Rs 12,45,260 crores, and achieved amount is Rs 5,75,760 crores. The expert committee estimation for 1996-2001 was Rs 24,64,000 crores and for 2001-2006 was Rs 37,80,000 crores (Karker, et.al, 2001). Investment requirement during 11th plan (2007-12) was Rs 2,50,000 crores another Rs 2,50,000 crores for transmission, distribution and rural electrification (Canning & Pedroni, 2004; Calderon & Servén, 2004). It has been estimated that investment of about Rs. 9, 75,000 crores will be needed to meet the capacity addition requirement during eleventh five year plan. The total details about the investment of centre, state and private sectors are given in the Table 4.7.

Table 4.7: Public and Private Investment in Electricity in India during the Period 2002-03 to 2009-10

(*Rs in crores*)

Year	Centre	State	Private	Total
2002-03	14219	20467	12926	47612
2003-04	17336	20566	15583	53485
2004-05	19708	18819	18428	56956
2005-06	22867	18329	21017	62268
2006-07	28332	19372	23825	71529
2007-08	29,386	27,252	54,497	1,11,134
2008-09	36,769	30,109	50,215	1,17,093
2009-10	39,528	31,193	55,237	1,25,958

Source: Ministry of power 2010, GOI

The above table shows the investment of public and private sectors, which increased year by year from the beginning from the year 2003-03 to 2009-10. However, these investments are not sufficient there is a large gap between the requirement of funds and the availability of funds. The table below indicates the requirement of investment for Indian electricity sector during the period 2001-30 (IEA, 2003 a).

Table 4.8: Total Investment for Indian Electricity Sector during the Period 2001-30

(USD billion)

	2001–10	2011–20	2021–30	2001–30
Generation	69	83	116	268
Refurbishment	4	5	6	15
Transmission	29	39	51	119
Distribution	44	85	134	262
Total	146	212	307	664

Source: IEA (2003a)

The Indian power sector has not been able to attract substantial private investment, in proportion to its requirements, due to its inadequate legal and commercial framework, and delays in obtaining regulatory approvals (IEA, 2003a). The government of India has taken initiatives to launch, accelerated power development & reform programme (APDRP) in 2001. The scheme has two components: a) investment component –

government of India provides additional central assistance for strengthening and up gradation of sub-transmission and distribution network. 25 percent of the project cost is provided as additional central plan assistance in form of grant to the state utilities. To begin with, the government also provided loan to the tune of 25 percent of the project cost. Another important thing is unfavorable conditions in the international capital market reduced the ability of the investors to raise capital for new investments (Lamech & Saeed, 2003). The total investment in power sector in India is given in the table 4.9.

Table 4.9: Number of Projects and Total Investments in Power Projects in India till the Year 2008

State	Electricity projects	Investment (Rs. in crore)
A.P	145	85,859
Assam	28	12,891
Bihar	65	39,899
Chhattisgarh	102	1,59,073
Delhi	14	13,040
Gujarat	112	2,14,748
Haryana	78	49,098
Himachal Pradesh	103	37,726
Jharkhand	59	1,27,441
Karnataka	147	49,947
Kerala	26	11,110
M.P	62	77,782
Maharashtra	135	1,59,048
Orissa	116	2,24,189
Punjab	54	13,208
Rajasthan	46	24,224
T.N	122	95,424
U.P	67	55,331
Uttarakhand	72	37,422
W.B	85	74,884
Other states	119	1,10,717
UT’s	17	609
Multi states	49	23,300
Un allocated	5	1,050
Total	**1,828**	**16,98,019**

Source: CMIE Investment Report 2008

The above table shows the total investment in power projects in India, state wise. Keeping in the mind the present demand for power in the market in each state, we can understand the amount of investment in power sector is less. There are several factors which influence the level of investment in power sector. They are:

- ***Country specific factors:*** These include macroeconomic fundamentals, growth potential and political stability.
- ***Sector specific factors:*** These include policies that influence industry structure, entry, competition and pricing behaviour in the sector under consideration. The cross-sectoral issues like liberalization of fuel markets also effect investment in power generation projects.
- ***Project specific factors:*** These include a number of contractual issues such as: power purchase agreement, fuel supply agreement, land acquisition, environmental issues, etc.

Woodhouse (2005a), in his study, identified five key factors that constitute the investment climate for private investment in the power sector: (i) strong public finances, (ii) viability of the sector, (iii) efficiency of fuel markets, (iv) political climate including the role of civil society, and (v) the legal framework. However, the investment in power sector is not up to the expected level. The main reason for the decrease of the investment is non-availability of funds to the government sector and less participation of the private sector (Rao, 2010).

Exclusively, to finance for power sector projects the Indian government incorporated some financing corporations. The Power Finance Corporation limited was incorporated in 1986 as a Development Financial Institution (DFI) dedicated to power sector. The main objectives to be pursued by PFC are: to finance power projects, in particular, thermal and hydro projects, power transmission & distribution works, renovation & modernization of power plants, etc. PFC's performance (cumulative) during last two decades (since inception) as on 30th Nov 2007 the amount sanctioned was Rs.1,56,322 crores, disbursement Rs. 83,928 crore. As on 30th Nov, 2007, PFC had sanctioned loans of the order of Rs. 36,363 crore (during FY 2007-08) for a wide range of power projects in various parts of the country and disbursements were to the tune of Rs. 8,074 crore. Rural

Electrification Corporation limited (REC) was incorporated as a company under the companies act, 1956 in the year 1969 with the main objective of financing rural electrification schemes in the country.

Table 4.10: Total Financial Assistance given by Rural Electrification Corporation Limited to Power Projects in India from the Year 2000-01 to 2009-10.

(Rs in lacks)

Particulars	**2009-10**	**2008-09**	**2007-08**	**2006-07**	**2005-06**
Number of projects approved	492	506	881	748	661
Financial assistance sanctioned	*4535736	*4074584	*4676976	*2862985	*1659689
Disbursements	2712714	2227786	1630370	1373299	800658

***** Excluding subsidy under RGGVY.

Source: Rural Electrification Corporation limited 41st annual report 2009-10

4.10.1 Power Finance Corporation of India (PFC)

PFC is the youngest to enter the list of the top 10 profit making public sector undertakings as per PSE survey report of department of public enterprises released in February, 2011. PFC is ranked 35th based on net worth in a listing of top 500 companies according to Dun & Bradstreet. PFC also figures among the top 500 global financial brands (Ranked 376th) according to brand finance Plc of UK. PFC got listed in global 2000 leading companies (Ranked 1195th), only 57 companies from India figured in this list.

The Indian power sector had a different landscape when PFC started operations. PFC acted as the change agent in turning around the sector into a viable investment proposition. Today PFC performs a variety of functions like funding power projects, implementing key development schemes and offering diverse products and services like consultancy and advisory in the power sector.

Table 4.11: Total Financial Assistance given by Power Finance Corporation of India to Power Projects in India from the Year 2005-06 to 2009-10.

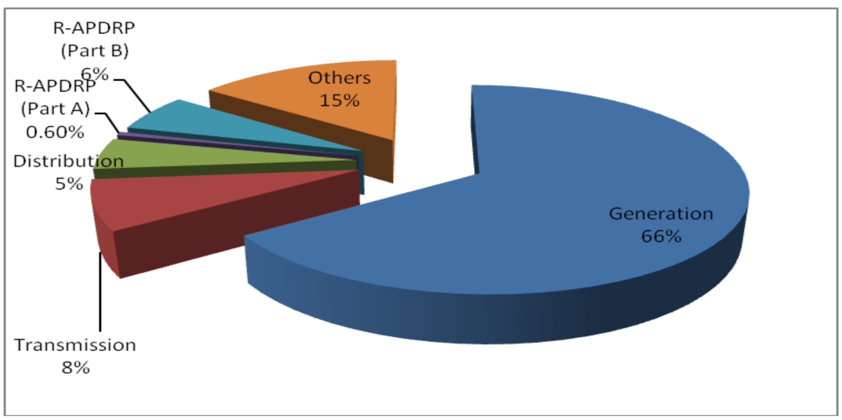
(Rs in crores)

Particulars	2009-10	2008-09	2007-08	2006-07	2005-06
Loans and Grants Sanctioned	31146	69498	57030	65465*	75197*
Loans and Grants Disbursed	14055	16211	21054	25808*	34122*

* Includes Sanctions & Disbursements under R-APDRP (Part A&B)

Source: Power Finance Corporation of India 25th annual report 2010-11

PFC disbursements components discipline wise can be seen from the following pie-chart. The major part of loans given to the generation of power the remaining goes to other components in power sector.



Source: Power Finance Corporation of India 25th Annual report 2010-11

Fig 4.2: Disbursement of Loans to Various Activities in Power Sector by PFC

4.10.2 Development of Private Finance

To cater the need of investment for power sector huge amount of funds are required. This can be met through private sector participation in power sector. India in 1990's opened up the power sector to private investment and also took up major policy initiatives to encourage private and foreign investment. The private sector participation is not only to ensure a larger flow of resources but also to introduce greater efficiency in the supply of these services (Montek S. Ahluwalia). The major risks a project faces are: political, financial, construction, operational, and market risks (Schaufelbergeretr, et.al, 2003).

However, the risk of the project should be reduced to attract private investment in the power sector. The private investment, in 10th plan investment is 31.47 percent of the total investment. Whereas, in 11th plan projected the share of private sector as 27.83 percent.

The power sector offers a wide scope for private investment through change of ownership of existing assets or green field investment in generation, transmission or distribution assets. The private power policy formulated in 1991 opened up the path to private and foreign investment in the generation and distribution of electricity. Private investors were offered a 16 percent return on equity, which was further incentivised in the case of higher efficiency levels in terms of Plant Load Factor (PLF). The privatization of developed countries is driven by the need to become competitive and provide greater choices to customers, in developing countries the need is funds for expansion and access to technology (Jain, 1999). The Indian electricity sector has gone through a lot of metamorphosis.

The central government's liberalization of investment in the power sector had created competition among states to provide better incentives for attracting private investment. Some states have managed to maintain a sustainable investment environment for the investors. This has kept the investors' interest alive in the power sector in more hospitable states. Investors' choice of a particular state is influenced, among others, by the relative investment climate in the state, the growth potential, the financial status of the buyer utility and the available risk mitigation options. The planning commission has noted that a similar financial package for the privatization of DISCOMS in other states would require support of Rs.1 trillion (GOI, 2005b).

4.11 Role of the Government

The private power policy 1991 opened up the path to private and foreign investment in the generation and distribution of electricity. The policy framework for private investment was further strengthened through the introduction of the mega power policy in 1995 for thermal projects over 1000 MW and hydro projects over 500 MW. Exclusively to finance for power sector projects the Indian government incorporated some financing corporations. They are, PFC in 1986, as a development financial institution it is dedicated to power sector and REC in1969 with the main objective of financing rural electrification schemes in the country.

There are four main issues concern to the government in a privatized infrastructure project: (1) timely completion of construction within the budgeted cost; (2) smooth operation and quality performance in the operation period; (3) public affordability to the service and products of the project; and (4) low total project life-cycle cost. Successful addressing of these issues requires a suitable capital structure and the long-term commitment of project participants (Zhang, M.ASCE et.al, 2005). The government has to take the steps to structuring large infrastructure projects on sound commercial principles in an enabling policy and regulatory environment. However, the government can also affect private infrastructure investment as a financier, supplier, customer, competitor, or regulator (Ramamurti, 2003).

The government of India has taken several measures for the development of power sector but it couldn't achieve the targets, because of the negative investment perception of the investors to invest funds in the power projects (Rao, & Rao, 2012). And also due to the risks in power sector, the private investments are not up to the expected level. In India the share of private participation in tenth five year plan for power sector is 31.47 percent, in Eleventh Plan the government estimated 27.83 percent it is 3.64 percent less.

In order to attract needed private investment in highly risky or financially unviable power projects, governments have to offer incentives to the private sector such as grants, subsidies, tax-exemptions, revenue and foreign exchange guarantees, and sovereign guarantees against force majeure and political risk, among others (Rao et.al, 2012).

4.11.1 Government Policy Initiatives for the Development of Private Finance

The government has taken several policy initiatives for encouraging private investment in power sector. They are:

1. Foreign Direct Investment (FDI) – 100 per cent FDI allowed in generation, transmission and distribution.

2. Tax holiday – profit on investments made in power sector during any block of 10 years in the first 15 years is exempt from income tax. In addition, the net interest and dividend income is exempt from income tax.
3. Capital import duties– waived for mega power generation projects (above 1000 MW for thermal and 500 MW for hydro), reduced duties for project imports.
4. Transmission & Distribution (T&D) equipments and transmission & distribution fuel – import duties on T&D equipment reduced to 10 per cent from the earlier 25 per cent.
5. Customs duties on imported coal reduced from 25 per cent to 15 per cent.
6. Progressive in its orientation, the electricity act 2003 marks a significant step forward towards making the electricity market more competitive and robust.
7. The electricity act 2003 aims at: providing a conducive atmosphere for private investments
8. Creating competitive power markets

Apart from the above mentioned policy initiatives the government has also taken several other initiatives. Such as:

1. Development of domestic debt capital market,
2. Permitting foreign equity flows into infrastructure,
3. Inducing foreign investors and multilaterals,
4. Liberalizing the rules for investment of pension fund, provident fund and insurance,
5. Government sponsored infrastructure financing facilities
6. Tax incentives etc. and
7. Giving independence to the regulatory mechanism to attract investments.

The present study mainly focused on these aspects to identify to what extent private funds are attracted by the government policy initiatives.

4.11.2 Why power sector failed to attract private investment

1. Delays in getting clearances: most power companies had started pulling out, in any case, frustrated with delays in getting clearances. The first high profile pull out was perhaps that of mission energy of the US, one of the largest US utilities. Then there were

others like cogentrix, electricity de France, the UK-based power gen and more recently Enron. Several others like AES Corporation, Daewoo of Korea and UK-based national power are sitting on the fence (The Economic Times Dec. 19, 2001).

2. Unfavorable conditions in the international capital market reduced the ability of the investors to raise capital for new investments. These conditions in developing countries along with previous experience of investors have been identified as the main reasons for the decline in foreign investors' interest in the power sector (Lamech & Saeed, 2003).

3. Risk return tradeoffs are another major factor which influences private investors. In Indian power projects risk is very high.

4. Lack of investor friendly policy environment and regulatory framework. In fact these two contribute significantly to the investment environment especially in the power sector.

5. The growth potential, the financial status of the buyer utility and the available risk mitigation options of the states to influence the investors' choice of selecting a particular state.

6. Lack of transparent policy environment and lack of independent regulatory framework. Some analysts point out that the importance of a transparent policy environment and independent regulatory framework, in attracting private investment in the power sector in developing countries.

Based on the above mentioned reasons, some factors are identified, which hinder the investment flow in power projects in India. They are:

1. Many requirements to obtain project approval,
2. Accusations of corruption and corrupt tendencies,
3. Poor credit worthiness of power off-takers,
4. High risks involved in project,
5. Strong political opposition to investor friendly reforms,
6. Lengthy legal process for settlement of disputes,
7. Resistance from environmental groups (due to hazards, such as carbon emission, etc.),

8. Frequent changes in government policies, and
9. Frequent increases in interest rates by commercial banks and financial institutions

The above mentioned factors are influencing the investment in power projects in India. Some factors are having high influence and some factors are having less influence on investment in power projects. However, the investors decision mainly depends upon these factors.

4.12 Conclusion

The reforms of electricity market have led to changes in the way decisions taken in power sector investment. The Indian government has been taken several steps to encourage private investment in power sector. The government has been taken new policy initiatives, provided incentives and provided sovereign guarantees against political and other kinds of risks. In spite of all these the power sector failed to attract sufficient private investment. In this scenario, as first step, the government has to take measures to identify why its policy initiatives are failed to attract more private investment. The second step is the government should take the measures for effective regulations, supported by law, financial autonomy and decision autonomy, which are key priorities to protect the interests of investors. The third step is due to competition from markets the world-over, a more conducive and stable policy would be required to keep the investments in the IPP scheme flowing in. Fourth step is private investment in foreign countries (e.g.: in Mexico) is solicited through competitive bidding to sell electricity to the incumbent utilities. In contrast to this, most of the private projects in India have been negotiated. The government should try to introduce this in all states in India, by taking in to the consideration, the lessons from the experiences of competitive bidding in case of distribution privatization in Orissa and Delhi. Finally, the government should take the measures to have transparent policy environment, design suitable structure to handle the "corruption" in all stages of activities in power sector and motivating investors will make the power sector to grow at good pace and attract more private investments.

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CHAPTER-V

SECTION - I

FACTORS INFLUENCING THE INVESTMENT OF POWER PROJECTS

5.0 Introduction

The Indian government is trying to encourage more private investment through its new policies, by providing incentives and creating investor friendly environment in the sector. The first major step towards encouraging private investment in the power sector has been taken in the year 1991 by providing a legal framework through an amendment of the existing electricity (supply) act. Automatic approval (RBI route) for 100 percent foreign equity is permitted in generation, transmission, distribution and trading in power sector, without any upper ceiling on the quantum of investment. The Indian government has initiated several policies with a great hope of improving investment in power projects. Still the gap between the requirement of funds and the supply of funds is not filled. The majority of investors have turned to this sector to invest their funds, only few investors have turned up. Because, “the power sector reforms initiated are unable to attract the investors”. The Indian power sector is not able to attract sufficient private investment, on par with its requirements, due to its inadequate legal and commercial framework, and delays in obtaining regulatory approvals. These things should be taken care by the government to attract required amount of funds. The present part of the study mainly focused on the investment and the factors attracting in India. The study selected some factors which influence the investment and made the analysis (on primary data collected from the respondents) of those factors that influence the investment of power sector.

5.1 Factors Influencing (Facilitating Factors) the Investment of Power Projects

Till the recent past power sector was a mostly state run enterprise. However, structural inefficiencies and failure to keep pace with the demand of a rapidly growing economy has forced the state to re-think its strategy. To maintain required level of economic development, the infrastructure should be developed. According to Chege (2003) “encouraging innovation and better practices in private sector financing” are required for infrastructure development, and also they are the main initiatives in the drive towards sustainable economic development. Due to these requirements the government has initiated several policies for the development of power sector. According to government of India report (GOI, 2005b) some states provided better incentives for attracting private investment. Some states have managed to maintain a sustainable investment environment for the investors. This has kept the investors’ interest alive in the power sector in more states in India. For attracting more funds, the project risk becomes a major hurdle for the projects. In respect of this Rao, (2010) said that, “the investment in power projects mainly depends upon risk profile of the project”. Moreover liberalization also affected the way power plants are financed. Another initiative taken by the Indian government is the regulatory reforms. It started with the setting up of the first state level regulatory institution in Orissa in 1995. This initiative has been highlighted the importance of the regulatory reforms for attracting private investment.

The factors influencing investment decision are classified as country specific factors, sector specific factors, and project specific factors. The study identified various factors from literature that influence the investment of the projects (which are given in review of literature). Apart from the above mentioned policy initiatives the Indian government also has taken several other initiatives, such as: development of domestic debt capital market, permitting foreign equity flows into infrastructure, inducing foreign investors and multilaterals to raise rupee loans, liberalizing the rules for investment of pension fund, provident fund and insurance, government sponsored infrastructure financing facilities and tax incentives, etc. This part of the study is mainly focuses on identifying the major factors that influence the level of investment inflow in Indian power projects. To measure the level or degree of investments, “Likert” scale was used. In that scale the code number

1 represents "very low", 2 represents "low", 3 represents neither low nor high", 4 represents "high", and 5 represents "very high". The total representative sample size is 379.

Table 5.1: Factors Influencing the Level of Investment in Power Projects (in Percent)

Factors Influencing Investment	1	2	3	4	5
Development of domestic debt capital market	0	3.4	32.2	53.8	10.6
Permitting foreign equity flows into infrastructure	5.8	21.4	47.2	15.8	9.9
Inducing foreign investors and multilaterals to raise rupee loans	7.1	31.9	47.8	5	8.2
Liberalizing the rules for investment of pension fund, provident fund and insurance in to the power sector.	5.5	11.1	40.4	41.4	1.6
Government sponsored infrastructure financing facilities	0	6.1	3.2	27.2	63.6
Independence of regulatory mechanism.	10	37.5	35.6	10.3	6.6
Gross Domestic Savings (GDS)	10.6	46.2	31.9	9.8	1.6
Tax incentives	0	8.4	12.7	57.5	21.4
Project size	4	18.2	18.5	52.5	6.9
Ability to complete the project on time	3	8	7.9	57.3	33.8
Project contractual arrangements such as PPA & Fuel supply agreements.	3	0	4	25.6	70.2
Track record of past ventures	0	1.3	13.2	49.9	35.6

Note: 1 = "very low", 2 = "low", 3 = neither low nor high", 4 = "high", and 5 = "very high".

The initiatives taken by the government such as: development of domestic debt capital market, arrangement of infrastructure financing facilities and tax incentives are influencing positively and its effect is "high" on the scale. The affect of project specific factors i.e. size of project, ability of completion, project contractual arrangements and track record of past ventures is indicated from "high to very high" on the scale. It means due to these factors the flow of investment increased in the projects. The affect of other initiatives such as: permitting foreign equity flows, inducing foreign investors, liberalizing the rules for investment of pension fund, provident fund and insurance is indicated by the respondents as "medium" on the scale. And the affect of the factors namely, regulatory factors and the economic factors is "low" to attract the investments.

Table 5.2: Mean Scores of Factors Influencing the Level of Investment in Power Projects

Factors Influencing Investment	Mean	Std. Deviation	Variance
Development of domestic debt capital market	3.72	0.696	0.485
Permitting foreign equity flows into infrastructure	3.02	0.998	0.997
Inducing foreign investors and multilaterals to raise rupee loans	2.75	0.960	0.922
Liberalizing the rules for investment of pension fund, provident fund and insurance in to the power sector.	3.22	0.873	0.762
Government sponsored infrastructure financing facilities	4.48	0.824	0.679
Independence of regulatory mechanism.	2.66	1.015	1.029
Gross domestic savings (GDS)	2.46	0.867	0.751
Tax incentives	3.92	0.820	0.673
Project size	3.40	0.991	0.982
Ability to complete the project on time	4.23	0.647	0.418
Project contractual arrangements such as PPA & Fuel supply agreements.	4.65	0.581	0.338
Track record of past ventures	4.20	0.709	0.503

The above table 5.2 shows the mean score, standard deviation and variance of the factors influence the investment in power projects. From these scores it is observed that, development of domestic debt capital market (3.72) (0.485), government sponsored infrastructure financing facilities (4.48) (0.679), tax incentives (3.92) (0.673), ability to complete the project in time (4.23) (0.418), project contractual arrangements such as: PPA & Fuel supply agreements (4.65) (0.338), and track record of past ventures (4.20) (0.503) are influencing investment inflow at "high" level. It means these factors are highly facilitating/attracting the investment to power projects. Permitting foreign equity flows into infrastructure (3.02) (0.997), inducing foreign investors and multilaterals to raise rupee loans (2.75) (0.922) and liberalizing the rules for investment of pension fund, provident fund and insurance in to the power sector (3.22) (0.762) affect is "medium" according to its mean and variance scores. And the affect of other factors such as: independence of regulatory mechanism (2.66) (1.029) and gross domestic savings (GDS) (2.46) (0.751) is "low" according to its mean and variance scores.

The Government has been taken several steps for the development of Indian debt market. It has been given tax exemptions on the debt and also the sovereign guarantees on the debt instruments. Because of these incentives the domestic debt capital market is slightly developed, but to acquire sustainable development it will take considerable time.

The Government has put more efforts for incorporating financing facilities/agencies to provide the funds to power projects, such as: the Power Finance Corporation limited (PFC) and Rural Electricity Corporation (REC). PFC was incorporated in 1986 as a Development Financial Institution (DFI) dedicated to power sector. This initiative has given good results in power sector to increase its investments.

The Government felt that, major part of investment to power sector is available from foreign equity agencies in the form of equity. But the foreign investors are not interested to invest in Indian power projects, because, there is no investor friendly environment in India. Apart from this, the unfavorable conditions in the international capital market, the policy environment and regulatory framework, are also contributed significantly to the decrease of investment and for the creation of adverse investment environment. Especially, in power sector, due to lack of transparency and the absence of independent regulatory institution, the investors are not interested to invest funds.

According to ADB (2009) report, long-term investors, such as pension and insurance funds, have a limited presence in the Indian market due to their regulatory restrictions. The present study also found that its presence is limited in India; the study results also confirming the opinion of ADB.

FICCI, (2002) investor survey finds that, 48 percent of the foreign investors felt, the performance of prevailing “regulatory system” across various economic sectors in India is average. And 52 percent of foreign investors opined that, it is below average. Present study also accepts with the results of FICCI, because, the study also found that major part of respondents in the field survey opined that, the performance of regulatory system is average in India. Due to the unsuitable/sub-standard regulations, power sector has failed to attract foreign investment. So the foreign investment flow in this sector is medium/average.

According to Dailami, et al (1998), Bosshard, (2002), Singh, (2007), project specific factors namely, project size, number of contractual issues (such as power purchase agreement, fuel supply agreement, etc.) are the major influencing factors for the investment of power projects. The study also accepts with the opinion of these authors because, the results of the present study also proving the authors opinions or their research results. Based on the results, the study revealed that, the above mentioned factors attracted the high level of investments in Indian power projects. Finally the study opined that, the "independent regulatory system" is required, which includes sound tariff setting process and transparent regulatory process. Lack of it, the investment flow is reduced. The present study results are also confirming the same thing.

5.2 Factors Restricting the Investment of Power Projects

Several factors are restricting the investment of the power projects. These are the major hurdles for the investors to invest funds in this sector. Mainly, the new entrants of the power sector fear about these factors. The study identified some factors from the review of literature, which are playing major role for restricting the investment.

Table 5.3: Factors Restricting the Investment of Power Projects (in Percent)

Factors Restricting Investment	1	2	3	4	5
Many requirements to obtain project approval.	1.8	22.4	20.6	40.4	14.8
Accusations of corruption and corrupt tendencies.	11.1	40.4	19.3	26.4	2.9
Poor credit worthiness of power off-takers.	3.7	26.1	47.2	12.9	10
High risk involved in project.	7.4	25.6	16.4	40.6	10
Strong political opposition to investor friendly reforms.	8.4	35.6	30.1	18.2	7.7
Lengthy legal process for settlement of loan agreements, etc.	21.6	49.9	16.6	5.3	6.6
Resistance from environmental groups (due to hazards, such as carbon emission, etc.)	5	1.6	20.8	40.1	32.5
Frequent changes in government policies.	9.8	45.6	17.4	25.3	1.8
Frequent increases in interest rates by commercial banks and financial institutions.	9	37.5	30.9	21.4	1.3

Note: 1 = "very low", 2 = "low", 3 = neither low nor high", 4 = "high", and 5 = "very high".

From the table 5.3 it can be observed that many requirements to get project approval, risks of project and resistance from environmental groups, are the major hurdles for investment. Its degree of restriction is “high”. The affect of poor credit worthiness of power off-takers is “medium” on investment in power projects. And the affect of all other factors such as accusations of corruption and corrupt tendencies, strong political opposition to investor friendly reforms, lengthy legal process for settlement of loan agreements etc., frequent changes in government policies and frequent increases in interest rates by commercial banks and financial institutions is “low” on investment. The scores of mean, standard deviation and variance are also calculated to support the above given analysis.

Table 5.4: Mean Scores of Factors Restricting the Investment of Power Projects

Factors Restricting Investment	Mean	Std. Deviation	Variance
Many requirements to obtain project approval.	3.44	1.051	1.104
Accusations of corruption and corrupt tendencies	2.70	1.067	1.138
Poor credit worthiness of power off-takers	2.99	0.970	0.942
High risk involved in project.	3.20	1.149	1.321
Strong political opposition to investor friendly reforms.	2.81	1.072	1.149
Lengthy legal process for settlement of loan agreements etc.	2.25	1.061	1.126
Resistance from environmental groups (due to hazards, such as carbon emission, etc.)	3.93	1.023	1.046
Frequent changes in government policies.	2.64	1.023	1.046
Frequent increases in interest rates by commercial banks and financial institutions.	2.69	0.951	0.904

From the above table 5.4 mean score and variance are taken to determine the either the variables influence is high or low. According to the scores, many requirements to obtain project approval (3.44) (1.104), high risk involved in project (3.20) (1.321) and resistance from environmental groups (due to hazards, such as carbon emission, etc.) (3.93) (1.046) are the major factors that restricting the investment in power projects. Poor credit worthiness of power off-takers (2.99) (0.942) is restricting averagely. And the other factors of, accusations of corruption and corrupt tendencies (2.70) (1.138), strong political opposition to investor friendly reforms (2.81) (1.149), lengthy legal process for settlement of loan agreements, etc., (2.25) (1.126), frequent changes in government policies (2.64) (1.046) and frequent increases in interest rates by commercial banks and financial institutions (2.69) (0.904) are influencing or restricting investment at low level in power projects.

Finally, to conclude that so many, statutory and non-statutory clearances are required for the establishment of power projects, these many clearances are not required to any other project in other infrastructure sectors. It is the major restricting factor for the investment in power projects. Also, the lengthy bureaucratic processes, non-transparent project approval processes are restricting the investment in power projects. So the government should reduce some of these requirements/clearances and try to measures to speed up the bureaucratic activities. Environmental groups are also opposing the power projects due to its environmental hazards. The promoters are also failed to ensure the people for the use of advanced environmental pollution control measures/technology. The government as well as the promoters failed to provide good rehabilitation facilities to the public. The study also found through its results, “they failed to provide good rehabilitation facilities to the people who lost their lands for the projects”. Another important thing is risks are depending on the size of the project and the selection of financing method. The present study results also proved it. The project specific factors include a number of contractual issues (such as land acquisition, environmental issues, etc.) influence the investment decision made by the investors, and these are linked to the legal framework of the country (mentioned by Bosshard, (2002), Singh, (2007)). The present study results revealed that, environmental factors are highly preventing/restricting the investment of power projects. Gupta, et al (1998) mentioned poor credit worthiness of power off-takers restricts the investment flow. This study confirms the opinion of the author and results of the study are also proved it.

SECTION - II

THE RELATIONSHIP BETWEEN FINANCING METHODS AND PROJECT RISKS

5.3 Introduction

For putting the investment of private sector in power projects, the risk of the projects is a big hurdle. Due to risk the value of the firm's assets is volatile. In fact the degree of the private sector investment depends on the degree of the risk involved in the project. The risks are involved at different stages of the projects. The large investment projects are always involved the risk at all stages of the project. The literature on risk revealed that, the risk is inherent in non-recourse financing. Now-a-days all most all projects are using non-recourse finance as a financing method. It is theoretically and practically opposite to the traditional asset based financing methods.

5.4 Financing Methods

The Indian power industry has been dominated by the public sector. Earlier/in olden days, the power projects developed mostly by the government utility firms, the finance is arranged through government budget in India. There are several methods in use for financing power projects globally, such as: equity, debt, project financing, leasing of infrastructure, structured financing, Public Private Partnerships (PPP's) and venture capital, forfeiting method of financing, etc. But the Indian projects using limited number of methods, due to several limitations and hurdles for obtaining finance from fund providers. Presently using financing methods are: equity financing, debt financing, PPPs, corporate finance, project finance and debt & equity. The study survey on the use of these methods in power projects in India, and the results were given in the table 5.5.

Table 5.5: Financing Methods for the Power Projects

Financing Methods	Frequency	Percent	Valid Percent	Cumulative Percent
Project Financing (SPV's)	173	45.6	45.6	45.6
Corporate Financing	27	7.1	7.1	52.8
Equity Financing	2	0.5	0.5	53.3
Debt Financing	6	1.6	1.6	54.9
Partnership's/Joint Ventures	9	2.4	2.4	57.3
Equity and Debt	162	42.7	42.7	100.0
Total	379	100.0	100.0	

From the table 5.5 it can be observed that, project financing is most popularly used method of financing. From the total representative sample, 45.6 percent of the projects are using this method of financing. The next method popularly used to finance the projects is equity & debt. It is used by 42.7 percent of the projects. And corporate finance is used by 7.1 percent of projects. Details that included in the above table presented with the help of radar diagram. It shows/ presents the data in an easy way for clear understanding.

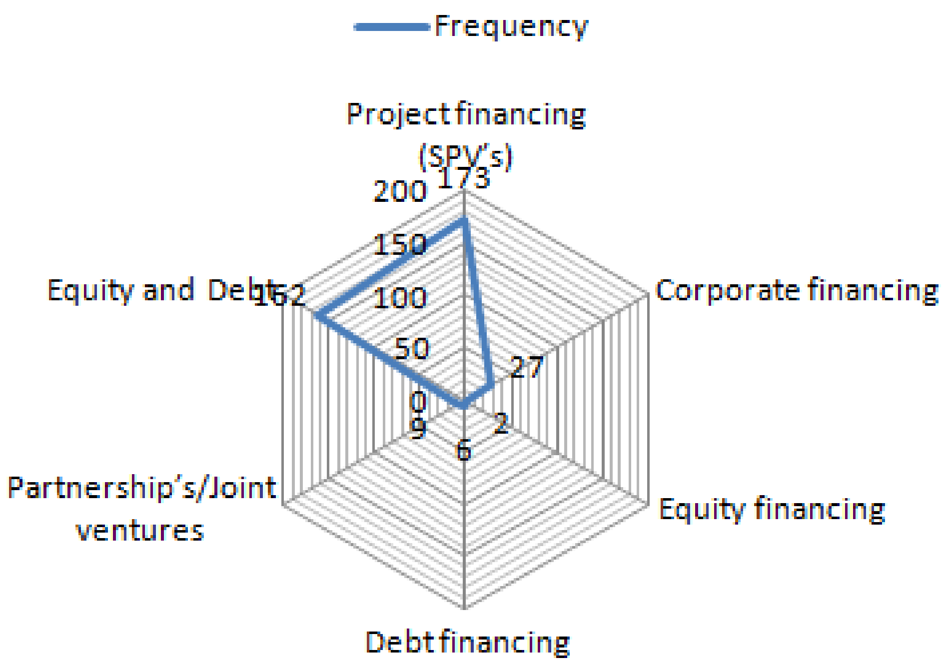

Fig 5.1: Method of Financing in Power Projects in India Survey Results

5.5 Method of Financing vs. Type (Fuel Type) of Projects

From the analysis of survey data given below it can be understood that the method of financing is similar to all kinds (fuel type) of projects. In other words the method of financing is similar for conventional energy and non-conventional energy. Even if the conventional and non-conventional energy projects using the same kind of method, the levels of the risks involved in those projects are not same. The level of risk differs to the each project. It is based on the type (fuel type) of the project. The survey analysis which explains the relationship between the methods of financing and the types of projects is shown in the column chart 5.2.

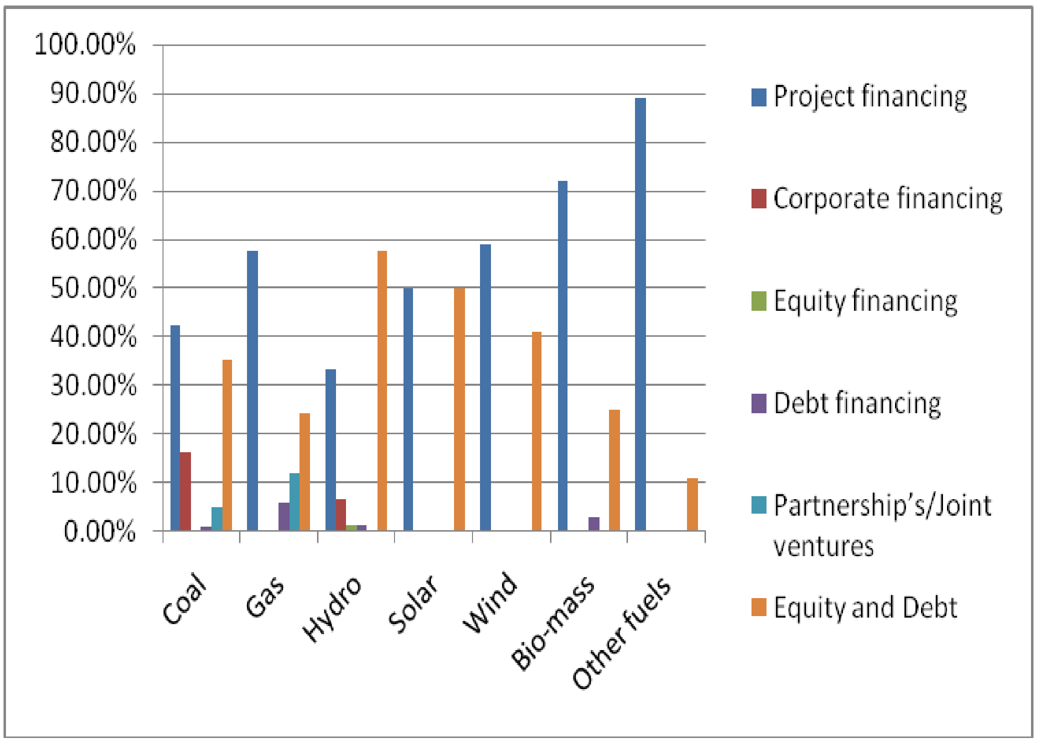

Fig 5.2: Diagramme Shows the Relationship between the Methods of Financing and the Types of Projects.

From the above chart 5.2, we can observe that most of the projects with different fuels chosen the "project finance" and "equity and debt" finance methods. From the total representative sample 45.6 percent of the projects using the "project finance" and 42.7 percent of the projects using the "equity and debt" financing method. The remaining methods have been adopted by very less number of projects. Corporate financing used by 7.1 percent of the projects, equity financing 0.5 percent, debt financing 1.6 percent, and the partnership financing 2.4 percent (See Annexure – V).

5.6 Method of Financing vs. Size of the Project

The relationship between financing methods and the risks, can also observe among the projects which are operating in different capacities levels. The method of financing is not similar to different sizes of projects (in terms of capacities). It can also be observed from the analysis given below. Small capacity projects adopted some methods of financing and large projects adopted some other methods of financing.

There are several methods of financing for power projects, such as:

- Project Financing,
- Corporate Financing,
- Equity Financing,
- Debt Financing,
- Public Private Partnerships (PPP's), and
- Equity and Debt Method.

In India very few methods are using because of various limitations preventing the adoption of all kinds of methods. The projects are operating in various capacities; no one method is suitable to the projects in different capacities. Through the analysis the study has been observed, "there is relationship between the size of the project in terms of capacity and the methods of financing". And the results of the study proved that, the size of the project affects the method of financing. The detailed analysis is given in the Table 5.6.

Table 5.6: Method of Financing vs. Size of the Project

Financing Methods vs. Size of the Project	Installed Production Capacity Range of					Total
	<10MW	10MW-50MW	50MW-100MW	100MW-500MW	>500MW	
Project Financing (SPV's)	33	51	5	32	52	173
	41.3%	56.0%	17.9%	45.1%	47.7%	45.6%
Corporate Financing	0	2	1	8	16	27
	.0%	2.2%	3.6%	11.3%	14.7%	7.1%
Equity Financing	2	0	0	0	0	2
	2.5%	.0%	.0%	.0%	.0%	.5%
Debt Financing	1	2	0	1	2	6
	1.3%	2.2%	.0%	1.4%	1.8%	1.6%
Partnership's/Joint ventures	0	0	0	3	6	9
	.0%	.0%	.0%	4.2%	5.5%	2.4%
Equity and Debt	44	36	22	27	33	162
	55.0%	39.6%	78.6%	38.0%	30.3%	42.7%
Total	80	91	28	71	109	379
	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

It is observed that,

- Equity and debt financing method majorly used by the projects in a capacity level of < 10MW (55 percent) and 50MW-100MW (78.6 percent).
- Project finance mainly used by the projects in a capacity level of 10MW-50MW (56 percent), 100MW-500MW (45.1 percent) and with capacity level of > 500MW (47.7 percent).

5.7 Financing Methods vs. Project Risks

Several financing methods are using for financing power projects in India. Each method of financing requires a separate structure to implement, and each method has its own advantages and disadvantages in terms of its risks and returns. However, the selection of suitable method of financing is important to obtain financial stability of the project and to reduce the volatility in financing. Modigliani & Miller (1958) disclosed a fact i.e. "any financing choice that is made in a competitive scenario and that does not change a project's cash flows and risks, cannot change its value. Gupta, et al. (1998) stated, "the risk profile along with the cash flow profile of the projects decides the financial structure of the project”. Schaufelberger, et.al (2003) identified that, the selection of an appropriate financing strategy for financing a project is a major challenge because, a major component of risk mitigation planning depends on the selection of an appropriate financing strategy. According to the above mentioned researchers, the relationship between financing methods and the project risks is debatable. Some researchers argued that, method of finance does not influence the risk of the project and some other researchers argued that, method of finance influences the level of risk. Based on these arguments, the present part of the study undertaken to identify, whether the method of financing reduces the level of project risk or not.

The study considered 379 power companies/projects, which includes both public and private sector companies/projects. Each project is using different type of financing methods which are having different degree of risks. This part of the study tests the relationship between select financing methods (such as: project financing, corporate financing, equity, debt financing, partnership/ joint venture financing methods) and project risks (various internal and external risks) which influence the power projects (such as, financial, construction, operating, technology, legal, political, environmental and regulatory risks). The past researches identified that, each financing method has different degree of influence on each kind of risk. The present study believes that, by using a suitable method of financing the risk of the project can be reduced. To prove the above phenomena this part of the study has been adopted.

Table 5.7 given below shows the responses of the respondents indicating the relationship between different financing methods (such as: project financing, equity, debt and equity & debt financings) and various internal and external risks (such as: financial, construction, operating, technology risks, and also the external risks such as: legal, political, environmental and regulatory risks). Regarding the risks the respondents are asked, about the level of risk involved in their power projects, and the degree of risk is measured by using “Likert” scale which includes five points from “very low” to “very high”. The results of the analysis are given in the table 5.7. The highlighted cells in the table indicate the highest frequency between both financing method and the level of risk.

TABLE 5.7: CROSS TABLE SHOWS THE RELATIONSHIP BETWEEN FINANCING METHODS AND PROJECT RISKS

Financing Methods Vs Risks	Financial Risk					Construction Risk					Operating Risk					Technology Risk				
	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high
Project financing (SPV's)	28	63	52	28	2	18	57	20	70	8	51	95	22	5	0	55	79	32	7	0
	16.20%	36.40%	30.10%	16.20%	1.20%	10.40%	32.9%	11.6%	40.50%	4.60%	29.50%	54.90%	12.70%	2.90%	0.00%	31.80%	45.70%	18.50%	4.00%	0.00%
corporate financing	0	0	0	27	0	0	0	0	17	10	0	4	6	15	2	0	4	8	15	0
	0.00%	0.00%	0.00%	100 %	0.00%	0.00%	0.00%	0.00%	63.00%	37.00%	0.00%	14.80%	22.20%	55.60%	7.40%	0.00%	14.80%	29.60%	55.60%	0.00%
Equity financing	0	1	0	1	0	1	0	0	1	0	0	2	0	0	0	0	0	0	2	0
	0.00%	50.00%	0.00%	50.00%	0.00%	50.00%	0.00%	0.00%	50.00%	0.00%	0.00%	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Debt financing	0	1	0	4	1	1	1	2	2	0	0	1	2	3	0	1	2	1	2	0
	0.00%	16.70%	0.00%	66.70%	16.7%	16.70%	16.7%	33.3%	33.30%	0.00%	0.00%	16.70%	33.30%	50.00%	0.00%	16.70%	33.30%	16.70%	33.30%	0.00%
Partner ship's	5	0	0	4	0	0	0	0	6	3	0	5	1	3	0	0	0	4	5	0
	55.60%	0.00%	0.00%	44.40%	0.00%	0.00%	0.00%	0.00%	66.70%	33.30%	0.00%	55.60%	11.10%	33.30%	0.00%	0.00%	0.00%	44.40%	55.60%	0.00%
Debt& Equity	0	6	34	121	1	4	6	25	66	61	16	31	51	36	28	11	36	42	71	2
	0.00%	3.70%	21.00%	74.70%	0.60%	2.50%	3.70%	15.4%	40.70%	37.70%	9.90%	19.10%	31.50%	22.20%	17.3%	6.80%	22.20%	25.90%	43.80%	1.20%
Total	33	71	86	185	4	24	64	47	162	82	67	138	82	62	30	67	121	87	102	2
	8.70%	18.70%	22.70%	48.80%	1.10%	6.30%	16.9%	12.4%	42.70%	21.60%	17.70%	36.40%	21.60%	16.40%	7.90%	17.70%	31.90%	23.00%	26.90%	0.50%

Cont…...

Financing Methods Vs Risks	Legal Risk					Political Risk					Environmental Risk					Regulatory Risk				
	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high
Project financing (SPV's)	5	40	16	55	57	44	55	25	47	2	64	25	16	60	8	51	61	36	25	0
	2.90%	23.10%	9.20%	31.80%	32.90%	25.40%	31.80%	14.50%	27.20%	1.20%	37.00%	14.50%	9.20%	34.70%	4.60%	29.50%	35.30%	20.80%	14.50%	0.00%
Corporate financing	0	16	11	0	0	0	17	8	2	0	0	8	12	7	0	0	7	16	4	0
	0.00%	59.30%	40.70%	0.00%	0.00%	0.00%	63.00%	29.60%	7.40%	0.00%	0.00%	29.60%	44.40%	25.90%	0.00%	0.00%	25.90%	59.30%	14.80%	0.00%
Equity financing	0	0	0	0	2	0	1	1	0	0	0	0	0	2	0	0	0	0	2	0
	0.00%	0.00%	0.00%	0.00%	100 %	0.00%	50.00%	50.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100 %	0.00%	0.00%	0.00%	0.00%	100 %	0.00%
Debt financing	1	1	1	1	2	0	2	0	3	1	0	2	1	0	3	1	0	1	4	0
	16.7%	16.70%	16.70%	16.70%	33.30%	0.00%	33.30%	0.00%	50.00%	16.70%	0.00%	33.30%	16.70%	0.00%	50.0%	16.70%	0.00%	16.70%	66.70%	0.00%
Partner ships	0	4	5	0	0	0	2	3	4	0	0	2	2	4	1	0	3	2	4	0
	0.00%	44.40%	55.60%	0.00%	0.00%	0.00%	22.20%	33.30%	44.40%	0.00%	0.00%	22.20%	22.20%	44.40%	11.1%	0.00%	33.30%	22.20%	44.40%	0.00%
Equity and Debt	6	63	55	31	7	0	57	48	39	18	26	62	23	38	13	7	38	36	79	2
	3.70%	38.90%	34.00%	19.10%	4.30%	0.00%	35.20%	29.60%	24.10%	11.10%	16.00%	38.30%	14.20%	23.50%	8.00%	4.30%	23.50%	22.20%	48.80%	1.20%
Total	12	124	88	87	68	44	134	85	95	21	90	99	54	111	25	59	109	91	118	2
	3.20%	32.70%	23.20%	23.00%	17.90%	11.60%	35.40%	22.40%	25.10%	5.50%	23.70%	26.10%	14.20%	29.30%	6.60%	15.60%	28.80%	24.00%	31.10%	0.50%

The above table 5.7 shows that, the responses of the respondents indicating the relationship among different financing methods and various internal and external risks. Likert scale is used to measure the degree of the risks, which includes five points from "very low" to "very high". The left side of the scale indicates that, the low degree of risk and the right side of the scale represent the high degree of risks. The highlighted cells in the table indicate the highest frequency between both financing method and the level of risk. More to say about the relationship between financing methods and level of risks, each method of financing has its own impact on each kind of risks in power projects.

5.7.1 Project Finance vs. Project Risks

From the table 5.7, if we observe the "project finance" and the financial risk of the project, most of the perceptions of the respondents plotted in the left side of the scale. A total of 181 power projects are using this method out of 379 projects randomly selected sample from the total population. In these power projects all kinds of risks are involved, where as the degree of those risks differ from one project to other project. Regarding financial risk, among 181 power projects 36.4 percent respondents opined that, their projects financial risk is "low", 16.2 percent respondents opined "very low" but a considerable number of respondents 30.10 percent opined that, the risk is "neither high nor low". The table 5.7 shows that, the majority of opinions (52.6 percent) plotted in the left side of the scale. It means the projects which used "project finance" as a method of financing, have a low level of financial risk, when it compared with other financing methods. The respondents revealed that, the reason for keeping this risk "low" is the projects have well defined agreements with their bankers, and also with various other parties who assures the bankers to provide required amount of funds to the project in time at convenient rate of interest.

Regarding the construction risk of these projects, the respondents opinions have been equally distributed in the both sides of the scale. From the total responses 43.3 percent plotted in the left side of the scale and 45.1 percent responses plotted in the right side of the scale. It shows that, this risk for every project is not same, for some projects it is extreme in both directions. So many respondents opined that, the control of this risk is depends upon timely completion of the project. If the construction is delayed, the risk will be increased. This is the main reason for all projects which are having “high” level of this risk. Apart from this, land expropriation & acquisition problems, default by concession company, late design changes, poor quality workmanship, excessive contract variation are the other reasons for high degree of this risk.

Operating risk of the power projects which using “project finance” is less. From the total sample 84.4 percent of the respondents indicated their responses in the left side of the scale from “low” to “very low”. The reasons for keeping this risk low by the projects are: proper implementation of operations & maintenance (O&M) contracts, and the use of advanced technology to reduce machinery break down, etc.

The technology risk of power projects which are using “project finance” is also low. The left side of the scale was represented by 77.5 percent of total responses. The reasons for keeping this risk “low” by the projects are: the use of super critical technology, and technology warranty given by the producers of that technology, etc. Here, the notable thing is, the advanced technology require more funds which can be completely provide only through project finance method. It makes the projects to keep this risk as low.

The legal risk of the power projects which are using project finance is high. 64.7 percent of opinions of respondents plotted in the right side of the scale. According to the respondents the reasons for high level of legal risk for their projects are: frequent disputes with the government regarding the fixation of tariff, (some power projects are filed suits for availing “provisional tariff it is on cost plus basis) legal charges towards the violation of contracts by the parties, land dispute cases, and other cases relating to the environmental hazards filed by the public, etc. Regarding this risk 23.1 percent respondents opined it is “low” for their projects. The reasons revealed by them are proper negotiations with the land owners, paying market rates to the acquired lands and conducting public debates and clarifying the doubts of the public in the villages surrounding of the plant location. And also providing proper rehabilitation facilities to the people who lost their lands for project establishment, providing employment in the plant to those people avoided so many legal problems to the projects. Generally, the

Project Finance (PF) involves several contractual agreements with project partners. The structure of PF is more complex, which leads to more legal issues.

The political risk of the projects which adopted “project finance” method is low. The above table shows 57.2 percent of the respondents indicated their responses in the left side of the scale. The reasons for keeping this risk low are: stability of the government in the states where the projects are located, corruption and bribery, etc.

Environmental risk is low for projects for which are using “project finance” method. From the total sample 51.5 percent of the respondents indicated their responses in the left side of the scale. The necessary measures for reducing this risk are: the use of super critical technology to avoid the excess fly ash, heat and other hazardous fumes in to the air, designing proper fly ash management techniques, waste water and other waste materials management, etc. Several projects developed green belts by acquiring waste lands near by the plant location. For all these activities the required fund can be acquired only through the project finance method.

Regulatory risk of the projects is low to the power projects under “project finance” method. From the total sample 64.8 percent of responses plotted in the left side of the scale, and 20.8 percent responses plotted in the middle of the scale. As per the opinions of the respondents the reasons for low and average level of this risk are: the regulatory commission while fixing tariff will take the opinions of public and private power projects. For this regulatory authorities will go for public hearing, after considering all parties opinions the acceptable price only will be fixed as tariff. The “project finance” is used by the large projects including independent power plants, merchant power plants and UMPP’s these projects has the flexibility of selling some proportion of generated power in the open market at the high prices which off-set the high production costs.

5.7.2 Corporate Financing vs. Project Risks

Corporate finance is used by 27 power projects. All of them (100 percent) are having “high” level of financial risk. The equity finance used by only two projects out of this total, 50 percent respondents opined that, the financial risk of their power projects is “low” and the remaining 50 percent respondents opined, it is “high”. The main reason for increasing this risk is, use of internal sources whose cost is more. Generally, the gestation period of the power projects is more i.e. from four to five years. For these projects using costly funds is generally cause for the loss. Apart from this Inflation and the rise of input prices etc are the other reasons for existence of this risk.

Construction risk for the projects under the corporate finance is in between the levels of high to very high. 100 percent of the respondents indicated their responses in the right side of the scale. The general reason for having high level of this risk is, time over run which leads to cost overrun, and which is based on timely availability of sufficient funds. In corporate finance scarcity of internal funds is a cause for the non - availability of funds to the project.

From the total projects which are using corporate finance method 55.6 percent of the respondents opined that, the operating risk is high. Most of these respondents opined this is due to the failure of using advanced technology, unable to have O&M partners, and unable to get superior quality input, etc.

Technology risk of the projects under corporate finance is from medium to high level. 55.6 percent of the respondents opined that, technology risk is high, because of the use of low/sub-slandered equipments. Here, the perceptible thing is the Indian made turbines are not suitable for imported coal, which gives more heat for generating power. Replacement of this technology by advanced technology requires huge amount of funds. Through the corporate finance method the required amount of fund is not available for small and medium size projects. So the acquisition of advanced technology is not possible to these projects. Legal risk of projects under corporate finance is involved from low to medium level. A considerable amount of respondents 59.3 percent opined that, legal risk is low, 40.7 percent of respondents opined it is neither high nor low. Unlike project finance in this financing structure so many project parties and the agreements between them are not involved. Lenders are also very confident about their loans repayment, because it is on-balance sheet financing. It gives them the right on sponsoring company assets.

Political risk of the projects is low for the projects which are using corporate finance. From the total 63 percent of respondents opined that, political risk is low and 29.6

percent of respondents opined, this is neither high nor low. In this method of financing major part of funds used from internal sources. These projects not required much of foreign funds which effected by government policies pertaining to the devaluation of currency. Some respondents opined that, their projects political risk is high, because of bureaucratic delays for late approval of the projects clearances.

Environmental risk of power projects under corporate finance is medium. Majority of the respondents opinions plotted in between low to high levels in the scale. A considerable amount of opinions 44.4 percent have been indicated this risk neither high nor low. 29.6 percent of respondents opined this risk is low because, most of them have developed green belt, and proper fly ash management techniques (making ash bricks). 25.9 percent of respondents opined, this risk is high, for most of the projects this risk arise in terms of delay in obtaining clearances from forest department.

Regulatory risk of the power projects under corporate finance is medium. From the total 59.3 percent of respondents opined, this risk is neither high nor low and 25.9 percent of respondents opined, it is low. It is because of (corporate finance mostly used by government power projects) framing regulations (the regulatory authorities go for public hearing they will take all parties opinions) by considering all parties opinions in public hearing. However, the regulations (of different state regulatory authorities) had a less affect on government power projects, because they are supported by the governments.

5.7.3 Equity Finance vs. Project Risks

Equity is the key protection against risks in power projects. And banks want to see more equity contribution made in the early life stage of the project. It acts as a cushion against the risk. The fact is equity will be hit first in the event of any problems before the debt is affected. Equity finance is the part of total capital which is provided by the promoters as their share of capital. It is risk free and non-time bounded capital. Under this method the risk of the power projects is less and the projects which used this method also less, because, it is scarce capital. Under this financing the financial risk of power projects is not same for all kinds of projects. Out of the total sample, 50 percent of respondents opined that, level of this risk is low, and 50 percent opined, it is high. The reasons for low level of this risk are: capital provided by the promoters at the initial stage of projects, no need to pay dividend immediately on this capital, so that the cost of capital on this capital can be avoided. 50 percent respondents opined that the financial risk is high under equity financing method. Because, lack of sufficient equity funds the loss is occurred to the projects.

Construction risk is not similar to all projects from the select sample under equity financing. 50 percent of respondents opined construction risk is very low. The reason mentioned by them is, at the beginning stage of the projects equity is used, which is available with the promoters, which will avoid the cost of capital on funds used for the construction of project. The other 50 percent of respondents opined, it is high because of insufficient equity fund (which is used at the early stages of the project) construction work delayed which causes for increasing construction cost.

Operating risk under equity financing is low. For the projects under equity finance, 100 percent of respondents opined that, their projects had a low level of operating risk. These projects are hydro electric projects, for them no input problem is occurred, finally there is no problem of input prices increasing, etc. Technology risk is high for these projects. 100 percent of respondents opined, their projects technology risk is high, because of technology obsolescence. The survey observed that, these projects are old and the used technology is outdated. To acquire new technology, additional funds required, and arranging new funds is a big problem to the projects now. Equity method cannot provide the required amount of funds to acquire the new technology.

Legal risk of the power projects under equity financing is very high. 100 percent of the respondents opined it, which are using this financing method. In the selected sample the equity is used only by small hydro projects. The cost of hydro project construction and maintenance of the projects are high, where as the tariff fixed by the concern state distribution authorities is less. To avail provisional tariffs from concern state power corporations on cost plus basis some projects filed suits against concern state power corporations. Because of limited equity, the projects are unable to produce bulk amount of production, which leads to increase of per unit cost of production. If other capitals adopted and used, they can expand their capacity of power production that can be reduced per unit cost. Political risk of power projects under equity is from low to medium level. 50 percent of respondents opined that, their projects political risk is low and the remaining 50 percent respondents opined, their projects political risk is neither high nor low. Environmental risk of these projects is high. 100 percent of respondents opined it. They opined that, this risk occurred in the form of delay in getting clearances from forest department. Regulatory risk is also high for the projects because the tariff is fixed by the regulatory authorities, which is less than the cost of per unit.

5.7.4 Debt Finance vs. Project Risks

Debt is the main source of fund to finance the power projects. Now-a-days projects sponsors are using from 75 percent to 80 percent of debt funds in their total capital structure. The debt financing method is used by six power projects out of these projects, 66.6 percent respondents opined that, it is “high”, because, the precariousness in fund availability, and the frequent changes in the interest rates of the commercial banks. The fluctuations in interest rates cause for the loss of power projects. This is not similar for all kinds of projects, because, it is dependent on flotation and fixed interest rates on debt. Apart from this so many projects raised foreign currency loans. For this kind of loans frequent changes in currency value is majorly affecting the projects to increase this risk. The remaining 16.7 percent of respondents opined that, this risk is “low” for their projects and another 16.7 percent of respondents opined, this risk is “very high” for their projects.

Construction risk under debt financing is from medium to low level in the projects. 66.7 percent of opinions plotted in the middle and left side of the scale, because, the availability and accessibility of debt finance, avoided the delays in construction of their projects. Debt financing method is used by medium and big size projects. They must arrange the EPC contract with other parties to complete the project within the time duration. 33.3 percent of respondents opined that, the construction risk is high, because, the projects are constructing in coastal areas in most of the states, the nature of soil is causes for the presence of construction risk.

The operating risk of the projects under debt finance is more. 50 percent of respondents opined that, their projects operating risk is high, 33.3 per cent of respondents opined, this risk is neither high nor low. The major reason for high level of this risk is, input supply problem. Domestic coal is not sufficient for producing power. Due to this, most of the large projects are importing coal from other countries which is very costly than the domestic coal. This increased cost leads to operating loss/risk.

The opinions of the respondents indicating the degree of technology risk of the projects under this method is spread equally on the both sides of the scale. In the sample 50 percent of the responses plotted in the left side of the scale, 33.3 percent of responses plotted in the right side of the scale. In this selected sample, technologically advanced projects (which are using super critical technology) and technologically poor projects both are equally included. For large projects huge amount of debt funds were available, and they can afford the costly technology. Whereas, medium and small projects, which are using this method, cannot afford the advanced technology because, it is very costly. The important thing here to identify is, for getting more coal efficiency large projects are importing technologically advanced turbines from foreign countries, which reduce the cost of per unit. So it can be reduced the technological risk of the projects.

Legal risk of power projects under debt financing is high. In the selected sample 33.3 percent of respondents opined that, the legal risk is high. The remaining proportion of the responses equally plotted in all categories indicating different levels of risks in the scale. The high level of legal risk occurred due to violation of terms in credit contracts by the lenders, etc. Political risk of the power projects under debt financing is high. 50 percent of respondents opined that, the political risk is high, because the debt financing is used by large thermal projects, which needs the local coal mines. The local governments are delaying and sometimes denying the permissions for captive coal mines due to certain environmental problems. It leads to make a huge loss from the high priced imported coal. Apart from this corruption and bribery are also increasing the political risk. A considerable amount of respondents 33.3 percent opined, the political risk is low, because these projects are the government/public sector projects.

Regarding environmental risk of the power projects, 50 percent of respondents opined that, their projects environmental risk is high, and 33.3 percent of respondents opined it is low. The high level of risk involved because of these projects are large, the required clearances are not available in time due to bureaucratic delays for late approvals, and in some states the local environmental protection groups oppose the projects in that locations. Some projects had the problem of disposing fly ash and other waste materials dumping.

Regulatory risk of the projects under debt financing is high. 66.7 percent of respondents opined it. Most of the projects which are using this method of financing are the private sector projects, which are more worried about power tariffs and other regulatory activities. For the government power projects this risk is less.

5.7.5 Partnership/ JV's vs. Project Risks

Partnership/ venture capital financing is other method of financing for power projects. Out of the total selected sample only "nine" power projects are adopted this method. In India this method of financing is still new, it is slowly getting attention from the promoters of the projects. Among the projects which are adopted this method of financing, 55.6 percent of respondents opined, the financial risk is "very low" and they mentioned the reason for it is, they have good partners and the good terms and conditions with them, and the responsibilities of the partners are well defined. The remaining 44.4 percent of respondents have been opined that, their projects risk is "high", because of frequent violation of terms of partnership agreement by the project partners.

Construction risk under the partnership/ venture capital financing is high. 100 percent of responses plotted on the right side of the scale. 66.7 percent of respondents opined this risk is "high", and 33.3 percent of respondents opined it is "very high". The respondents revealed that, the high level of this risk occurred due to partner's delay of arranging capital. This leads to the cost overruns and delays in completion of projects. Ultimately it resulting the increase of interest payments and extending the repayment duration. In power sector most of the projects following this method of financing are belongs to the government sector, especially the NTPC jointly developing power facilities with other state governments. Central Regulation Commission (CRC) specified the proportion of equity investment of NTPC. That level should not exceed by NTPC in its investment. Actually the projects required high amount of equity funds to reduce various kinds of risks. But the NTPC has no flexibility to put excess equity for reducing the construction risk.

The operating risk of the power projects under partnership/ venture capital financing is medium. The responses are equally representing on the both sides of the scale. 55.6 percent of respondents opined this risk level is low. The reasons revealed by the respondents are: they had own coal mines and also long term input supply agreements with coal India ltd, for continuous supply of coal. If the prices of input increase it can be off-set by the increased amount of revenues. And 33.3 percent of respondents opined that, their projects operating risk is high. According to the opinions of the respondents, funds whatever they are allocating to the projects, are not using for power facility creation or expansion. High portion of that amount goes to the maintenance of the plants. Here the important thing to be remembered is O&M contracts will be arranged after two years from the initial start or construction of the plant, and then the O&M contract will be arranged until that maintenance of the plant was a major problem.

The technology risk of the power projects under partnership/ venture capital financing is from medium to high level. 55.6 percent of respondents opined that, technology risk is high. The main reason for it is the cost of the advanced technology. To reduce this burden, now-a-days most of the projects inviting technology manufacturers as a partner in the project to bring the technology as their part of investment. For ex: the Karnataka Power Corporation Ltd (KPCL) and BHEL jointly constructing the Raichur thermal power station latest phase. In this project BHEL bringing technology and equipment as its part of capital. In one way, it will satisfy the technology requirement of the project, but offering partnership share is loss to KPCL.

Legal risk under Partnership/ venture capital financing is medium. 55.6 percent of respondents opined, legal risk is neither high nor low. 44.4 percent respondents opined it is low. As per their opinions, the partnership agreements must be strong enough between the project and the partners. For those projects, in the early stages of construction and operation defaults would not be occurred.

Political risk under partnership/ venture capital financing is in between medium to high levels. 44.4 percent of respondents opined that, their power projects political risk is high, because in different states the rules of land acquisition are different. Local politics affect the prices of lands which are required for project construction generally which gives the scope to local political parties to raise allegations/objections. Similarly the decision for the allotment of local mines influences by other factors such as political factors, the government policies of import, customs duties on imported coal and the government decisions regarding allotment of coal to private sector projects. All these factors will create political risk to the projects.

Environmental risk under partnership/ venture capital financing is high. The reasons for it are problem of fly ash disposal, failure of developing green belts around the plant, strong opposition from environmental protection groups, etc. 22.2 percent of respondents opined that, environmental risk is low because they are using super critical technology and pollution controlling measures which reduce the environmental risk. Regulatory risk under partnership/ venture capital financing is high. 44.4 percent of respondents opined that, regulatory risk is high because, the risks arise in granting licences/permits etc in the form of delay. 33.3 percent of respondents opined that it is low.

5.7.6 Debt & Equity Finance vs. Project Risks

Debt and equity is the other method of financing for power projects, both sources will be used in different proportions, based on the availability of those capitals. It is on-balance sheet financing. The equity part is provided by the promoters, and the debt will be raised from different sources of lenders. Under this method of financing 162 power projects are operating. Financial risk is one kind of risk in those projects. More than half of the respondents 74.7 percent opined, their power projects financial risk is high, because of the high cost of capitals. Frequent changes in interest rates on debt, are leads to the payment of excess interest rates to the lenders. For foreign currency loans sudden fluctuations in currency value are increasing this risk.

Construction risk under debt and equity method of financing is high. 78.4 percent of respondents opined that, this risk is from high to very high level. It is because of the nature of soil. Soil nature (strong or loose soils) is delaying the most of power projects especially in coastal areas. Some projects are not constructed in according to the specifications, which leads to a shortfall in capacity and efficiency. Some projects are not arranging turnkey contract (Engineering Procurement and Construction (EPC) contract and other construction contracts etc. because of all these factors the construction is high. To mitigate this risk equity should be used at the initial stage of construction and the debt should be used in later stages of the projects. This kind of mechanism can avoid the cost payment on capital in initial stage and ultimately it reduces the total financial risk by reducing interest rate risk.

Operating risk under debt and equity method of financing is high. 31.5 percent of respondents opined that, it is medium (neither high nor low), 39.5 percent of respondents opined it is high. And the remaining 29 percent of respondents opined it is low. The reason for high level of operating risk is input supply problem. Domestic coal is not sufficient, due to this most of the large projects importing coal from other countries, which is very costly. This increased cost leads to the occurrence of operating loss/risk. Input availability for renewable energy fuels is un-predictable, less dependable and more expensive than non-renewable it will frequently interrupt the production of power which leads to operating loss. Delay in O&M contract arrangement, the O&M contracts are arranged after two years of initial start of the plant, and then the O&M contract will be arranged. Until that maintenance of the plant was the major problem. All these factors lead to the increase of operating risk of the projects.

Technology risk under debt and equity method of financing is high. 43.8 percent of respondents opined that, their projects operating risk is high, because the technology of many hydro projects (which are established long back) is obsolescence. This leads to low performance of the plant than the expected level. Replacement of old technology by the new technology require huge amount of funds, which cannot provided by this method of financing at initial stage of projects.

Legal risk under debt and equity method of financing is low. 38.9 percent of respondents opined that, their projects legal risk is low. The reason is violation of contracts by parties is less. 19.1 percent of respondents opined, their projects legal risk is high, because the grant of permission for sale of certain proportion of power in the open market by some projects (IPP's) but later on it is withdrawn by the government and it created legal problems. Finally the legal issues pertaining to fixing tariff per unit, etc., are also cause for the legal risk.

Political risk under debt and equity method is average. Its responses were equal in the both sides of the scale. 35.2 percent respondents opined, this risk is low, because unchanged tax advantages for new power projects from a long period of time, political stability in most of the states in India, etc. 35.2 percent responses plotted in the right side of the scale because, corruption, bureaucratic factors for late approvals, foreign exchange control problems, etc.

Environmental risk under debt and equity method of financing is low. 52.5 percent of responses plotted in the left side of the scale. The reasons for low level of this risk are, the projects which are adopted or using this method of financing are having the super critical technology, which reduces the pollution in environment. They are also implementing proper plans for disposal of fly ash (dumping in empty coal mines) etc. Regulatory risk under debt and equity method of financing is high. 50 percent of responses plotted in the right side of the scale. The reasons for high level of regulatory risk are: sub-standard government regulatory actions, ineffective license policies and tariffs settings, etc. 23.5 percent of respondents opined, their power projects regulatory risk is at low level.

However, from the above analysis it can be concluded that, the method of financing influences the level of various risks in power projects vice -versa. The level of risks in the projects absolutely influences the selection of suitable method of financing. The analysis from the above table 5.7, it can be clearly understand that the relationship between the financing methods and the level of various risks.

5.7.7 Financial Risk vs. Financing Methods

From the analysis it is clear that the overall financial risk of the projects from the selected sample of 379 projects is “high”. Out of the total sample 48.8 percent of respondents opined that, their projects financial risk is high. If we see the analysis from each financing method point of view, financial risk is low under “project finance”, “equity” and “partnerships/venture financing” methods. Among these three methods “equity” and “partnerships/venture financing” used by very few projects(0.5 percent and 2.4 percent of power projects respectively from the total selected sample) where as the “project finance” method is used by huge number of power projects (45.6 percent of total selected sample), the reasons are given above. However, the results of project finance are more reliable, because, it is representing large number of projects in the total sample. For the projects under “corporate finance”, “debt finance”, and “equity & debt financing” methods, the financial risk is high. The contributing factors for increasing financial risk are given above. It is obvious from the above analysis, the use of “project finance” method is only can reduced the financial risk in large number of projects from the selected sample. Based on this analysis, it is suggested that “project finance” method is an appropriate method of financing to reduce financial risk in power projects.

5.7.8 Construction Risk vs. Financing Methods

The overall construction risk of the power projects in total selected sample is “high”. Here, the noticeable thing is under all kinds of financing methods this risk is high, because, it is the result of the non availability of the funds at the right time and at right amount. Among all kinds of financing methods project finance is better to handle this risk. If it sees, the respondents’ opinions are equally distributed on the both sides of the scale but little bit edge in the right side of the scale. From the total responses 43.3 percent plotted in the left side of the scale and 45.1 percent plotted in the right side. There is a little difference i.e. 1.8 percent between two groups of projects, which are having low level of construction risk and high level of construction risk. Keeping view to this it is suggested that, better to adopt project finance method to reduce the construction risk.

5.7.9 Operating Risk vs. Financing Methods

The overall operating risk of the power projects from the selected sample is "low" (54.1 percent of the respondents opined from the total sample of the study). The power projects under "project finance", "equity financing" and "partnerships/venture financing" have low level of operating risk. Under project finance 84.4 percent of the respondents (from the total projects 173) have indicated their responses as low on the left side of the scale. Under equity finance 100 percent of the respondents (from the total projects 2) indicated their responses as low in the left side of the scale. Under "partnerships/venture financing" 55.6 percent of the respondents (from the total projects 9) indicated their responses as low in the left side of the scale. In future the power projects can adopt any one of these three methods of financing. Most probably the project finance is the right choice because its results are more concurrent than other financing methods. Due to this it is used by large number of power projects in selected sample of the study.

5.7.10 Technology Risk vs. Financing Methods

The overall technology risk of power projects in total selected sample is "low". (49.6 percent of respondents opined from the total sample of the study) among all kinds of financing methods the projects under project finance and debt finance had low level of technology risk. For the "project finance", the left side of the scale indicates 77.5 percent of responses and for the "debt finance" 49.9 percent of responses plotted in the left side of the scale. It means the technology risk is low for these two methods. The projects under other financing methods had high level of technology risk; the reasons for it are given above. As per the results of this analysis, it is suggested that, better to adopt any one of those two financing methods to reduce the technology risk. But most preferable method among those two is "project finance"

5.7.11 Legal Risk vs. Financing Methods

The overall legal risk of the power projects in total selected sample is "high". (40.9 percent of the respondents opined from the total sample of the study) among all kinds of financing methods the projects under "corporate finance" (59.3 percent of projects in 27 projects), "partnerships/venture financing" (44.4 percent of projects in 9 projects) and "equity and debt" (42.6 percent of projects in 162 projects) methods have low level of legal risk. Under other financing methods the projects have high level of legal risk. Based on this analysis it is suggested that, better to adopt any one of those financing method mentioned above, to reduce the legal risk of the power projects. The preferable method is corporate finance, because most of the power projects which are used it have low level of legal risk. Unlike project finance it involves less number of agreements with the project participants.

5.7.12 Political Risk vs. Financing Methods

The overall political risk of the power projects is "low" (47 percent of the respondents opined from the total sample). Except the "debt finance" and "partnerships/venture finance", the projects under other financing methods have low level of political risk. Under project finance 57.2 percent of projects (from the total of 173 projects), under corporate financing 63 percent of projects (from the total of 27 projects), and under equity and debt method 35.2 percent projects (from the total of 162 projects) have low level of political risk. Based on this analysis it is suggested that, better to adopt the corporate finance to reduce the political risk of the power projects. Project finance is the second preferred method of financing to reduce the political risk of the power projects.

5.7.13 Environmental Risk vs. Financing Methods

The overall environmental risk of the power projects is "low". (40.3 percent of the respondents opined from the total sample). The environmental risk is low for the projects under project finance (51.5 percent of projects opined from 173 projects), and "equity and debt" (54.3 percent of projects opined from 162 projects), under corporate finance it is average (44.4 percent of projects opined from 27 projects) for the other financing methods environmental risk is high, but in the total representative sample environmental risk is low, because, the large number of projects adopted project finance and equity and debt methods for financing. Based on this analysis it is suggested that adopting any one of these two methods is best for the power projects to reduce the environmental risk.

5.7.14 Regulatory Risk vs. Financing Methods

The overall regulatory risk of the power projects is "low". (44.4 percent of the respondents opined from the total sample). For corporate finance method regulatory risk is medium (59.3 percent of projects opined from 27 projects), the regulatory risk of the power projects under project finance is low (64.8 percent of projects opined from 173 projects), for the other methods of financing it is high. The analysis shows that, the use of project finance reduce the regulatory risk in the projects.

Table 5.8: Financing Methods and the Degree of Risks in Power Projects, in India.

Financing Method	**Financial Risk**	**Construction Risk**	**Operating Risk**	**Technology Risk**	**Legal Risk**	**Political Risk**	**Environmental Risk**	**Regulatory Risk**	**Total Risk**
Project Finance	Low	High	Low	Low	High	Low	Low	Low	Low
Corporate Finance	High	High	High	High	Low	Low	Medium	Medium	High
Equity Finance	Low	High	Low	High	High	Low	High	High	High
Debt Finance	High	High	High	Low	High	High	High	High	High
Partner ship's/jv's	Low	High	Low	High	Medium	High	High	High	High
Debt & Equity	High	High	High	High	Low	Low	Low	High	High

The above table 5.8 shows, the summary of the financing methods vs. various risks in power projects vice-versa. Among all financing methods of power projects, project finance kept most of the risks as low (such as, financial, operating, technology, political, environmental and regulatory risks) the overall risk of this method is at low level. For the remaining methods the overall risk is at "high" level. Several respondents revealed that, according to the future requirements to reduce various types of project risks, project finance method is suitable. Partnership's/Jv's, is also suitable method to reduce the risks but its acceptance and adaptability in India is low because, it is new concept to Indian promoters of power projects.

Again to prove the study hypothesis of "financing method influences the degree of internal risks in power projects", and "external risks influence the selection of financing method in power projects", Chi-square test was used. The test is applied for every type of risk.

The Pearson Chi-square statistic tests, whether the two variables are independent or not. If the significant value is small enough (conventionally *sig*. must be less than 0.05) then the null hypothesis can be rejected. It means the variables are independent and gain confidence in the hypothesis that they are in some way related. The analysis of the hypothesis is given below.

5.8 Chi-Square Model

The degree of freedom (DF) is equal to:

$$DF = (r - 1) \text{x} (\text{c} - 1)$$

Where 'r' is the number of levels for one categorical variable, and 'c' is the number of levels for the other categorical variable.

The expected frequency counts are computed separately for each level of one categorical variable at each level of the other categorical variable. Compute r X c expected frequencies, according to the following formula.

$$E_{\mathrm{r}}c = \frac{(n_{\mathrm{r}} \text{x}\, nc)}{n}$$

where $E_{r,c}$ is the expected frequency count for level **r** of variable A and level **c** of variable B, n_r is the total number of sample observations at level r of variable A, n_c is the total number of sample observations at level **c** of variable B, and n is the total sample size.

The test statistic is a chi-square random variable (λ^2) defined by the following equation.

$$\lambda^2 = \sum \frac{(O_{\mathrm{r}}c - E_{\mathrm{r}}c)^2}{\mathrm{E_r c}}$$

where $O_{r,c}$ is the observed frequency count at level **r** of variable A and level **c** of variable B, and $E_{r,c}$ is the expected frequency count at level **r** of variable A and level **c** of variable B.

To show the influence of financing methods on project risks in power projects in India, the study formulated a hypothesis, which includes four sub-hypothesis. They are:

Hypothesis (H)1: Financing method influences the internal risks in power projects.

H1a: Financing method influences the financial risk in power project.

H1b: Financing method influences the construction risk in power project.

H1c: Financing method influences the operating risk in power project.

H1d: Financing method influences the technology risk in power project.

Table 5.9: Chi-Square Test between Financing Methods and Internal Risks of the Power Projects

Relationship	Particulars	Pearson Chi-Square	Likelihood Ratio	Linear-by-Linear Association	Result
Relationship between Financing methods and Financial risk	Value	210.933	229.663	92.431	Accept
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0	
Relationship between Financing methods and Construction risk	Value	127.223	146.519	63.051	Accept
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0	
Relationship between Financing methods and Operating risk	Value	165.673	182.649	81.406	Accept
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0	
Relationship between Financing methods and Technology risk	Value	131.642	154.227	83.415	Accept
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0	

Table 5.9 shows that, the outcome of chi-square statistics. The Pearson chi-square statistic tests whether the two variables are independent or not. If the significant value is small enough (conventionally *sig.* must be less than 0.05) then the null hypothesis deemed to be rejected. The P-value is the probability of observing a sample statistic as

extreme as the test statistic. The value likelihood ratio confirms the main chi-square result. The detailed analysis of each sub-hypothesis is given below.

H1a: Financing method influences the financial risk in power project

The calculated value of chi-square statistic is 210.933, the degree of freedom is 20, and the Asymp. Significance value is 0.000. The total number of cases considered for the analysis is 379. Here, it can be observed that the *P-value* is lesser than 0.05 ($P < 0.05$) so, it is highly significant. It means the method of financing influences the financial risk in power projects. Hence, the hypothesis can be accepted.

H1b: Financing method influences the construction risk in power project

The calculated value of chi-square statistic is 127.223 the degree of freedom is 20, and the Asymp. Significance value is 0.000. The total number of cases considered for the analysis is 379. Here, it can be observed that the *P-value* is lesser than 0.05 ($P < 0.05$) so, it is highly significant. It means the method of financing influences the construction risk in power projects. Hence, the hypothesis can be accepted.

H1c: Financing method influences the operating risk in power project

The calculated value of chi-square statistic is 165.673 the degree of freedom is 20, and the Asymp. Significance value is 0.000. The total number of cases considered for the analysis is 379. Here, it can be observed that the *P-value* is lesser than 0.05 ($P <0.05$) so, it is highly significant. It means the method of financing influences the operating risk in power projects. Therefore, the hypothesis can be accepted.

H1d: Financing method influences the technology risk in power project

The calculated value of chi-square statistic is 131.642 the degree of freedom is 20, and the Asymp. Significance value is 0.000. The total number of cases considered for the analysis is 379. Here, it can be observed that the *P-value* is lesser than 0.05 ($P < 0.05$) so, it is highly significant. It means the method of financing influences the technology risk in power projects. Therefore, the hypothesis can be accepted.

From the above analysis it is observed that, the hypotheses H1a, H1b, H1c and H1d, P-values are lesser than the level of significance 0.05 ($p < 0.05$). Hence, all sub-hypotheses can be accepted, through this, the main hypothesis: "financing method influences the internal risks of the project" also can be accepted.

Hypothesis (H) 2: External risks influence the selection of financing methods in power projects.

H2a: Legal risk influences the selection of financing methods in power project.

H2b: Political risk influences the selection of financing methods in power project.

H2c: Environmental risk influences the selection of financing methods in power project.

H2d: Regulatory risk influences the selection of financing methods in power project.

Table 5.10: Chi-Square Test between Project External Risks and the Selection of Financing Methods in the Power Projects

Relationship	Particulars	Pearson Chi-Square	Likelihood Ratio	Linear-by-Linear Association	Result
Relationship between Legal risk and the selection of financing methods	Value	118.658	133.775	38.530	Accept
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0	
Relationship between Political and the selection of financing methods	Value	96.769	117.438	31.536	Accept
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0	
Relationship between Environmental risk and the selection of financing methods	Value	97.728	94.448	94.448	Reject
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0.331	
Relationship between Regulatory risk and the selection of financing methods	Value	105.333	111.701	66.465	Accept
	df	20	20	1	
	Asymp. Sig. (2-sided)	0	0	0	

H2a: Legal risk influences the selection of financing methods in power project

The calculated value of chi-square statistic is 118.658, the degree of freedom is 20, and the Asymp. Significance value is 0.000. The total number of cases considered for the analysis is 379. From the analysis, given in the table, it can be observed that the *P-value* is lesser than the level of significance 0.05 ($p < 0.05$) so, it is highly significant. It means, the legal risk is influencing the method of financing in power projects. Hence, the hypothesis can be accepted.

H2b: Political risk influence the selection of financing methods in power project

The calculated value of chi-square statistic is 96.769, the degree of freedom is 20, and the Asymp. Significance value is 0.000. The total number of cases considered for the analysis is 379. From the analysis, given in the table it can be observed that the *P-value* is lesser than the level of significance 0.05 ($p < 0.05$) so, it is highly significant. It means, the political risk is influencing the method of financing in power projects. Therefore, the hypothesis can be accepted.

H2c: Environmental risk influences the selection of financing methods in power project

The calculated value of chi-square statistic is 97.728, the degree of freedom is 20, and the Asymp. Significance value is 0.33. The total number of cases considered for the analysis is 379. From the analysis, given in the table it can be observed that the *P-value* is greater than the level of significance 0.05 ($p > 0.05$) so it is insignificant. It means, the environmental risk is not influencing the method of financing in power projects. Therefore, the hypothesis is deemed to be rejected.

H2d: Regulatory risk influences the selection of financing methods in power project

The calculated value of chi-square statistic is 105.333, the degree of freedom is 20, and the Asymp. Significance value is 0.000. The total number of cases considered for the analysis is 379. From the analysis, given in the table it can be observed that, the *P-value* is lesser than the level of significance 0.05 ($p < 0.05$) so, it is highly significant. It means, the regulatory risk is influencing the method of financing in power projects. Hence, the hypothesis can be accepted.

From the above analysis, it is observed that the hypothesis H2 has four sub-hypotheses among all except H2c the remaining H2a, H2b, and H2d are significant and can be accepted. Hence, the main hypothesis: “external risks influence the selection of financing methods in power projects” also can be accepted.

The relationship between method of financing and project risks from the above analyses (H1 and H2) shown with the help of a diagram given below, which represent various internal, and external risks of the projects, financing methods and the relationship involved among them. The arrows show the direction of the influence between the variables.

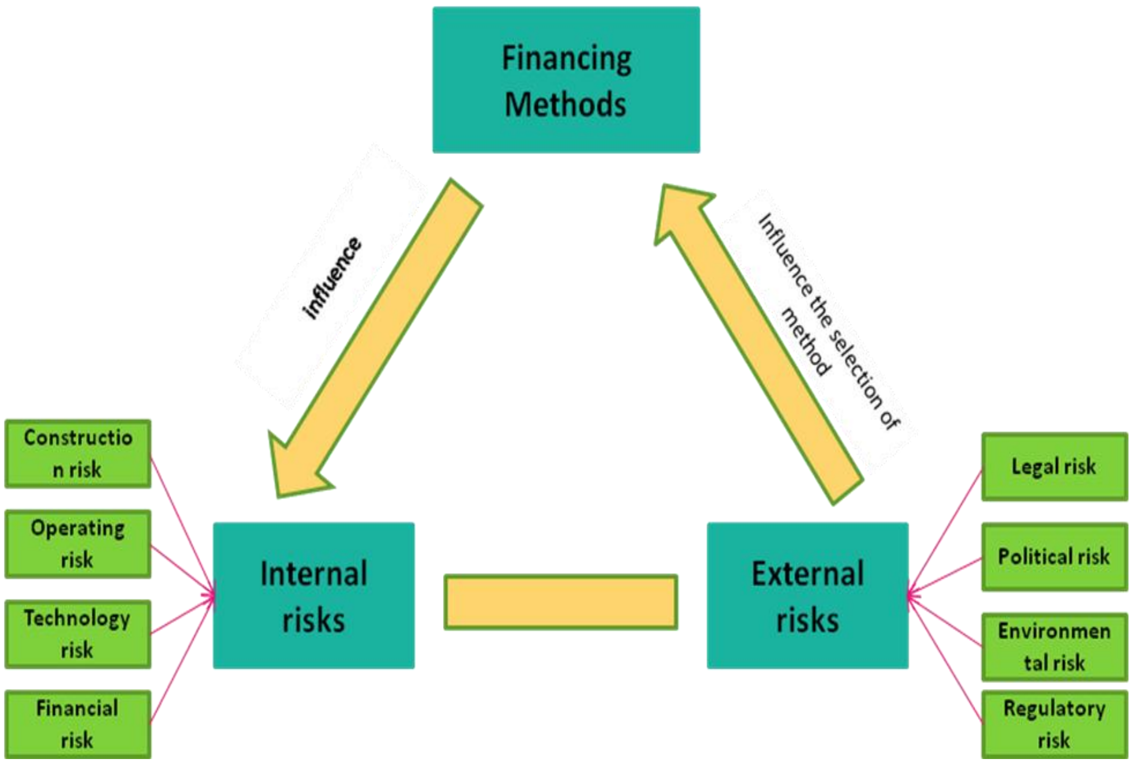

Fig 5.3: Relationship between the Methods of Financing and Project Risks.

Table 5.11: Summary of Hypothesis between the Method of Financing and Project Risks

Hypothesis	Relationship	P-value	Result
H1a	Financing method ------- Financial risk	0.000 (P < 0.05)	Accept
H1b	Financing method ------- Construction risk	0.000 (P < 0.05)	Accept
H1c	Financing method ------- Operating risk	0.000 (P < 0.05)	Accept
H1d	Financing method ------- Technology risk	0.000 (P < 0.05)	Accept
H2a	Legal risk ------- Selection of financing methods	0.000 (P < 0.05)	Accept
H2b	Political risk ------- Selection of financing methods	0.000 (P < 0.05)	Accept
H2c	Environmental risk --- Selection of financing methods	0.33 (P > 0.05)	Reject
H2d	Regulatory risk ------- Selection of financing methods	0.000 (P < 0.05)	Accept

5.9 Financing Methods – Problems in Its Implementation

Several issues arise while implementing financing methods in the project. The study identified various issues, which creates problems in power projects while implementing financing methods in India. They are: sudden requirement of huge capital, increasing interest rates, deciding debt and equity ratio, ESCROW a/c takes more time to arrange, initial terms are violated by creditors, extra time required by banks to release loans, influence of project-specific factors, risk sharing problems, poor credit rating of promoters, delay in fund supply/ loan installment by creditors and changes in money value for foreign debt.

These problems are not same to every project; they depend on the method of financing used by the project, and the agreements between the project and the creditors. However, the study gets the responses from the select sample of 379 power projects in India. The number of projects that are facing each problem is shown in the list given below.

Table 5.12: Problematic Issues in Indian Power Projects while Implementing the Financing Methods

Sl: no	Problematic Issues in Power Projects while Implementing the Financing Methods	Number of Projects.
1	No problems	186
2	Sudden requirement of huge capital	11
3	Increasing interest rates	46
4	Problem of deciding debt& equity ratio	31
5	ESCROW a/c takes more time to arrange	3
6	Initial terms are violated by creditors	3
7	Extra time required by banks to release loans	1
8	Influence of project-specific factors	16
9	Risk sharing problem	15
10	Poor credit rating of promoters	22
11	Delay in fund supply/ loan installment by creditors	17
12	Changes in money value for foreign debt	28

If it sees the table 5.12 contains the problems of power projects while using a particular method of financing. 186 power projects have no problems with their financing methods.

Among all problems revealed by the respondents, increasing interest rates is the major problem, which is arising in many projects (46 projects). The next important problem is problem of the debt and equity ratio (31 projects). The all other problems are arising in a few projects only.

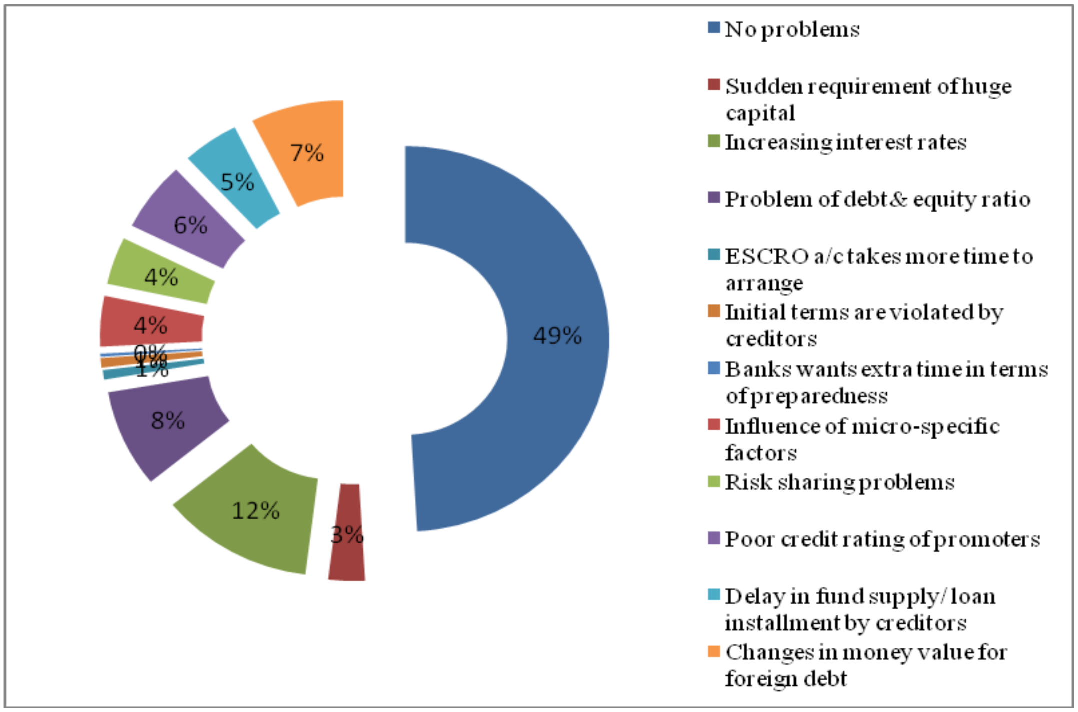

Fig 5.4: Problems Occurred in Indian Power Projects, while Implementing Financing Methods

The above pie chart represents the problems occurred in power projects and the percentage of the projects in the total select sample from the power sector in India.

5.10 Suitable Method of Financing – Respondents Perceptions

The power projects are using several financing methods; each method is different from that of other method. While using each method, the projects are facing so many problems, those are mentioned above. To avoid those problems and to suggest most suitable method of financing, the study surveys the opinions of the respondents, regarding the best method of financing. As per their opinions several methods are identified. The details are given in the table 5.13.

Table 5.13: The Respondents Perceptions, Regarding the Best Method of Financing

Sl: No	Financing Method	Number of Respondents
1	Equity	9 (2.37)
2	Debt	66 (17.41)
3	Project Finance	134 (35.36)
4	Debt & Equity	115 (30.34)
5	Recourse Financing	21 (5.54)
6	Consortium Based Finance	22 (5.80)
7	Corporate Finance	1 (0.26)
8	Joint Ventures	11 (2.90)

Table 5.13 shows that, project finance is the elevated method of financing. Several projects (134 projects) prefer this method. The nest highest preferred method of financing is debt and equity (115 projects). Then the debt finance (66 projects). And the other methods are preferred by only less number of projects.

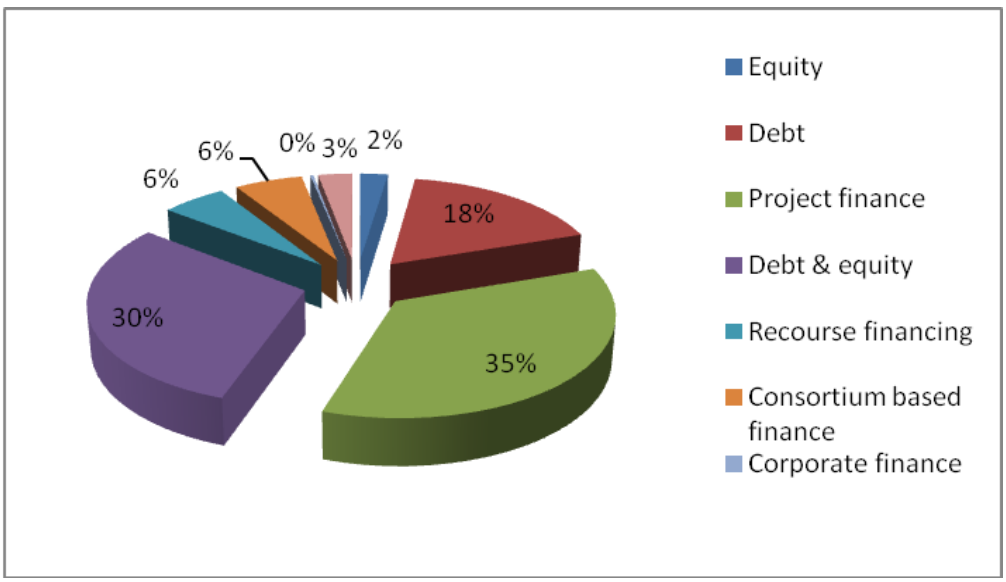

Fig 5.5: Diagram Representing Perceptions of the Respondents, Regarding the Best Method of Financing

The above pie chart shows that, the percentage of the waitage given to each method of financing. Among the total respondents 35 percent of the respondents suggested that, project finance is the best method of financing. 30 percent of the respondents suggested that, the debt and equity method is the best method of financing. However, in most of the situations project finance is proved as the most suitable method of financing for power projects.

5.11 Factors Influencing the Debt Finance – Garrett Ranking Technique

Debt is the major source of financing to the power projects. In India traditionally the investment is made by the government from its budgetary allocations, and from the support of government sponsored financial agencies. Now the trend is changed the promoters bring their own funds in the form of equity. Now–a-days projects are financed by using off-balance sheet financing methods or non-recourse financing methods. In this kind of financing mechanism major part of financing is involve debt, and remaining is equity (it is 80:20 ratios). It shows that, the importance of debt in financing structure of the power projects. The debt finance need to be tapped from various sources of domestic and international, which includes direct market borrowing, banks and all India financial institutions, power finance corporation, multilateral/ bilateral credits, syndicated loans etc. There are essentially three types of debt financings: borrowing, corporate bonds, and trade debt. But getting debt funds from the lenders is not an easy thing. They consider so many factors and require several things from the project. If those are satisfied by the (by providing required information and the necessary documents) by the projects, then they accept to provide the loans to the projects. Here, the difficult task to the projects is providing the required information and necessary documents to the creditors in time. In this process there are several factors influencing the debt financing.

The study considered few factors which are influencing the debt funds according to their severity of influence the respondents are asked to rank those variables from rank five to rank one. It means the highest number of the rank given to highly influencing factor and lowest number of rank given to least influencing factor. This kind of ranking is required for the Garratt ranking analysis. Based on the respondents opinion the study try to identify the most influencing and least influencing factors of debt financing of the power projects in India. The details of the survey are given in the table 5.14.

Table 5.14: Survey Results of the Total Ranks Given to Each Factor Influencing the Project Debt Finance.

Ranks	Project Risks	Interest Rates	Term of Financing	Demand for funds at the point of Time	Fear of Assets & Liability Mis-match
5	174	90	36	44	36
	45.9 %	23.7%	9.5%	11.6%	9.5%
4	95	82	116	32	54
	25.1%	21.6%	30.6%	8.4%	14.2%
3	90	56	156	67	10
	23.7%	14.8%	41.2%	17.7%	2.6%
2	18	145	56	154	6
	4.7%	38.3%	14.8%	40.6%	1.6%
1	2	6	15	82	273
	5%	1.6%	4%	21.6%	72%

To identify the most influencing and least influencing factors, according to their severity of influence, Garrett ranking technique is used. It is scientifically very reliable for giving ranks to factors. Its computation procedure is given below:

$$\text{Percentage position} = \frac{100 \times (Rij - 0.5)}{Nj}$$

Where,

R_{ij} = Rank allotted to the i^{th} factor by the j^{th} individual, and

N_j = Total number of factors ranked by the j^{th} individual.

The percentage of responses for each rank was further converted into scores by using the Garret's table (See Annexure - VI). Then the scores of all respondents assigned to each factor and they will be added. The resultant sum is divided by the total number of sample. Next, the mean scores of all the items arranged in a descending order and ranks allotted to them according to the scores obtained.

Table 5.15: Ranks Allotted to the Determinants of the Debt Finance, Under the Garret's Ranking Method

Sl: no	Factors Influencing Debt	Total Scores	Mean Scores	Ranks	No: of Respondents
1	Project Risks	27370	72.22	1	379
2	Interest Rates	21050	55.54	2	379
3	Term of Financing	20990	55.38	3	379
4	Demand for Funds at the Point of Time	14990	39.55	4	379
5	Fear of Assets & Liabilities Mis-match of Financing Institutions	10430	27.52	5	379

The table 5.15 shows the factors influencing the debt, total scores and the mean scores of each variable. Based on the mean scores, the variables ranks are allotted. According to garret's rank table the first rank is allotted to the variable whose mean score is highest. This procedure continued to the remaining variables to give further ranks.

The first rank allotted to "project risks". It means it is the most influencing factor for the selection of debt finance to finance power projects. The project risks includes, input availability risk, financial risk, construction risk, operating risk, technology risk, legal risk, political risk, environmental risk and regulatory risk, etc. In India political and regulatory risks are very high. The initial stage of the project involves undesirable high level of risks. So the banks must aware of lending during initial stage of the project which is highly risky. Generally those undesirable high levels of risks create volatility in cash inflows of the project, which lead to the delay in repayment schedules.

The second rank is alloted to "interest rates", the use of any capital mainly based on its cost of capital. The rate of intrest is generally high for short-term loand and it is low for long-term loans. Some times it will depends on the availability of funds. The intrest rates on debt fund decided by the providers of the funds. Based on it the companies will take the decisions whether to use debt funds or to go for alternative sources of financing.

The third rank is alloted to "demand for funds at the point of time". It shows that, if the demand for the funds suddenly increases in the market, all companies rush to get funds at a time, and the scarcity of funds will arise. It will also influence the availability of debt funds. Ultimately it will influence the selection of debt financing of the power projects.

Fourth rank is alloted to “the term of financing” it also has a significant impact on the selection of debt financing. Here the prominent thing is it will link with the intrest rates and the assets and liabilities mis-match of the financial institutions. Based on the term of finance the fund providers decides the rate of intrest.

Fifth rank is alloted to “fear of assets and liabilities mis-match” of the financial institutions. It is major obstacle for the power companies, to get the funds from financial institutions. Especially, in short-term loans if the companies are failed to repay the loan intime, it will effect thef balancing of assets and liabilities of financial institutions. So the fear of financial institutions influences the debt financing of power projects.

The above analysis is shown by using “radar” diagram. It includes the factors influencing the debt capital and the ranks given by the respondents.

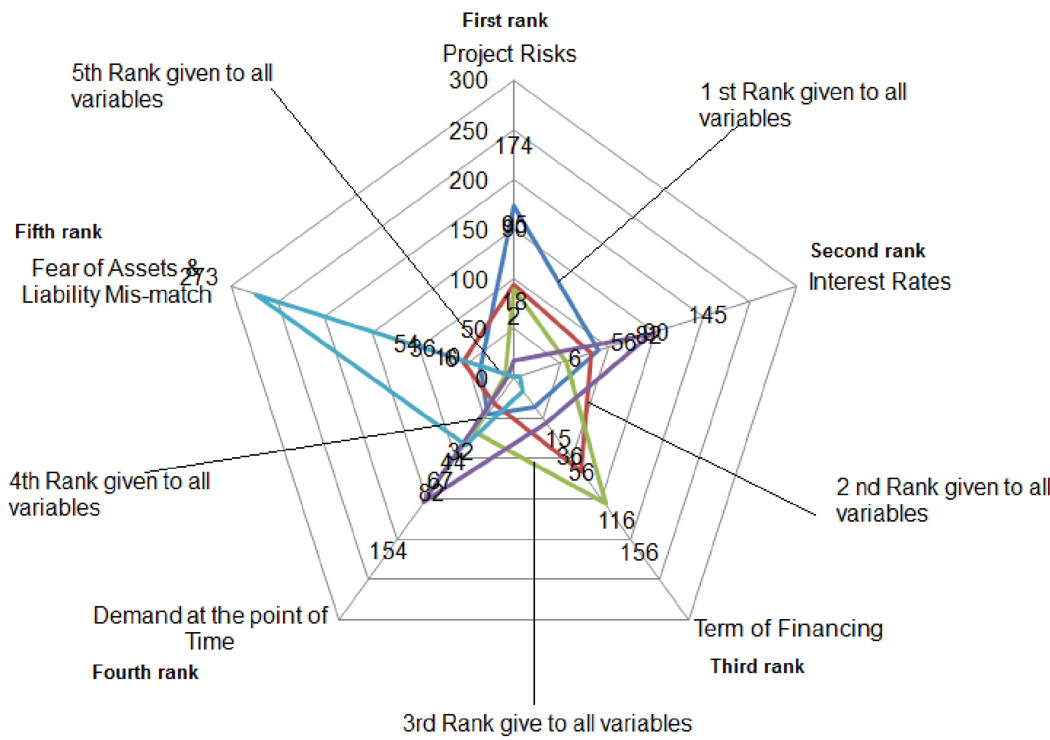

Fig 5.6: Radar Diagram Represents the Factors Influencing the Debt Capital and the Ranks Given by the Respondents.

The above radar diagram represents the five factors, included in this part of the study which influences the debt financing. It also represents the scores given by the respondents. It can be observed from the diagram, the inside circles representing, the ranks given by the respondents to all variables.

However, the analysis clearly shows that, the relationship among all variables. Interest rates linked with term of financing and demand at the point of time. The term of financing closely relates to “assets and liabilities mis-match” of the financial institutions. If the power companies fail to repay the loan especially short-term loans intime, it will lead to the problem of mis-match of assets and liabilities of financial institutions and bankers.

For the projects to overcome these hurdles the sectoral cap of lending should be removed. This enables the banks to provide large amount of loans to power projects. Through the study it is found that, the respondents have given the first rank to “project risks”. It means this factor has major influence on debt financing of power projects in india. To overcome this problem the projects should prepare thorough plans of all activities, before going to aproach the creditors. And also the promoters should get all clearances either statutory or non-statutory, in time. They should convince and take the acceptance from the people at the plant location for land acquisition and they should provide good compensation and other rehabilitation facilities to the people who lost their lands for project. This will avoid major risk of the projects.

Another important thing is environmental issues, the promotors should take all necessary precautions for reducing pollution and other hazards in the plant location. This ensures the environmental groups and the ministry of environment to reduce pollution. To overcome this problem, it is better to take the help of advanced technology, and try to adopt good fly ash management techniques.These measures enable the projects to reduce another major component of risk. Finally, for reducing the risk of projects, the promotors should design a suitable risk mitigating mechanism/framework. And the promotors should provide complete information of all these things to creditors, to show how the project will mitigate the risks. This information helps to convince the creditors for getting required amount of funds. The second rank is given to “demand for funds at the point of time"; it means the demand for debt funds in the financial market. It is also major factor influencing the debt availability. To handle this problem, and to get sufficient funds in-time, an active bond market should be developed. It can increase the flow of long-term funds and reduce reliance on banks.

The Indian government has taken several steps for the development of domestic debt market, but development of debt market is not at the expected level. The government should encourage studies on this issue, and try to identify the drawbacks or the shortfalls of its policies, to take further steps for the development of domestic debt market. Third rank is given to "term of financing", generally creditors provide finance for short period of time, but power projects require long term loans. The maturity period of loan influences the interest rate charged by banks. Interest rates typically rise with loan maturity. To get long term loans at lower interest rate, projects should provide strong security arrangements. Fourth rank is given to "interest rates" the interest rate charging on loan funds, is depending on both the maturity and risk of the loan. To reduce interest on debt, the promoter's creditworthiness will help. The last and fifth rank is given to "fear of assets and liability mis-match" of the financial institutions. "Many power projects require long-term financing when banks provide such funds, they will expose to a maturity mismatch". With this fear banks hesitating to provide finance. To overcome this problem it is better to take short-term loans and making prompt payment, keeping very strong relations between project and creditors. However, a history of borrowing and prompt payments indicates to lenders that the borrower takes his obligations seriously.

SECTION - III

RISK ANALYSIS OF POWER PROJECTS IN INDIA

5.12 Introduction

The development of new projects involves various risks, including, input availability risk, regulatory risk, construction risk, financing risk, etc. In India political and regulatory risks are very high. Some risks are homogeneous and some risks are heterogeneous to the project which is depending on the project conditions, government policies, investment decisions and other factors of the power companies. However, the literature says that, risk is common to every project, but the question is how to reduce it? The answer for this we can found in several ways. Once the projects risks are identified, the likelihood of its occurrence assessed and its impact on the project can be determined. To reduce these risks the sponsors must allocate those risks to various parties involved in the project. Some times by using a suitable method of financing it can be reduced. Esty, (2002) suggested that "by isolating the asset in a standalone project company, project finance reduces the possibility of risk contamination". According to Farrell, (2003) "through recourse financing" the risk can be reduced. Here, the important thing the project sponsor should notice, i.e., the existence of direct relationship between the sponsor's debt to assets ratio and risk. Miller, & Lessard, (2000) said that "the sponsor can decrease the risk of the project by entering in to a variety of contracts".

The development of power projects in India is in a blossoming stage, and the developers have to face many risks involved in the development of these projects. These risks are generally present in the projects, but in India it needs special consideration because, credibility to meet the contractual obligations by state owned monopolies (power purchaser, fuel supplier and transporter) is very poor. However, there are some major risks described by various participants of the projects (developers, investors and contractors) those risks are adopted by this study to analyse its degree of existence. The outcome of the analysis is given below:

Table 5.16: The Degree of Risks in the Power Projects in India

Risk	Very Low	Low	Neither High nor Low	High	Very High
Financial Risk	33	71	86	185	4
	8.7%	18.7%	22.7%	48.8%	1.1%
Construction Risk	24	64	47	162	82
	6.3%	16.9%	12.4%	42.7%	21.6%
Operating Risk	67	138	82	62	30
	17.7%	36.4%	21.6%	16.4%	7.9%
Technology Risk	67	121	87	102	2
	17.7%	31.9%	23.0%	26.9%	.5%
Legal Risk	12	124	88	87	68
	3.2%	32.7%	23.2%	23.0%	17.9%
Political Risk	44	134	85	95	21
	11.6%	35.4%	22.4%	25.1%	5.5%
Environmental Risk	90	99	54	111	25
	23.7%	26.1%	14.2%	29.3%	6.6%
Regulatory Risk	59	109	91	118	2
	15.6%	28.8%	24.0%	31.1%	.5%

From the above table it can be observed that, the financial risk of the projects from the selected sample is “high”. Out of 379 representative sample, 48.8 percent of respondents opined that their projects financial risk is high. Construction risk of the power projects in total selected sample is “high”. From the total sample, 64.3 percent of respondents supported it, and said that their projects financial risk is high. Operating risk of the power projects in total selected sample is “low”. 54.1 percent of respondents have had this opinion. Similarly, technology risk of power projects in total selected sample is “low”, which is opined by 49.6 percent of respondents from the total sample. Legal risk of the power projects in total selected sample is “high”. 40.9 percent of respondents opined it. Political risk of the power projects is “low”. 47 percent of respondents have expressed their opinions it is low for the projects. Environmental risk of the power projects is “low”. It is said by 40.3 percent of respondents from the sample survey. Regulatory risk of the power projects is “low”. 44.4 percent respondents opined it.

5.13 Relationship between Project Risks and Size of the Project

In India, different capacities of power projects operating in both public and private sectors. All projects involved various kinds of risks, but for all power projects the levels risks not similar, due to several factors which caused for varying the same risk differently in the projects which are operating in different capacity levels of production. However, there is no single research on it, to understand the real trend. This part of the study attempts to identify and prove whether the risks are similar to all sizes of power projects or not. To test this phenomenon the study divided all kinds of power projects in to five categories. They are:

- < 10 MW projects,
- 10-50 MW projects, 50-100 MW projects,
- 100-500 MW projects and
- >500MW projects.

The details of projects involved in each category or level of capacity are given below.

Table 5.17: Projects with Different Installed Capacities of Production

Capacity	**Frequency**	**Percent**
<10MW	80	21.1
10MW-50MW	91	24
50MW-100MW	28	7.4
100MW-500MW	71	18.7
>500MW	109	28.8
Total	379	100

To test the relationship between project size and project risks, the study selected “eight” kinds of risks such as financial risk, construction risk, technology risk, operating risk, legal risk, regulatory risk, environmental risk, political risk. The details of the degree of these risks in each category of projects, and the percent of perceptions of respondents on “Likert” five point scale given below.

Table 5.18: Size of the Projects (in Terms of Capacity) vs. The Degree of Risks

Project Size	Financial Risk					Construction Risk					Operating Risk					Technology Risk				
	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high
<10MW	9	13	19	39	0	15	10	9	26	20	25	28	12	11	4	20	33	7	20	0
	11.3%	16.3%	23.8%	48.8%	.0%	18.8%	12.5%	11.3%	32.5%	25.0%	31.3%	35.0%	15.0%	13.8%	5.0%	25.0%	41.3%	8.8%	25.0%	.0%
10MW-50MW	1	16	40	32	2	5	18	14	42	12	22	33	15	18	3	26	37	15	12	1
	1.1%	17.6%	44.0%	35.2%	2.2%	5.5%	19.8%	15.4%	46.2%	13.2%	24.2%	36.3%	16.5%	19.8%	3.3%	28.6%	40.7%	16.5%	13.2%	1.1%
50MW-100MW	1	3	2	22	0	0	3	3	17	5	2	10	8	6	2	2	10	8	7	1
	3.6%	10.7%	7.1%	78.6%	.0%	.0%	10.7%	10.7%	60.7%	17.9%	7.1%	35.7%	28.6%	21.4%	7.1%	7.1%	35.7%	28.6%	25.0%	3.6%
100MW-500MW	6	14	14	37	0	2	13	3	29	24	8	22	11	14	16	8	18	23	22	0
	8.5%	19.7%	19.7%	52.1%	.0%	2.8%	18.3%	4.2%	40.8%	33.8%	11.3%	31.0%	15.5%	19.7%	22.5%	11.3%	25.4%	32.4%	31.0%	.0%
>500MW	16	25	11	55	2	2	20	18	48	21	10	45	36	13	5	11	23	34	41	0
	14.7%	22.9%	10.1%	50.5%	1.8%	1.8%	18.3%	16.5%	44.0%	19.3%	9.2%	41.3%	33.0%	11.9%	4.6%	10.1%	21.1%	31.2%	37.6%	.0%
TOTAL	33	71	86	185	4	24	64	47	162	82	67	138	82	62	30	67	121	87	102	2
	8.7%	18.7%	22.7%	48.8%	1.1%	6.3%	16.9%	12.4%	42.7%	21.6%	17.7%	36.4%	21.6%	16.4%	7.9%	17.7%	31.9%	23.0%	26.9%	.5%

Cont…….

Project Size	Legal Risk					Political Risk					Environmental Risk					Regulatory Risk				
	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high
<10MW	2	19	18	22	19	12	11	17	29	11	37	25	4	13	1	12	23	12	31	2
	2.5%	23.8%	22.5%	27.5%	23.8%	15.0%	13.8%	21.3%	36.3%	13.8%	46.3%	31.3%	5.0%	16.3%	1.3%	15.0%	28.8%	15.0%	38.8%	2.5%
10MW-50MW	5	9	19	30	28	23	26	14	23	5	30	24	9	21	7	32	18	12	29	0
	5.5%	9.9%	20.9%	33.0%	30.8%	25.3%	28.6%	15.4%	25.3%	5.5%	33.0%	26.4%	9.9%	23.1%	7.7%	35.2%	19.8%	13.2%	31.9%	.0%
50MW-100MW	0	15	2	8	3	1	12	4	10	1	3	14	1	5	5	3	8	2	15	0
	.0%	53.6%	7.1%	28.6%	10.7%	3.6%	42.9%	14.3%	35.7%	3.6%	10.7%	50.0%	3.6%	17.9%	17.9%	10.7%	28.6%	7.1%	53.6%	.0%
100MW-500MW	2	37	13	12	7	4	40	16	11	0	12	22	14	21	2	4	28	24	15	0
	2.8%	52.1%	18.3%	16.9%	9.9%	5.6%	56.3%	22.5%	15.5%	.0%	16.9%	31.0%	19.7%	29.6%	2.8%	5.6%	39.4%	33.8%	21.1%	.0%
>500MW	3	44	36	15	11	4	45	34	22	4	8	14	26	51	10	8	32	41	28	0
	2.8%	40.4%	33.0%	13.8%	10.1%	3.7%	41.3%	31.2%	20.2%	3.7%	7.3%	12.8%	23.9%	46.8%	9.2%	7.3%	29.4%	37.6%	25.7%	.0%
TOTAL	12	124	88	87	68	44	134	85	95	21	90	99	54	111	25	59	109	91	118	2
	3.2%	32.7%	23.2%	23.0%	17.9%	11.6%	35.4%	22.4%	25.1%	5.5%	23.7%	26.1%	14.2%	29.3%	6.6%	15.6%	28.8%	24.0%	31.1%	.5%

The above table shows, various categories of power projects and different kinds of risks involved in power projects in India. The scale measurement levels indicate from very low to very high. The number of respondents opinions indicated on different points in the scale for different project risks.

While calculating the total risk of the project category, capacity level <10 MW, from the above table the left and right sides the scale scores of all risks are combined, also the middle of the scale scores are combined to get the overall percent of the opinions in each side of the scale, so that, to conclude the overall risk of this category. From the total sample of 379 power projects, 80 projects belong to this capacity. All projects include the selected risks. The above table shows "eight" kinds of risks, for each risk 80 respondents have given their opinions. For all selected risks the total number of 640 opinions indicated. Among this, the overall percent of respondents perceptions in the left side of the scale is 45.9 percent, and the total percent of perceptions in the right side of the scale is 38.75 percent. Therefore, it is concluded that the overall risk of the project in this category is "high".

In 10 MW - 50 MW capacities category, 91 power projects are representing from the total sample. Among all these projects 44.64 percent opinions fall in the left side of the scale, 36.4 percent responses fall in the right side of the scale. Therefore, it is concluded that the overall risk of the project in this category is "low". In 50 MW – 100 MW category 28 power projects are representing from the total sample. Among all these projects 38.83 percent of opinions fall in the left side of the scale, and 47.77 percent of opinions fall in the right side of the scale. Therefore, it is concluded that the overall risk of the project in this category is "high".

In 100MW – 500 MW category 71 power projects are representing from the total sample. Among all these projects 42.25 percent of opinions fall in the left side of the scale, and 36.97 percent of opinions fall in the right side of the scale. Hence, it is concluded that the overall risk of the project in this category is "low". In the final category of > 500MW 109 power projects are representing, among these projects 35.55 percent of opinions fall in the left side of the scale and 37.39 percent of responses fall in the right side of the scale. Thus, it is concluded that the overall risk of the project in this category is “high”.

From the analysis given in the table above, the conclusions regarding degree of risks Vs size of power projects given in the table 5.19.

Table 5.19: Analysis of Size of the Projects Vs Degree of Risks in the Power Projects.

Project capacity	**Total risk**
<10MW	High
10MW-50MW	Low
50MW-100MW	High
100MW-500MW	Low
>500MW	High

From the review of literature a hypothesis is formulated to test the relationship between project risks and size of project. To prove the above phenomenon statistically, and to test the formulated hypothesis Kruskal-Wallis H test was used. Because, the data used for this analysis was scaled (Likert scale) data and it was not having normality. Therefore, the use of this technique is appropriate for the data. The formulated hypothesis and other sub-hypotheses, description of the test model, and results are given below.

The Kruskal-Wallis test is the nonparametric test it is equivalent to the one-way ANOVA and an extension of the Mann-Whitney U test. It will allow the comparison of more than two independent groups. It is used when there is a need to compare three or more sets of scores, which come from different groups. As the Kruskal-Wallis test does not assume normality in the data and is much less sensitive to outliers. It can be used when these assumptions have been violated and the use of the one-way ANOVA is inappropriate. In addition, if the data is ordinal and cannot be used a one-way ANOVA, this test can be used. The Kruskal-Wallis test ranks all data from all groups together; i.e., rank the data from 1 to *N* ignoring group membership. Assign any tied values the average of the ranks they would have received had they not been tied.

The test statistic is given by:

$$K = (N-1)\frac{\sum_{i=1}^{g} n_i(\bar{r}_{i\cdot} - \bar{r})^2}{\sum_{i=1}^{g}\sum_{j=1}^{n_i}(r_{ij} - \bar{r})^2},$$

Where:

n_i is the number of observations in group i

r_{ij} is the rank (among all observations) of observation j from group i

N is the total number of observations across all groups

$$\bar{r}_{i\cdot} = \frac{\sum_{j=1}^{n_i} r_{ij}}{n_i},$$

$\bar{r} = \frac{1}{2}(N+1)$ is the average of all the r_{ij}.

Notice that the denominator of the expression for K is exactly $(N-1)N(N+1)/12$ and $\bar{r} = \frac{N+1}{2}$. Thus

$$K = \frac{12}{N(N+1)}\sum_{i=1}^{g} n_i\left(\bar{r}_{i\cdot} - \frac{N+1}{2}\right)^2$$

$$= \frac{12}{N(N+1)}\sum_{i=1}^{g} n_i\bar{r}_{i\cdot}^2 - 3(N+1)$$

Notice that the last formula only contains the squares of the average ranks.

A correction for ties can be made by dividing K by $1 - \frac{\sum_{i=1}^{G}(t_i^3 - t_i)}{N^3 - N}$, where G is the number of groupings of different tied ranks, and t_i is the number of tied values within group i that are tied at a particular value. This correction usually makes little difference in the value of K unless there are a large number of ties.

Finally, the p-value is approximated by $\Pr(\chi^2_{g-1} \geq K)$. If some n_i values are small (i.e., less than 5) the probability distribution of K can be quite different from this chi-squared distribution. If a table of the chi-squared probability distribution is available, the critical value of chi-squared, $\chi^2_{\alpha:g-1}$, can be found by entering the table at $g-1$ degrees of freedom and looking under the desired significance or alpha level. The null hypothesis of equal population medians would then be rejected if. $K \geq \chi^2_{\alpha:g-1}$ Appropriate multiple comparisons would then be performed on the group medians.

If the statistic is not significant, then no differences exist between the samples. However, if the test is significant then a difference exists between at least two of the samples. The hypothesis and the sub-hypotheses are given below.

Hypothesis (H) 3: Project risks differ for each power project based on its level of capacity

H3a: Financial risk differs for each project in different level of capacity

H3b: Construction risk differs for each project in different level of capacity

H3c: Operating risk differs for each project in different level of capacity

H3d: Technology risk differs for each project in different level of capacity

H3e: Legal risk differs for each project in different level of capacity

H3f: Political risk differs for each project in different level of capacity

H3g: Environmental risk differs for each project in different level of capacity

H3h: Regulatory risk differs for each project in different level of capacity

To prove the above mentioned hypothesis, this test compares the different categories (in terms of capacity) of power projects. Also it measures the degree of project risks to all categories. The Kruskal-Wallis test operated by using SPSS 17.0, the outcome this test given in the table 5.20.

Table 5.20: Mean Ranks of Project Risks for Each Category of the Power Projects

Risk	Installed Production Capacity range of Projects	N	Mean Rank
Financial Risk	<10MW	80	186.12
	10MW-50MW	91	184.97
	50MW-100MW	28	240.89
	100MW-500MW	71	191.61
	>500MW	109	182.93
	Total	379	
Construction Risk	<10MW	80	176.99
	10MW-50MW	91	173.65
	50MW-100MW	28	209.95
	100MW-500MW	71	218.28
	>500MW	109	189.65

	Total	379	
Operating Risk	<10MW	80	157.39
	10MW-50MW	91	173.37
	50MW-100MW	28	215.89
	100MW-500MW	71	229.26
	>500MW	109	195.59
	Total	379	
Technology Risk	<10MW	80	163.23
	10MW-50MW	91	147.21
	50MW-100MW	28	209.57
	100MW-500MW	71	212.61
	>500MW	109	225.62
	Total	379	
Legal Risk	<10MW	80	214.23
	10MW-50MW	91	240.07
	50MW-100MW	28	166.39
	100MW-500MW	71	151.42
	>500MW	109	161.61
	Total	379	
Political Risk	<10MW	80	229.14
	10MW-50MW	91	170.42
	50MW-100MW	28	204.41
	100MW-500MW	71	162.07
	>500MW	109	192.11
	Total	379	
Environmental Risk	<10MW	80	128.79
	10MW-50MW	91	170.57
	50MW-100MW	28	201.54
	100MW-500MW	71	192.54
	>500MW	109	246.53
	Total	379	
Regulatory Risk	<10MW	80	202.26
	10MW-50MW	91	162.82
	50MW-100MW	28	221.70
	100MW-500MW	71	186.27
	>500MW	109	197.98
	Total	379	

The above table 5.20 shows the mean ranks of the various project risks for each category of projects. The table also shows the number of projects in each category of capacity under each risk. According to the mean ranks of selected risks, the conclusions are drawn and given below.

i. Financial risk is similar for every project in different capacity levels.
ii. Construction risk differs for each project in different capacity levels. According to mean score rank (218.28) for the projects between 100 MW - 500 MW capacities, this risk is high.
iii. Operating risk differs for each project in different capacity levels. According to mean score rank (229.26) for the projects between 100 MW - 500 MW capacities, this risk is high. And for the projects < 10 MW capacity this risk is low.
iv. Technology risk differs for each project in different capacity levels. According to mean score rank (225.62) for the projects between > 500 MW capacity, this risk is high. And it is low for the projects in between 10 MW - 50 MW capacities.
v. Legal risk differs for each project in different capacity levels. According to mean score rank (240.07) for the projects between 100 MW - 500 MW capacities, this risk is high. It is low for the projects in between 100 MW - 500 MW capacities.
vi. Political risk differs for each project in different capacity levels. According to mean score rank (229.14) for the projects < 10 MW capacity, this risk is high. It is low for the projects in between 100 MW - 500 MW capacities.
vii. Environmental risk differs for each project in different capacity levels. According to mean score rank (246.53) for the projects > 500 MW capacity, this risk is high. It is low for the projects < 10 MW capacity.
viii. Regulatory risk differs for each project in different capacity levels. According to mean score rank (221.70) for the projects between 50 MW -100 MW capacities, this risk is high. It is low for the projects between 10 MW -50 MW.

From the above analysis, it is concluded that the risks are not similar to all projects with different capacities of production. Only the financial risk is similar to all capacities of projects, the remaining risks such as: construction, operating, technology, legal, political, environmental and regulatory risks are not similar to all capacities of projects. The reasons are: irrespective of the capacity /size of the project, the availability of finance is depending on the promoters credibility, interest rates and inflation. First, to get sufficient amount of funds the promoters should have credit worthiness. If the promoter is credit worthy, the project will get the finance at a cheaper cost. Secondly, inflation affects every project, irrespective of its capacity or size. These factors made the financial risk similar to all capacities of projects.

Table 5.21: Kruskal-Wallis Test Statistic [a, b]

Test	Financial Risk	Construction Risk	Operating Risk	Technology Risk	Legal Risk	Political Risk	Environ Risk	Regulatory Risk
Chi-Square	7.868	9.742	21.64	36.651	43.172	19.696	60.828	10.349
df	4	4	4	4	4	4	4	4
Asymp. sig.	0.097	0.045	0.000	0.000	0.000	0.001	0.000	0.035

a. Kruskal Wallis Test
b. Grouping variable: installed production capacity range of projects

The Kruskal-Wallis test compares the medians of three or more groups. It is possible to have a tiny P – value, which is clear evidence that the population medians are different even if the distributions overlap considerably.

The rank table shows that the mean rank of the each risk for each category of projects. The test statistics table shows the Chi-square value (Kruskal-Wallis H), the degree of freedom and the value of significance level. From the data, based on Kruskal-Wallis test results compared different categories of the power projects, for measuring the degree of various risks in different projects, to know whether they are similar to all categories of projects or not.

H3a: Financial risk differs for each project in different level of capacity: The above rank table shows that the financial risk is similar to all categories of power projects. The test statistic table shows that, the chi-square value (Kruskal-Wallis H) is 7.868, the degree of freedom is 4 and the Asymp. Sig value is 0.097. The *P- value* is insignificant, because, it is greater than the level of significance at five percent ($P > 0.05$). Hence, the hypothesis is deemed to be rejected.

H3b: Construction risk differs for each project in different level of capacity: The construction risk is not similar to all categories of power projects. The statistic table shows that, the chi-square value (Kruskal-Wallis H), is 9.742, the degree of freedom is 4 and the Asymp. Sig value is 0.045. It is very near to the significant level of 0.05. The *P-value* is significant, because, it is lesser than the level of significance at five percent ($P < 0.05$). Therefore, the hypothesis can be accepted

H3c: Operating risk differs for each project in different level of capacity: The operating risk is not similar to all categories of power projects. The statics table shows that, the chi-square value (Kruskal-Wallis H), is 21.64, the degree of freedom is 4 and the Asymp. Sig value is 0.000. The *P- value* is significant, because, it is lesser than the level of significance at five percent ($P < 0.05$). Thus, the hypothesis can be accepted

H3d: Technology risk differs for each project in different level of capacity: Technology risk is not similar to all categories of power projects. The statics table shows that the chi-square value (Kruskal-Wallis H), is 36.651, the degree of freedom is 4 and the Asymp. Sig value is 0.000. The *P- value* is significant, because, it is lesser than the level of significance at five percent ($P < 0.05$). Hence, the hypothesis can be accepted.

H3e: Legal risk differs for each project in different level of capacity: Legal risk is not similar to all categories of power projects. The statics table shows that, the chi-square value (Kruskal-Wallis H), is 43.172, the degree of freedom is 4 and the Asymp. Sig value is 0.000. The *P- value* is significant, because, it is lesser than the level of significance at five percent ($P < 0.05$). Therefore, the hypothesis can be accepted.

H3f: Political risk differs for each project in different level of capacity: Political risk is not similar to all categories of power projects. The statics table shows that, the chi-square value (Kruskal-Wallis H), is 19.696, the degree of freedom is 4 and the Asymp. Sig value is 0.001. The *P- value* is significant, because, it is lesser than the level of significance at five percent ($P < 0.05$). Hence, the hypothesis can be accepted.

H3g: Environmental risk differs for each project in different level of capacity: Environmental risk is not similar to all categories of power projects. The statics table shows that, the chi-square value (Kruskal-Wallis H), is 60.828, the degree of freedom is 4 and the Asymp. Sig value is 0.000. The *P- value* is significant because it is lesser than the level of significance at five percent ($P < 0.05$). Hence, the hypothesis can be accepted.

H3h: Regulatory risk differs for each project in different level of capacity: Regulatory risk is not similar to all categories of power projects. The statics table shows, the chi-square value (Kruskal-Wallis H), is 10.349, the degree of freedom is 4 and the Asymp. Sig value is 0.035. The *P- value* is significant, because, it is lesser than the level of significance at five percent ($P < 0.05$). Hence, the hypothesis can be accepted.

In this analysis to prove the hypothesis, eight risks considered. To test the similarity of each risk in projects in different level of capacity, eight sub-hypothesis formulated. From this analysis it observed that, only the P-value of H3a (financial risk) is insignificant and the remaining sub-hypotheses such as: H3b, H3c, H3d, H3e, H3f, H3g, & H3h, P-values are significant. It means, from the given eight risks seven risks (above mentioned) are not similar in all categories of power projects. Based on these results the main hypothesis "project risks differ for each power project based on its level of capacity" can be accepted. The summary of outcome is given in the table 5.22.

Table 5.22: Summary of Hypotheses Shows the Relationship between Project Risks and Size of the Projects

Hypothesis	Relationship	P-value	Result
H3a	Financial risk ----- Project capacity	0.097 (P> .05)	Reject
H3b	Construction risk ----- Project capacity	0.045 (P< .05)	Accept
H3c	Operating risk ----- Project capacity	0.000 (P< .05)	Accept
H3d	Technology risk ----- Project capacity	0.000 (P< .05)	Accept
H3e	Legal risk ----- Project capacity	0.000 (P< .05)	Accept
H3f	Political risk ----- Project capacity	0.001 (P< .05)	Accept
H3g	Environmental risk ----- Project capacity	0.000 (P< .05)	Accept
H3h	Regulatory risk ----- Project capacity	0.035 (P< .05)	Accept

5.13.1 Model Indicating the Relationship among Size of the Project, Project Risk and the Method of Financing

From the above analysis, it is identified that there is a strong relationship among the size (capacity) of the project, project risks and the method of financing. It is observed that the projects have "high" level of risk which are in less than 10MW capacity and in between 50MW-100MW capacities and using "equity and debt" financing method. Projects in between 10MW-50MW, and 100MW-500MW capacities and using "project finance" method have "low" level of risk. Hence, it is proved in the analysis financing method vs.

risk, the projects which are using the "project finance" method of financing have a "low" level of risks, and the projects using remaining methods have a high level of risks. This means financing methods influencing the level of risk which is dependent on the size (capacity) of the projects. This analysis also shows that, except financial risk, remaining risks are not similar to the projects which are in the capacities mentioned above. This is because of "project finance" method, which helped to reduce the risks efficiently through various agreements with the parties involved in the project.

Based on the above analysis a model is developed to show the relationship among the projects with different capacities, project risk and the selection of financing method. The model is given in figure 5.7.

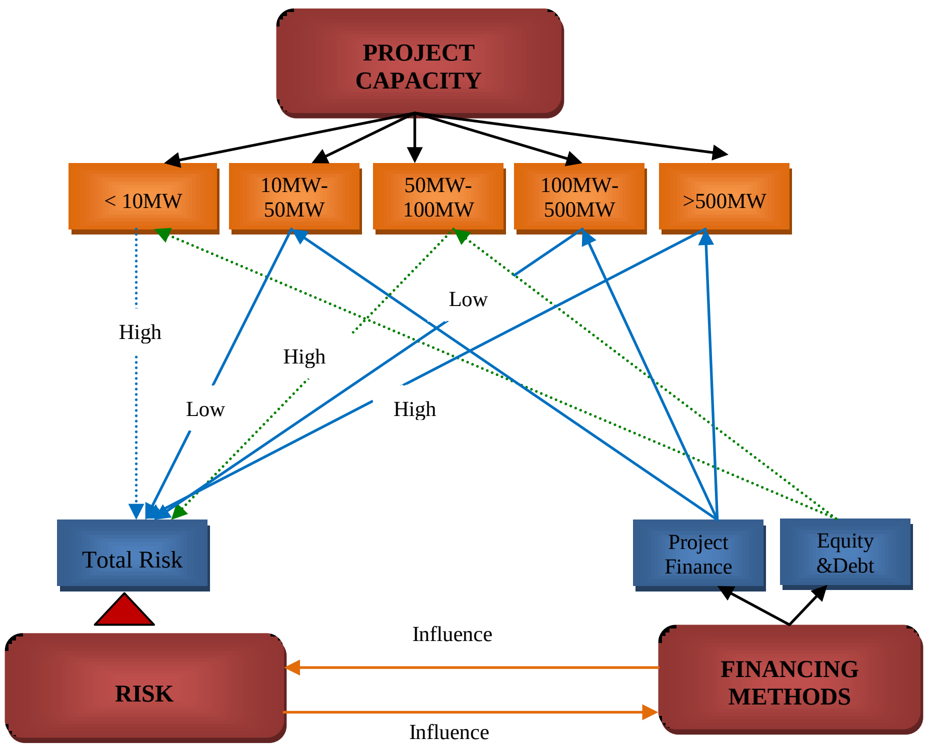

Fig 5.7: Relationship between Size of the Project, Financing Method and Risk

From the above figure we can observe that the method of financing which is having low level of risk in different sizes of projects. The level of risk is low for the projects which are using project financing method. This means that the method of financing has its impact on the level of risk.

SECTION - IV

FINANCIAL CLOSURE OF POWER PROJECTS

5.14 Time Duration for Obtaining Statutory Clearances

The early financial closure is required to start the power project early. Early financial closure required getting statutory clearances/approvals quickly from various government authorities. Financial closure of the project generally depends upon various statutory clearances for the projects, project agreements with the parties involved in the parties, etc. It also depends on the availability of debt financing and risk sharing among the parties involved in the project. The main reason for the promoters unable to achieve the early financial closure is the difficulty in obtaining project financing, especially equity finance. The lenders asked for different guarantees from the government, due to the unfavorable financial conditions in the state electricity boards of various states, which are the sole purchasers of electricity from the projects.

Due to delay in getting statutory clearances from various government authorities in India, most of the power companies started pulling out, and several projects frustrated with delays in obtaining clearances. The first high profile pull out in India was Mission Energy of the US, one of the largest US utilities. Then, there are others projects like Cogentrix, Electricity de France, the UK-based Power Gen and more recently Enron. Several others like AES Corporation, Daewoo of Korea and UK-based national power are sitting on the fence (The Economic Times Dec. 19, 2001).

Several project clearances required for the establishment of power projects. The present part of the study is pursuing the selected statutory clearances to identify the actual time duration taking for obtaining approvals from the government and other concerned authorities. The selected clearances are:

1. Water availability,
2. Off-take agreement,
3. Pollution control clearance (water and air),

4. Financing (equity),
5. Land acquisition,
6. Equipment procurement, and
7. Transportation of fuel.

According to the opinions of respondents the average time for obtaining selected statutory clearances is in between 2-10 months (details are given below). From the analysis it is identified that, land acquisition required more time than the other approvals. There are several reasons for the delay in land acquisition. According to Thomas, et al (2006) delay in land acquisition may occur due to litigations, non-availability of land, and administrative delay in land acquisition and, increase in cost of land.

Table 5.23: Average Time Duration for Obtaining the Statutory Clearances

Project Clearances	Average Time Duration in Months
Water Availability	2
Off-take Agreement	6
Pollution Control Clearance (Water and Air)	6
Financing	6
Land Acquisition Clearances	10
Equipment Procurement	8
Transportation of Fuel	3

The present part of the study wants to give some suggestions for early financial closure of the power projects in India. For this it identified some issues causes for the delay in the financial closure namely, statutory approvals from various government authorities, project agreements, preparing detailed feasibility report and arranging equity capital, etc. The literature shows that, among all these issues, delay in getting project approvals is the main cause for not achieving early financial closure by the projects. Therefore, the study selected some issues (statutory approvals given above) to identify which is more delaying project financial closure. Regarding this the opinions of the respondents are collected through the questionnaire survey. This study wants to compare both the public and private sector projects to identify the delay in getting selected approvals, whether similar for both the sectors or not. To test this phenomenon, the required hypothesis is formulated and given below.

Hypothesis (H) 4: Time duration to get statutory clearances differs for public and private sector power projects in India

As mentioned above the study considered various statutory approvals for public and private sector projects. To examine the similarity of time duration for obtaining each clearance for public and private sector projects. A separate sub-hypothesis formulated to support the main hypothesis.

H4a: The time duration for getting water availability clearance differs for public and private sector power projects

H4b: The time duration for getting off-take clearance differs for public and private sector power projects.

H4c: The time duration for getting pollution control clearance differs for public and private sector power projects

H4d: The time duration for getting financing (equity) clearance differs for public and private sector power projects

H4e: The time duration for getting land acquisition clearance differs for public and private sector power projects

H4f: The time duration for getting equipment procurement clearance differs for public and private sector power projects

H4g: The time duration for getting transportation of fuel clearance differs for public and private sector power projects

Mann-Whitney test U statistics test was used to compare the public and private sector power projects, in terms of time duration for getting clearances from various government authorities, to establish a power project. The study has identified, this test is appropriate for this analysis. Because, this is a non-parametric test, it doesn’t require the normality in data (the data used for this analysis is scaled (Likert scale) data, and it is not having normality).

5.14.1 Mann - Whitney Test Model

Mann - Whitney test is a non-parametric and equivalent of the independent t-test. This test was used to test difference between two conditions and different participants have been used in each condition.

For larger samples, a formula can be used:

1. Add up the ranks for the observations which came from sample 1. The sum of ranks in sample 2 follows by calculation, since the sum of all the ranks equals $N(N + 1)/2$ where N is the total number of observations.
2. U is then given by:

   $$U_1 = R_1 - \frac{n_1(n_1+1)}{2}$$

   Where n_1 is the sample size for sample 1, and R_1 is the sum of the ranks in sample 1.

   Note that there is no specification as to which sample is considered sample 1. An equally valid formula for U is

   $$U_2 = R_2 - \frac{n_2(n_2+1)}{2}.$$

   The smaller value of U_1 and U_2 is the one used when consulting significance tables. The sum of the two values is given by

   $$U_1 + U_2 = R_1 - \frac{n_1(n_1+1)}{2} + R_2 - \frac{n_2(n_2+1)}{2}.$$

   Knowing that $R_1 + R_2 = N(N + 1)/2$ and $N = n_1 + n_2$, and doing some algebra, we find that the sum is

   $$U_1 + U_2 = n_1 n_2.$$

The Mann - Whitney test is operated by using SPSS 17.0, the outcome of the analysis is given below.

Table 5.24: Mean Ranks of Statutory Clearances for each Category of the Public and Private Sector Power Projects in India

Statutory Clearance	Type of Organization	N	Mean Ranks	Sum of Ranks
Water Availability	Government	129	164.38	21204.50
	Private	250	203.22	50805.50
	Total	379		
Off-take Agreement	Government	129	174.62	22526.50
	Private	250	197.93	49483.50
	Total	379		
Pollution Control Clearance (Water and Air)	Government	129	174.78	22546.00
	Private	250	197.86	49464.00
	Total	379		
Financing (Equity)	Government	129	186.80	24097.00
	Private	250	191.65	47913.00
	Total	379		
Land Acquisition Clearances	Government	129	239.71	30922.50
	Private	250	164.35	41087.50
	Total	379		
Equipment Procurement	Government	129	204.13	26332.50
	Private	250	182.71	45677.50
	Total	379		
Transportation of Fuel	Government	129	168.80	21775.50
	Private	250	200.94	50234.50
	Total	379		

The above table shows that, the mean ranks of project statutory clearances for each category (public and private) of projects. From the above ranks it is clearly appearing, there is no difference in time duration for obtaining the financing (equity) approval and equipment procurement acceptance (from the equipment producers), between public and private sector projects. Whereas, in the remaining statutory approvals (mentioned above), large difference is existed between the public and private sector projects. The detailed test analysis is given below.

- For getting water availability approval / clearance, the time duration is not similar to all power sector projects. According to mean score rank (203.22) the private sector projects required more time to get this approval.
- The time duration for getting off-take clearance is not similar for public and private power sector projects. According to mean score rank (197.93) the private sector projects required more time to get this approval.
- The time duration for getting pollution control clearance is not similar for public and private power sector projects. According to mean score rank (197.86) the private sector projects required more time to get this approval.
- The time duration for getting financing clearance is identical to both public and private sector power projects.
- The time duration for getting land acquisition clearance is not similar for public and private power sector projects. According to mean score rank (239.71) the public sector projects required more time to get this approval.
- The time duration for getting equipment supply acceptance is similar to both public and private sector power projects.
- The time duration for getting acceptance for transportation of fuel is not similar for public and private sector power projects. According to mean score rank (200.94) private sector projects required more time to get this approval.

From the above analysis, it is observed that, financing and equipment supply approvals obtained quickly by the private sector, when it compare with the public sector. It is because, the private promoters paying market rate to the owners of acquired land. Regarding equipment they are not waiting for the domestic equipment. They importing equipment from foreign countries like China, and Korea, etc. The test statistic results of Mann-Whitney U test given in the table 5.25.

Table 5.25: Test Statistics[a] of Time Duration for obtaining Statutory Clearances for Public and Private Sector Power Projects in India

Test	Water Availability	Off-take Agreement	Pollution Control (Water and Air)	Financing	Land Acquisition	Equipment Procurement	Transportation of Fuel
Mann-Whitney U	12819.5	14141.5	14161.0	15712.0	9712.5	14302.5	13390.5
Wilcoxon W	21204.5	22526.5	22546.0	24097.0	41087.5	45677.5	21775.5
Z	-3.581	-2.051	-2.066	-.430	-6.905	-1.865	-2.958
Asymp. Sig. (2-tailed)	.000	.040	.039	.667	.000	.062	.003

a. Grouping Variable: Type of organization

H4a: The time duration for getting water availability clearance differs for public and private sector power projects: For water availability clearance/approval, Mann-Whitney U statistics value is 12819.5, Wilcoxon W is 21204.5, Z-score is -3.581 and the Asymp. Sig value is 0.000. It means the calculated *P- value*, is more significant since, it is lesser than the level of significance at 5 percent ($P < 0.05$). Based on this result, it is very clear that the time duration for water availability approval is not similar for public and private sector power projects. Hence, the hypothesis can be accepted. According to the mean ranks private sector projects required more time to get this clearance than the public sector projects.

H4b: The time duration for getting off-take clearance differs for public and private sector power projects: For off-take agreement, Mann-Whitney U statistics value is 14141.5, Wilcoxon W is 22526.5, Z-score is -2.051 and the Asymp. Sig value is 0.040. It means the calculated *P- value*, is more significant since, it is lesser than the level of significance at 5 percent ($P < 0.05$). From this analysis it can be understand that, the time duration for getting off-take agreement is not similar for public and private sector power projects. Therefore, the hypothesis can be accepted. The mean ranks show that, private sector projects required more time to get this clearance when it compared with public sector projects.

H4c: The time duration for getting pollution control clearance differs for public and private sector power projects: For the pollution control clearance, Mann-Whitney U statistics value is 14161, Wilcoxon W is 22546, Z-score is -2.066 and the Asymp. Sig value is 0.039 and it shows, the calculated *P- value*, is more significant, because, it is lesser than the level of significance at 5 percent ($P < 0.05$). The test results revealed that, the time duration for getting pollution control clearance is not similar for public and private sector power projects. Therefore, the hypothesis can be accepted. The mean ranks show that, private sector projects required more time to get this clearance.

H4d: The time duration for getting financing (equity) clearance differs for public and private sector power projects: For the financing clearance, Mann-Whitney U statistics value is 15712, Wilcoxon W is 24097, Z -score is -.430 and the Asymp. Sig value is 0.667. It is obvious the calculated *P- value* is insignificant because, it is higher than the level of significance at 5 percent ($P > 0.05$). The test results discovered that, the time duration for getting financing (equity) clearance is similar for public and private sector power projects. Therefore, the hypothesis is deemed to be rejected. The time duration for giving financing acceptance from equity investors is similar to public and private power projects.

H4e: The time duration for getting land acquisition clearance differs for public and private sector power projects: For the land acquisition clearance, Mann-Whitney U statistics value is 9712.5, Wilcoxon W is 41087.5, Z-score is -6.905 and the Asymp. Sig value is 0.000. It means the *P- value* is more significant, because, it is lesser than the level of significance at 5 percent ($P < 0.05$). It is the evidence to describe that, time duration for getting land acquisition is not similar for public and private sector power projects. The mean ranks show that, public sector projects required more time to get this clearance.

H4f: The time duration for getting equipment procurement clearance differs for public and private sector power projects: For the equipment procurement, Mann-Whitney U statistics value is 14302.5, Wilcoxon W is 45677.5, Z-score is -1.865 and the Asymp. Sig value is 0.062. It means the calculated *P- value* is insignificant, because, it is higher than the level of significance at 5 percent ($P > 0.05$). From the data it is identified that, the time duration for getting acceptance from equipment producers is similar for public and private sector power projects. . Hence, the hypothesis is deemed to be rejected.

H4g: The time duration for getting clearance for transportation of fuel differs for public and private sector power projects: For the transportation of fuel clearance, Mann-Whitney U statistics value is 13390.5, Wilcoxon W is 21775.5, Z-score is -2.958 and the Asymp. Sig value is 0.003. It means the calculated *P- value* is significant, because, it is lesser than the level of significance at 5 percent ($P < 0.05$). From this analysis it can be understand that, the time duration for getting approval for transportation of fuel from the transport agencies is not similar for public and private sector power projects. Hence, the hypothesis can be accepted. Accordingly, the mean ranks show that, private sector projects required more time to get this clearance.

Table 5.26: Summary of Hypotheses (Time Duration for obtaining Statutory Clearances for the Public and Private Sector Power Projects)

Hypothesis	Relationship	P-value	Result
H4a	Water availability ----- Public and private projects	0.000 (P< .05)	Accept
H4b	Off-take clearance ----- Public and private projects	0.040 (P< .05)	Accept
H4c	Pollution control ----- Public and private projects	0.039 (P< .05)	Accept
H4d	Financing (equity) ----- Public and private projects	0.667 (P> .05)	Reject
H4e	Land acquisition ----- Public and private projects	0.000 (P< .05)	Accept
H4f	Equipment procurement ----- Public and private projects	0.062 (P> .05)	Reject
H4g	Transportation of fuel ----- Public and private projects	0.003 (P< .05)	Accept

5.15 Investors Priorities for Investment

The main purpose of adopting the present part of the study is to analyse the investors perception and their priorities for investing funds in power projects. The investors of power sector mainly consider the project risks and its impact on project, to invest their funds. While investing in power projects they prefer to know about the risks and other important aspects which influence their investments. All investors including financial institutions and commercial bankers give their preference to the projects which are strong in project contractual arrangements and which are having creditworthy promoters.

The main requirement of the fund investors is; the project must provide all relevant documents for getting funds. These documents (contractual arrangements with input providers and output purchaser and relevant statutory clearances) only provide the confidence to the investors to take investment decision. Especially, power projects are very large and very complex projects, they have to provide several other documents than the above mentioned. To the project to acquire funds, there are two important sources, one is government sponsored financial institutions and the second is private financial institutions and commercial bankers. However, the private capital is required to satisfy the requirement of the funds in projects, because, the government merely cannot satisfy the entire requirement of funds. The availability of private capital and the rapid and continued growth of the power sector in India are linked with the continued growth of the country economy. The government should take proper measures to increase the growth of economy. It is true that, the further development of India's infrastructure is dependent on the formulation and effective implementation of programs and policies that facilitate and encourage private sector investments in infrastructure (Rao, & Rao, 2012).

To achieve the investment target and to develop the power sector both public and private investments are required. In this context, this study has been undertaken to identify, the investors' priorities to invest funds in power projects. Therefore, the study would help the projects to maintain or to focus on those priorities to attract investors. This study enables the projects to know the most important priorities and less important priorities of investors, to invest their funds. This study mainly tries to identify the investors perception on investing funds in the power projects. The present study hopes that, this would help the projects to know the investors requirements from the projects and also it helps the projects to equip themselves with all kinds of necessary security arrangements and contractual arrangements to satisfy the investors' requirements in-time, to get required amount of funds.

The study identified some priorities of investors while investing funds in power projects, and classified those in to two categories such as: primary priorities and secondary priorities. The fulfillment of primary priorities by the projects makes the investors to take investment decision. The secondary priorities also considerably important to the investors, but some time they can compromise without fulfillment of any one of those. The detailed explanation of those factors is given in the table 5.27.

Table 5.27: Investors Priorities for Investing Funds in the Power Projects

Investors Priorities	Primary (% of Respondents)	Secondary (% of Respondents)	Total no: of Respondents
Credibility of the promoter	100	0	379
Statutory clearances	100	0	379
Regulatory issues	42.2	57.8	379
Contract arrangements	92.1	7.9	379
Non-statutory clearances (land availability, fuel linkage and financing)	100	0	379
Project risks	77.8	22.2	379
Government support to project	48.8	51.2	379
Political support to project	14.8	85.2	379
Country specific factors	66.8	33.2	379
Environmental groups support to project	51.2	48.8	379
Strength of the project	74.1	25.9	379
Sector specific factors	58.3	41.7	379
Liquidity of the market	5.8	94.2	379

The above table shows that, the investors, priorities for investment of funds in power projects in India. The table also shows that, the total respondents' opinions on investors' priorities in the projects. From the above analysis the opinions of the respondents indicating the primary priorities of investors as: credibility of the promoter, statutory clearances, non-statutory clearances (land availability, fuel linkage and financing), contractual arrangements, project risks, country specific factors, environmental groups support to project, strength of the project, and sector specific factors. The remaining factors such as: government and political support to the project and liquidity of the market are the secondary priorities. From the above analysis the study draw a model for factors influence the investors investment decisions. The model given in the figure 5.8

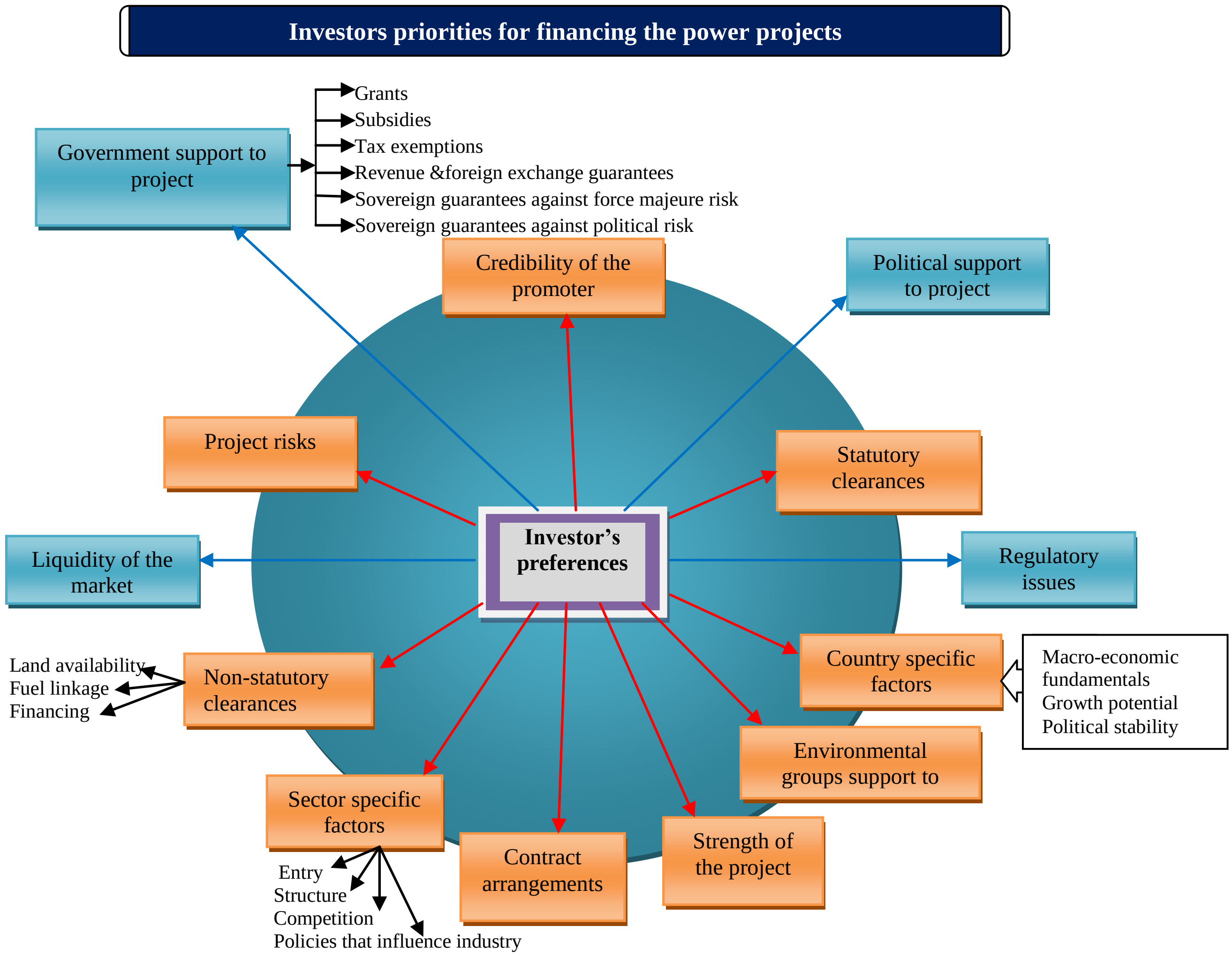

Fig 5.8: Investors Priorities for Financing the Power Projects

The above diagram representing various factors that relates to the investors priorities of investing funds in power projects. The diagram is representing two categories of factors such as: primary priorities and secondary priorities.

5.15.1 Primary Priorities of the Investors: The factors which are plotted on the circle of the diagramme are the primary priorities of the investors; the factors outside the circle are the secondary priorities of the investors to invest funds. The investors always prefer the projects, which are very strong in the primary priorities expected by them. The detailed explanation of the primary priorities is given below:

Credibility of the promoter is the most essential to the project. It means the good past track record of the promoter in the same field. Generally, all financial institutions and banks prefer the projects, which are having creditworthy promoters. This will enable the creditors to overcome the problem of default in debt servicing. And also the creditworthy promoters bring good amount of equity in to the project.

Statutory clearances are the major factors to attract the investment from investors. These are the approvals from the central and state governments. Obtaining most of the clearances need good efforts by the promoters. Some approvals may take long period of time, due to this the project's time and cost will be overrun. And it will become a problem to the project. To avoid this problem, the promoters should get these clearances in time. Several clearances are required for power projects the important are given below.

List of clearances required for power project given by ministry of commerce and industry of India. Memorandum of understanding to be signed with state government land acquisition for power plant, ash dyke, dam site, colony, coal handling, cross country pipeline, coal conveyor etc. which comprises of following type of lands i. government land ii. private land iii. forest land. Procedure for land acquisition: government land a. identify the land coming under project site, after preparation of list of land owners a no objection certificate is to be obtained from local gram panchayat.

Acquisition of private land is similar to acquisition of government land. Environmental clearance for power plants, dams, required from Ministry of Environment and Forestry (MoEF). However, the site clearance provided by MoEF has certain conditions, if the site selected meets all the conditions, then they precede for environmental clearance. Apart from these the other clearances are water availability clearance, off-take agreement, financing clearance, equipment procurement agreement, transportation of fuel agreement, etc.

The contractual arrangements with different parties make the project very strong in all aspects. Investors always want to invest their funds in the projects, which are having strong contractual arrangements support. The contractual arrangements ensure the risk reduction in future. For power projects several contracts are required they are: contract agreement to supply of raw materials, contract agreement to sale (off-take) of products, agreement for the proper operation of the project, agreements for the technical support and maintenance of the facilities, and insurance packages, etc.

Non-statutory clearances also have its impact on investments of the project. These clearances are land availability, fuel linkage and financing. Land availability is most important factor. The land is acquired through two ways, first one is government acquire some land for the project and the second way is promoters of the project acquire the remaining land. So many problems are arising now-a-days while acquiring land from the owners. To avoid these problems first, the people should be convinced by the promises given by the promoters regarding reduction of pollution and replacement of land, etc. This can be done through the motivation of the project promoters.

Secondly, promoters should pay or offer high prices for the lands and provide other benefits expected by the land owners in that location. The procedure of acquiring land discussed above (in statutory clearances) but the promoters should take steps carefully to acquire the land. Fuel linkage is another problem in present days. All most all power projects are importing coal from foreign countries, which is highly superior in quality. Here, the problem is bringing the coal from nearest port to plant location. Regarding this proper transportation facilities are required. Otherwise the cost of input will be increased. The other issue is “arranging finance”. It is an agreement between project and financial intuitions, first the promoters quickly arrange their share of capital in the form of equity then, the lenders accept to provide debt capital to the project. However, these non-statutory clearances must be obtained in-time. Otherwise project estimated cost will be increased, which makes project very unattractive to the investors.

Risk is another major issue that influences the investors’ decision. The investors always want to avoid the risk in financing. The investment in the project mainly depends upon the level of risk, involved in that project. To curb the risk, promoters should identify likely arising risks and they should design proper mechanism to reduce or eliminate it. According to Kistner, & Price, (1999) the major objective of risk identification is to avoid the unintentional or unconscious retention of risk that occurs when a source of performance variability remains undiscovered. For properly managing risks the projects also required a well established integrated process called, the Corporate Risk Review (CRR), for dealing with the financial impact of all its risks.

Country specific factors also influence the investors decisions especially foreign investors. Those factors namely: macro-economic potential, growth potential and political stability. If the country is perfect in all these aspects, then the investors prefer to invest in that country. To avoid this problem, it is better to concentrate on domestic investors and their investments. Environmental groups support to the project is another issue, in present scenario it is severe problem to power projects in India. So many projects stopped and cancelled due to the resistance from environmental groups. The projects should convince the people and should give strong assurance to reduce the environmental hazards with the help of advanced technology to reduce the pollution, then this problem will be vanished. Strength of the project is another thing which attracts the investors. It involve in all aspects of the project right from back ground of the promoter for getting all clearances/approvals from government authorities. Another factor is sector specific factors, such as: entry, structure, competition and policies that influence industry, these factors should be attractive to the investors. These factors are tough in Indian power sector and they make the sector fail to get sufficient investments.

5.15.2 Secondary Priorities of Investors: Secondary priorities of investors to invest funds in power projects are:

Government support to project is the major one. It is required to the projects to get project land, statutory clearances and other benefits. It enables the projects to become very strong in all aspects and to attract investment from investors. Government support get by the project in the form of grants, subsidies, tax exemptions, revenue & foreign exchange guarantees, sovereign guarantees against force majeure risk and sovereign guarantees against political risk, etc. Another secondary priority is political support to the project. It means the local political groups should co-operate to the project in all aspects. Now–a-days, so many projects are facing this problem in terms of political pressure, while getting permissions from various local authorities and acquiring land from the owners. The projects should free from all these problems. Then only the investors will prefer to invest funds.

Regulatory issues are other secondary priorities to the investors. Power sector is having strong regulatory mechanism in India, but it should give the flexibility to the projects to formulate their own policies, especially, while price fixing to its units of production. It enables the projects to get more private investments from the local and global investors. The investors also prefer this kind of regulatory mechanism in the sector. The important regulatory issues are: independence of regulators, sound price-setting regime and transparent regulatory processes. These would help to the projects to attract funds from investors. The last factor which influences the investors preference is the liquidity of the market. It means the opportunity to the institutions to raise funds for financing power projects. In India the market liquidity is very less. To increase it the government must encourage the domestic investors by offering various benefits.

The summary of the results of the hypotheses in the total study analyses is given below.

Table 5.28: Summary of Hypotheses and its Results

Hypothesis	Statement of Hypothesis	Test Used	P-value	Result
H1	Financing methods influence the internal risks in power projects.	Chi-square	0.000 (P <0.05)	Accept
H2	External risks influence the selection of financing methods in power projects	Chi-square	0.000 (P <0.05)	Accept
H3	project risks differ for each power project based on its level of capacity	Kruskal-Wallis" H Test	0.000 (P <0.05)	Accept
H4	Time duration to get statutory clearances differs for public and private sector power projects in India	Mann-Whitney test	0.000 (P <0.05)	Accept

5.16 Conclusion

The issues pertaining to the financing are very important in power projects and they need special attention from the promoters and other parties involved in the project. While raising the funds for the projects, promoters must identify the requirements of the investors. Then, they try to satisfy the requirements of the investors by providing the necessary information and documents. The government should support to the projects for increasing their investments by creating investor friendly environment and providing necessary encouragement and incentives to the investors. And also the government should review the performance of its policies from time to time. From the study analysis it is identified that, the method of financing is similar for conventional energy and non-conventional energy. The conventional and non-conventional energy projects which are using the same kind of financing method, the level of the risks involved in those projects are not same. The level of risk is little high in the non-conventional energy projects. It is also identified that the size of the project has influence on the selection of the financing method.

Regarding the risks, it is identified that, the internal risks are influenced by the method of financing and the external risks have its influence on the selection of method of financing. So the promoters should pay more attention to reduce the internal risks of the projects. Also it is identified that the risk of the project depends upon the size of the project. Finally, it is concluded that by using a suitable method of financing, the risk of the projects can be reduced.

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CHAPTER -VI

FINDINGS AND SUGGESTIONS

6.0 Summary

India ranked as world's sixth in energy consumption. It accounts for about 3.5 percent of the world's total annual energy consumption. However, India's per capita consumption of 631kwh is very low as compared to world per capita consumption of 2,873 kwh. This issue needs to be addressed on priority to meet the country's goal of speed economic and social development. It is seen that the power sector's contribution to India's GDP is 2.4 percent p.a, which should increase to a more significant level. Power sector in India is still in the developing stage, and a huge amount of funds are required to develop the sector. To attract the investments in this sector, the risk of the projects should be minimised. Because, the investors always seeking to reduce risk in financing projects. Financing power projects is a critical and strategic issue, because its characteristics are different from those of other sectors. The power sector has a long gestation period which carries a high degree of risk. In present scenario of resource crunch, it is becoming increasingly difficult to mobilize funds for financing power projects. This is leading to a huge demand supply gap. The reason for it is the investors are not generally positively inclined to invest in the power sector. Also, lenders look for return on investment, which is less in the case of the power sector. Therefore, due to the less return on investment, the power projects are facing scarcity of funds. Apart from this, several other factors are influencing the debt financing in power projects. In this scenario, to attract private funds, the government has initiated several policy reforms but they are yet to show significant results. Apart from this, there is no transparent policy environment. The government has the responsibility to address all these problems to encourage investments in this sector. In view of all these issues, the study mainly focused on major determinants like:

- Factors influencing the investment in power projects,

- The relationship between the method of financing and the level of risks involved in the projects,
- Factors which influence the debt finance,
- Risk analysis of power sector projects, and
- The factors which influence the financial closure of the projects.

From these analyses, the study has sought to contribute valuable inputs to the academic research, and also contribute research findings to the power sector for mobilizing more investments. Finally, the study observations and the recommendations are given below.

6.1 Contribution to Academic Research

Contribution of the study to the academic research is considered very significant. The study established an organized and structured questionnaire to collect the data on various issues of financing power projects (This questionnaire is a new development in the field of power projects financing). Through this, one can analyse the relationship between several factors which are related to the power sector financing; especially, the relationship between financing methods and project risks. In future, the questionnaire developed for this study and the methodology designed for collecting responses from the respondents would help other researchers to undertake similar kind of research in other sectors.

6.2 Contribution to Power Sector in India

Contribution of the study to the power sector is also very significant. The study identified the impact of risks on financing methods and vice-versa. This analysis would help the sector to adopt suitable methods of financing to reduce the level of risks involved in the projects. The study identified the reasons for the delay in financial closure, and sought to provide an understanding for where and why the financial closure is getting delayed, so that appropriate measures could be taken to ensure quick financial closure. The study would also enable the power projects for understanding and differentiating the investment factors, so as to attract more investments and identify the causes for decrease of the investment. The study also brings out the relationship between the size of the project and the level of risk. These analyses would help the sector to maintain the required amount of investment, so as to generate adequate amount of profits. The study also identified the investor's priorities of investment in the projects.

6.3 FINDINGS

The findings are presented under various headings, such as investment, financing methods, project risks and financial closure.

6.3.1 Investment

1. The study selected some factors which facilitate the investment. These factors include:
   - development of domestic debt capital market,
   - permitting foreign equity flows into infrastructure,
   - Inducing foreign investors and multilaterals loans,
   - Liberalizing the rules for investment of pension fund, provident fund and insurance,
   - Government sponsored infrastructure financing facilities
   - Tax incentives,
   - Project size,
   - Ability to complete the project in time,
   - Project contractual arrangements such as PPA & fuel supply agreements, and
   - Track record of past ventures.

   From these factors and according to their mean scores and variances, the most influencing factors are: government sponsored infrastructure financing facilities (Mean rank 4.48) (Variance 0.679), tax incentives (Mean rank 3.92) (Variance 0.673), ability to complete the project in time (Mean rank 4.23) (Variance 0.418), project contractual arrangements such as PPA & fuel supply agreements (Mean rank 4.65) (Variance 0.338), and track record of past ventures (Mean rank 4.20) (Variance 0.503) this is also supported by the proportion of the respondents responses. From the sample, the proportions of responses on the right hand side of the scale for all the above mentioned variables are totaled. The total proportions of the above opinions are 90.8 percent, 78.9 percent, 91.1 percent 95.8 and 85.5 percent respectively.

2. It is observed that, the ratings on government policies is very poor and not up to the expected level in India, due to lack of proper reviews on policies. As an evidence, the study results show that, the following factors have a medium influence on inflow of investments in to the power sector: permitting foreign equity flows into infrastructure (Mean rank 3.02) (Variance 0.997), inducing foreign investors and multilaterals to raise rupee loans (Mean rank 2.75) (Variance 0.922), and liberalizing the rules for investment of pension fund, provident fund and insurance (Mean rank 3.22) (Variance 0.762).

3. According to the respondents, more foreign debt funds are required. Foreign debt is good for the project whenever the domestic currency is devalued. Whenever the domestic currency value increases it is better to repay the foreign loan.

4. From review of literature the study identified some factors which are major hurdles for attracting the investment. According to their mean scores and variance (given in the brackets), the most restricting factors are: many requirements to obtain project approval (3.44) (1.104), high risk involved in project (3.20) (1.321) and resistance from environmental groups (due to hazards, such as carbon emission) (3.93) (1.046). To justify the above mentioned findings, the percent of opinions on the right hand side of the scale were totaled. The total percent of opinions were found to be 55.2 percent 50.6 percent and 72.6 percent respectively.

5. The less restricting factors are: lengthy legal process for settlement of loan agreements, etc, (2.25) (1.126), frequent changes in government policies (2.64) (1.046). To justify this, the percent of responses on the left hand side of the scale were totaled. The total percent of opinions are found to be 71.5 percent and 55.4 percent respectively.

6.3.2 Financing Methods

6. From the data analysis, it is observed that “project finance” is the most popular method of financing. From the total sample, 45.6 percent projects adopted it. The next popular method is “equity and debt”, which is used by 42.7 percent of projects. Corporate finance is being used by 7.1 percent of projects. Most of the projects have chosen project finance, because, it was felt that only this method can bring down the overall risk of the project to an accepted level, and it also facilitates easy inflow of funds. From the results of the analysis, it can be said that project finance is the popularly used method of financing.

7. The method of financing is the same for all kinds (fuel type) of projects. It means the method of financing is similar for both conventional energy and non-conventional energy projects. From the analysis of the representative sample, it is observed that, 42.4 percent of coal projects are using project finance and 35.4 percent of coal projects are using equity & debt method, and a total of 77.8 percent of coal projects chosen these two methods. Based on this analysis, it can be concluded that, these two methods are the most preferred methods for financing coal projects.

8. For gas projects, 57.6 percent projects are using project finance and 24.2 percent projects are using equity & debt method. Thus, based on this analysis it can be concluded that these two methods are the most preferred methods for financing gas projects.

9. For hydro projects, 33.3 percent projects are using project finance and 57.6 percent projects are using equity & debt method. Hence, based on the analysis it can be concluded that these two methods are the most popular methods for financing hydro projects.

10. For solar projects 50 percent are using project finance and 50 percent projects equity & debt method. Therefore, based on this analysis it can be concluded that project finance, equity & debt methods are the most suitable methods for financing solar projects.

11. For wind projects, 59.1 percent projects are using project finance and 40.9 percent projects equity & debt method. So based on this analysis it can be concluded that project finance, equity & debt methods are the best methods for financing wind projects.

12. For bio-mass projects, 71.9 percent projects are using project finance and 25 percent projects equity & debt method. Based on this analysis it can be concluded that project finance, equity & debt methods are considered most suitable methods for financing bio-mass projects.

13. It is observed that equity & debt financing method is majorly used for projects with a capacity level of < 10MW (55 percent) and 50MW-100MW (78.6 percent). Project finance is mainly used in projects with a capacity level of 10MW-50MW (56 percent), 100MW-500MW (45.1 percent) and with a capacity level of > 500MW (47.7 percent). The analysis shows the small capacity projects are mainly using equity & debt method and large capacity projects, are using project finance method.

14. To explain the relationship between method of financing and the risks, the study selected eight types of risks. The overall financial risk of the projects from the selected sample is “high”. Among 379 sample, 48.8 percent of respondents opined that their projects financial risk is high. The reasons cited for high level of this risk are: increase in interest rates, fluctuations in currency exchange rates, inflation, and bankruptcy of the project partner. These factors should be handled carefully through the agreements with various parties. From the analysis, it can be seen that financial risk is low under “project finance”. This means project finance vigilantly handled the financial risk to some extent. So it is better to adopt project finance as a method of financing to reduce financial risk.

15. The overall construction risk of the power projects in the total selected sample is “high”. Under all kinds of financing methods, risk in this mode is high, because of construction delays. Apart from this, the land expropriation and acquisition problems, default by concession company, late design changes, poor quality of workmanship, and excessive contract variations are the other reasons. This risk is the result of the non-availability of the funds at right time and in the right amount. Among all kinds of financing methods, project finance is best suited to handle this type of risk. From the analysis it is concluded that it is better to adopt project finance to reduce the construction risk.

16. The overall operating risk of the power projects in the total selected sample is “low” (54.1 percent of total sample of the study). Under project finance, 84.4 percent of the respondents (from the total 173 projects); under equity finance 100 percent of the respondents (from the total 2 projects); under “partnerships/venture financing” 55.6 percent of the respondents (from the total 9 projects) indicated their responses as low on the left side of the scale. This is due to establishment of proper O&M contracts with the operating agencies and the use of advanced technology in the plants. Generally, this risk arises due to: poor technology used, tariff mechanisms, operating cost overruns, operational revenues being below expectation, low operating productivity, and maintenance costs being higher than expected. To handle these factors and to reduce the operating risk, project finance method is considered the suitable method of financing.

17. The overall technology risk of power projects in the total selected sample is “low” (49.6 percent of the total sample of the study). Among all kinds of financing methods, the projects under project finance and debt finance have low level of technology risk. This risk generally arises due to: poor quality of technology, lack of technology warranty and guarantee, etc. For project finance the left side of the scale indicates 77.5 percent of responses. This is because of: the use of advanced technology and the use of super critical technology in those projects to reduce this risk, and also the agreements with the technology provider for providing guarantees and warranty. To reduce this type of risk, “project finance” is the preferred method of financing. It can reduce the risk more efficiently by providing the required amount of funds in time to procure the appropriate technologies.

18. The overall legal risk of the power projects in the total selected sample is “high” (40.9 percent of total sample of the study). Among all kinds of financing methods, the projects under “corporate finance” (59.3 percent of 27 projects), “partnerships/venture financing” (44.4 percent from 9 projects) and “equity & debt” (42.6 percent from 162 projects) have low levels of legal risk. Among these methods to reduce legal risk, “corporate finance” has been found to be very suitable, because,

it does not involve any agreements with project parties, and no problem of default of agreements will arise to create legal risk.

19. The overall political risk of the power projects is “low” (47 percent of the total sample of the study). Under project finance, 57.2 percent projects (from the total of 173 projects) have low levels of this risk. Generally, this risk arises due to: unstable government, adverse government actions, payment failure by government, corruption and bribery and bureaucratic biases for late approvals. It is suggested that “project finance” is a better/suitable method of financing, to reduce the political risk. Apart from this, the political risk insurance is essentially required for every project to curb this risk.

20. The overall environmental risk of the power projects is “low” (40.3 percent of the total sample of the study). The environmental risk is low for the projects under project finance (51.5 percent of 173 projects), and “equity & debt” (54.3 percent from 162 projects). These two have been found to be appropriate methods of financing to reduce this risk. Mainly this risk arises due to: paucity of funds to implement measures to handle fly-ash, absence of proper disposal system for waste water and other waste materials, etc. Based on the analysis, it is suggested that by using any one of the above two methods this risk can be reduced effectively.

21. The overall regulatory risk of the power projects is “low” (44.4 percent from total sample of the study). The regulatory risk of the power projects under project finance is low (64.8 percent from 173 projects). To reduce the regulatory risk, it is better and appropriate to opt for project finance method.

22. The summary of the above findings is presented in the table: 6.1 for clear and better understanding.

Table 6.1: Financing Methods and the Degree of Risks in Power Projects

Financing Method	Financial Risk	Construction Risk	Operating Risk	Technology Risk	Legal Risk	Political Risk	Environmental Risk	Regulatory Risk	Total Risk
Project Finance	Low	High	Low	Low	High	Low	Low	Low	Low
Corporate Finance	High	High	High	High	Low	Low	Medium	Medium	High
Equity Finance	Low	High	Low	High	High	Low	High	High	High
Debt Finance	High	High	High	Low	High	High	High	High	High
Partner ship's/jv's	Low	High	Low	High	Medium	High	High	High	High
Debt & Equity	High	High	High	High	Low	Low	Low	High	High

Finally, it is concluded that "project finance" is the only the method which can reduce the overall risk of the project. The remaining financing methods involve high level of risk, when compared with project finance. From the findings regarding financing methods Vs project risks, it is concluded that financing method influences the degree of internal risks (financial risk, construction risk, operating risk and technology risk) in power projects and external risks (legal risk, political risk, environmental risk and regulatory risk) of the projects. These considerations are influencing the selection of financing methods in power projects. Statistically also the findings agree with the results of statistical model which is used to test the formulated hypotheses on above mentioned phenomena.

Chi-square test was conducted to test the research hypotheses framed for this part of the study. The results of the hypotheses are:

Hypothesis (H1a): Financing methods influence the financial risk in a power project. The calculated *P – value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). Based on the P- value, this hypothesis is accepted. This means that financing risk differs, based on the type of financing method.

Hypothesis (H1b): Financing methods influence the construction risk in power project. The calculated *P – value* (0.000) is lesser than the level of significance at 5 percent (P <

0.05). According to the P- value this hypothesis is accepted. This means that construction risk differs based on the type of financing method.

Hypothesis (H1c): Financing methods influence the operating risk in a power project. The calculated *P – value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P- value, this hypothesis is accepted. This means that operating risk differs based on the type of financing method.

Hypothesis (H1d): Financing methods influence the technology risk in a power project. The calculated *P – value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P- value, this hypothesis is accepted. This means that technology risk differs based on the type of financing method.

The sub-hypothesis (H1a, H1b, H1c, & H1d) are all significant ($P < 0.05$) and accepted. Hence, the main hypothesis "financing methods influence the internal risks in power projects" can also be accepted.

External risks (legal risk, political risk, environmental risk and regulatory risk) of the projects are influencing the selection of financing methods in power projects.

Hypothesis (H2a): Legal risk influences the selection of financing methods in a power project. The calculated *P – value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). Based on the P- value this hypothesis is accepted. This means that legal risk can influence the selection of the financing method.

Hypothesis (H2b): Political risk influences the selection of financing methods in a power project. The calculated *P – value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). Based on the P- value, this hypothesis is accepted. This means that political risk can influence the selection of the financing method.

Hypothesis (H2c): Environmental risk influences the selection of financing methods in a power project. The calculated *P – value* (0.330) is higher than the level of significance at 5 percent ($P > 0.05$). According to the P- value, this hypothesis is deemed to be rejected. This means that environmental risk cannot influence the selection of the financing method.

Hypothesis (H2d): Regulatory risk influences the selection of financing methods in a power project. The calculated *P – value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). Based on the P- value, this hypothesis is accepted. This means regulatory risk can influence the selection of the financing method.

Except for the sub-hypothesis on environmental risk (H2c), remaining (H2a, H2b and H2d) are significant ($p < 0.05$) and accepted. Therefore, the main hypothesis "external risks influence the selection of financing methods in power projects" can also be accepted.

23. The study identified various problems that arose in power projects while financing those projects in India. These are: requirement of huge capital, increasing interest rates, problem of deciding debt & equity ratio, ESCROW a/c takes more time to arrange, violation of terms of the agreements by creditors, banks wants extra time in terms of preparedness, influence of micro-specific factors, risk sharing problems, poor credit rating of promoters, delay in fund supply/ loan installment by creditors and fluctuations in money value for foreign debt. Among all these, increasing interest rates is the major problem according to 12.14 percent of respondents. The second major problem is "problem of deciding debt & equity ratio" according to 8 percent respondents and the third major problem is poor credit rating of promoters according to 6 percent respondents.

24. Regarding the suitable method of financing for power projects 35 percent of respondents opined that, project finance is the best and suitable method of financing, 30 percent of respondents opined for the debt and equity method is the best method. This brings out that the majority of the respondents are in favor of these two financing methods for power projects in India. Since these can be reduce the risks and ensure sufficient amount of funds to the projects.

25. The study identified five factors that influence the debt financing of power projects by using "Garrett rank" method. According to this method, assigned ranks for the factors are: first rank is given to "project risks", second rank to "interest rates", third rank to "term of financing", fourth rank is given to "demand for funds at the point of

time", and the fifth rank to fear of assets and liabilities mis-match of financial institutions. From this analysis, it can be understood that the project risks are having greater influence on debt financing of power projects than the other factors.

6.3.3 Project Risks

26. Regarding the project risks, it is identified that:

- Financial risk of the power projects is "high". Among 379 sample 48.8 percent respondents perceived that project's financial risk is high.
- Construction risk of the power projects is "high" 64.3 percent respondents perceived that project's construction risk is high.
- Operating risk of the power projects is "low" (54.1 percent of total sample of the study).
- Technology risk of power projects is "low" (49.6 percent of total sample of the study)
- Legal risk of the power projects is "high" (40.9 percent of total sample of the study).
- Political risk of the power projects is "low" (47 percent of total sample of the study).
- Environmental risk of the power projects is "low" (40.3 percent of total sample of the study).
- Regulatory risk of the power projects is "low" (44.4 percent from total sample of the study).

If it is observed from these analyses, among all risks, construction risk is considered to be the major risk in more number of projects in the sample. The next major risk is financial risk.

27. From the analysis, it is also identified that the risks are not similar for all capacities of projects. Only the financial risk is similar for all capacities of projects. Construction risk, operating risk, technology risk, legal risk, political risk, environmental risk and regulatory risks are not similar for all capacities of projects. The reasons are irrespective of the capacity /size of the project, the availability of finance is dependent upon the promoter's credibility, the prevailing interest rates and inflation. If the promoter is credit worthy, he can get more finance at a cheaper cost, whether his project is small or large. Inflation will affect every project irrespective of the capacity

or size of the project. These factors made the financial risk similar to all capacities of projects.

28. It is observed that the total risk of the capacity level <10 MW is “high”. The overall responses in the left side of the scale are 45.9 percent, the total responses in the right side of the scale are 38.75 percent. The total risk of the capacity level of 10 MW - 50 MW is “low”. 44.64 percent responses in the left side of the scale, 36.4 percent responses in the right side of the scale. The total risk of the capacity level of 50 MW – 100 MW is “high”. 38.83 percent of responses in the left side of the scale, and 47.77 percent of responses in the right side of the scale. The total risk of the capacity level of 100 MW – 500 MW is “low”. 42.25 percent of responses in the left side of the scale, and 36.97 percent of responses in the right side of the scale. The total risk of the final category of >500 MW is “high”. 35.55 percent of respondents indicated on the left side of the scale and 37.39 percent of respondents indicated on the right side of the scale.

From the analysis, it is identified that, there is a strong relationship among the size (capacity) of the project, project risk and the method of financing. It is observed that projects with less than 10MW capacity and 50MW-100MW capacity and using equity and debt financing method had “high” level of risk. Projects with 10MW-50MW capacity, and 100MW-500MW and using project financing method had “low” level of risk. Hence, it is proved in the analysis of financing method Vs risk, the projects using the project finance as method of financing had “low” level of risk, and the remaining methods have a high level of risks. This means financing methods are influencing the level of risk which is dependent upon the capacity of the projects. If project finance is used by the projects with less than 10 MW capacity and those in the 50MW-100MW capacity range they can also reduce their overall risk. This analysis also shows that, except financial risk, remaining risks are not similar to the above mentioned capacities of projects. This is because of project finance method, which helps to reduce the risks very efficiently through various agreements with the parties involved in the projects.

The above inferences are drawn from the statistical analysis by using "Kruskal-Wallis" H Test. This technique is used for comparing the different categories of power projects in terms of capacity levels for measuring whether the degree of risks are similar to all capacities of projects or not.

Results of hypotheses

Hypothesis (H3a): Financial risk differs for each project in different level of capacity. The *P-value* (0.097) is higher than the level of significance at 5 percent ($P > 0.05$). According to the P – value, the hypothesis can be rejected. This means that the financial risk is similar to all kinds of capacities of projects.

Hypothesis (H3b): Construction risk differs for each project in different level of capacity. The *P-value* (0.045) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis can be accepted. This means that the construction risk is not similar to all kinds of projects.

Hypothesis (H3c): Operating risk differs for each project in different level of capacity. The *P-value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the operating risk is not similar to all kinds of projects.

Hypothesis (H3d): Technology risk differs for each project in different level of capacity. The *P-value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis can be accepted. This means that the technology risk is not similar to all kinds of projects.

Hypothesis (H3e): Legal risk differs for each project in different level of capacity. The *P-value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the legal risk is not similar to all kinds of projects.

Hypothesis (H3f): Political risk differs for each project in different level of capacity. The *P-value* (0.001) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the political risk is not similar to all kinds of projects.

Hypothesis (H3g): Environmental risk differs for each project in different level of capacity. The *P-value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the environmental risk is not similar to all kinds of projects.

Hypothesis (H3h): Regulatory risk differs for each project in different level of capacity. The *P-value* (0.035) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the regulatory risk is not similar to all kinds of projects.

From the results of the sub-hypotheses, it is concluded that, except H3a, the remaining (H3b, H3c, H3d, H3e, H3f, H3g and H3h) are accepted. Therefore, the main hypothesis "project risks differs for each power project based on it level of capacity" can also be accepted.

6.3.4 Financial Closure

29. The study attempted to ascertain, whether time duration for getting statutory clearances is similar for public and private projects or not. Regarding finance (equity) clearance and equipment procurement clearance the time duration is almost all same. Time duration for getting water availability clearance, off-take clearance, pollution control clearance, land clearance and clearance for transportation of fuel, differ for public sector projects to private sector projects. According the test analysis, private sector projects require more time to get water availability, off-take, pollution, and clearance for transportation of fuel than the public sector projects. For obtaining land clearance, public sector projects are taking more time than private sector projects. And for the remaining approvals of financing and equipment procurement, the time duration is similar for both categories of projects.

Mann-Whitney test U statistics test is used to compare the public and private sector power projects, in terms of time duration for getting clearances from various government authorities to establish a power project.

Results of hypotheses

Hypothesis (H4a): The time duration for getting water availability clearance differs for public and private sector power projects. The *P-value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the time duration for getting water availability clearance is not similar. It varies for public and private sector projects.

Hypothesis (H4b): The time duration for getting off-take clearance differs for public and private sector power projects. The *P-value* (0.040) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the time duration for getting off-take clearance is not similar. It varies for public and private sector projects.

Hypothesis (H4c): The time duration for getting pollution control clearance differs for public and private sector power projects. The *P-value* (0.039) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the time duration for getting pollution control clearance is not similar. It varies for public and private sector projects.

Hypothesis (H4d): The time duration for getting financing clearance differs for public and private sector power projects. The *P-value* (0.667) is greater than the level of significance at 5 percent ($P > 0.05$). According to the P – value, the hypothesis can be rejected. This means that the time duration for getting finance clearance is similar for public and private sector projects.

Hypothesis (H4e): The time duration for getting land acquisition clearance differs for public and private sector power projects. The *P-value* (0.000) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the time duration for getting land acquisition clearance is not similar. It varies for public and private sector projects.

Hypothesis (H4f): The time duration for getting equipment procurement clearance differs for public and private sector power projects. The *P-value* (0.062) is greater than the level of significance at 5 percent ($P > 0.05$). According to the P – value, the hypothesis can be rejected. This means that the time duration for getting equipment procurement clearance is similar for public and private sector projects.

Hypothesis (H4g): The time duration for getting transportation of fuel clearance differs for public and private sector power projects. The *P-value* (0.003) is lesser than the level of significance at 5 percent ($P < 0.05$). According to the P – value, the hypothesis is accepted. This means that the time duration for getting transportation of fuel clearance is not similar. It varies for public and private sector projects.

From the results of study hypotheses, it is concluded that, except the sub-hypotheses H4d and H4f, the remaining hypotheses (H4a, H4b, H4c, H4e, H4g and H4h) are accepted. Hence, the main hypothesis "time duration to get statutory clearances differs for public and private sector power projects in India" can also be accepted.

30. According the test analysis, private sector projects require more time to get water availability, off-take, pollution, and transportation of fuel clearances than the public sector projects. This is due to bureaucratic delays and some government policies which are hurdles to the private sector for getting clearances quickly.

31. For obtaining land acquisition clearance, public sector projects are taking more time than private sector projects. The main reason for it is that the government is not paying the current market price to the land owners.

32. The study identified that credibility of the promoter, statutory clearances, non-statutory clearances (land availability, fuel linkage and financing), contractual arrangements, project risks, country specific factors, environmental groups support to project, strength of the project, and sector specific factors are the primary priorities of investors for their investment. The secondary priorities are: government support to the projects, political support to the projects, regulatory issues and liquidity of the market.

Table 6.2: Summary of Hypotheses and its Results

Hypothesis	Statement of Hypothesis	Test Used	P-Value	Result
H1	Financing methods influence the internal risks in power projects.	Chi-square	0.000 ($P < 0.05$)	Accept
H2	External risks influence the selection of financing methods in power projects	Chi-square	0.000 ($P < 0.05$)	Accept
H3	Project risks differs for each power project based on its level of capacity	Kruskal-Wallis" H Test	0.000 ($P < 0.05$)	Accept
H4	Time duration to get statutory clearances differs for public and private sector power projects in India	Mann-Whitney test	0.000 ($P < 0.05$)	Accept

6.4 SUGGESTIONS

The following suggestions are made to make power projects more investors friendly.

- The corporate bond market is still underdeveloped, with illiquid primary and secondary markets, absence of risk management and credit enhancement instruments. Several financial products are not available in India. To improve the liquidity of the market, government has taken several steps. It has given tax exemptions on the debt and also the sovereign guarantees on the debt instruments. But there is no review of its performance. The government should review its performance for a certain period of time. This kind of reviews helps the government to bridge implementation gaps and to modify its policies according to changes in domestic and global economic conditions. The Indian government has already taken several steps for the development of domestic debt market, but development of debt market is not at the expected level. But in India to get sustainable development of debt market it will take considerable time. The government should encourage studies on this issue and try to identify the drawbacks or the shortfalls to take further steps for development of the domestic debt market.

- Promoter background, it includes capacity to implement project in time, promoters' capability to provide own capital, past record of the promoters in the same field and commitment of the promoter to attract investments. In India, credit rating of many promoters is very poor. They have to improve it to get more funds.

- Fuel linkage especially for the imported coal, the transportation from sea port to plant location and the cost saving model of supply of coal are important to the power project for attracting investments. Market demands a higher risk premium on loans to countries with high inflation. If the risk premium is high, the domestic and foreign investors put their funds in power projects. Otherwise, the inflation should be decreased to avoid the payment of high risk premium.

- The regulatory system requires a transparent regulatory process and sound tariff setting process that can help attract the funds from domestic, as well as from foreign investors.

- To increase the foreign equity flows, government should create investors friendly environment which includes, eliminating bureaucratic bias, reducing taxes and providing government guarantees to foreign investors and multilaterals.

- Pension and insurance funds are the emerging sources of investment for power projects. But the availability of this fund for power sector is very less, because of its sectoral cap of investing this fund. At present, in India, regulation stipulates that the entire corpus of pension assets be invested in the public and quasi-public debt instruments. Investment in equities or private debts is not at all permitted, except for group superannuation schemes and individual retirement annuities offered by LIC of India. Such conservative investment norms resulted in poor rates of returns from pension schemes. Such conservative investment norms should be relaxed on investments to the private sector. The sectoral cap of investment should be liberalised and funds should also be invested in private sector projects, because the private sector projects are earning good returns and these projects are paying high returns to investors. Liberal and multi-option investment norms should be adopted.

- Government should control the inflation, and adopt monetary policies to increase GDS and to transfer some proportion of GDS to the power sector in terms of investment.

- The main factor restricting the investments is the large number of requirements to obtain project approval. The government should reduce the number of approvals so that the promoters can easily establish the projects. To reduce the number of required approvals the respondents made some suggestions at the time of the field survey, they are: government should integrate various departments e.g., forest, water, pollution control and captive mine and provide the clearances through a specially designated government agency with the approval of the concerned ministries. If possible, the government should create/design a system to provide all clearances at one place. This includes opening regional centres in all regions for providing various clearances.

- Because of poor financial rating of the SEB's, promoters have insisted on particular state government guarantees and government of India (GOI) guarantees for the payment obligations of the SEBs. The government should take the initiative to provide guarantee. It would also enable the projects to raise more debt funds from creditors.

- To avoid the environmental problems the projects should follow established environmental regulations of the country. This comprises pollution related issues such as noise, air pollution, water pollution, and visual disturbances and those related to natural resources such as unsustainable use of natural resources including minerals, water, and land. Also, the promoters and the government should ensure the utilization of advanced technology to reduce pollution.

- Corruption involved at every stage of project development. To control corruption in bureaucrats, the government should design guidelines while providing approvals, which would make the entire process more transparent and reduce corruption.

- To avoid the problems in financing power projects the respondents made some suggestions they are: to avoid the problem of change in interest rates, which occur at the time of financing the project, a proper agreement should be made between projects and creditors. The information about cost of various capitals should be collected to decide the ratio of debt & equity, pre-planning for arranging ESCROW a/c to reduce time delay, identifying the alternative sources of financing to curb the loss if the creditors violate the terms of the agreement, designing and implementing proper risk sharing mechanism to mitigate risk, maintaining small reserve funds to face the problems of delay in fund supply/ loan installment by creditors and whenever the domestic currency devalued, it is better to raise foreign loan and whenever the domestic currency value increases it is better to repay the foreign loan. Through this mechanism the risk of fluctuations in money value for foreign debt can be mitigated. There is a need for developing innovative sources of finance which will reduce all kinds of risks and provide sustainable amount of funds. For this, the projects need to adopt the financial engineering to design new financial instruments and methods of financing.

- Among all financing methods “project finance” and “equity & debt” finance methods are the best methods for the power projects. The study analysis has also brought out that project finance is the most suitable method of finance for any kind of the project. Using this method, project risk can reduce and can provide required amount of funds for the projects. It is suggested that all projects should adopt project finance method.

- To reduce overall project risks, the promotors should design a suitable risk mitigating framework. They should provide all relevent information to creditors to show how the project will overcome or mitigate the risks. This information helps convince the creditors to get the required amount of funds. The second rank given to “demand for funds at the point of time”; it means the demand for debt funds in the market. It is also a major factor influencing the debt availability. To handle this problem and to get sufficient funds intime, an active bond market should be developed. This would help to the projects to increase the flow of long-term funds and reduce reliance on banks.

- Regarding the factors that influence debt finance, the projects should prepare the plans of all activities before aproaching creditors. Since risk is a key driver of the cost of debt, the project should design a proper risk sharing/transfer mechanism to reduce the project risks. The active bond market can increase the flow of long-term funds and reduce reliance on banks. The government should take proper measures for the development of domestic debt market, and reduce the effect of the factor “demand for funds at the point of time”. Now a days there is scarcity for funds. However, once the domestic debt market conditions improve, the demand for funds can be satisfied. Most of the creditors provide finance for short period of time, but power projects require long term loans. To get long term loans at lower interest rate, projects should provide strong security arrangements. The interest rate charged depends on both the maturity and risk of the loan. Projects should raise loans for long-period of time and risk of the project should be reduced. An important factor is the promoter's creditworthiness, which can also help to reduce interest rates on debt. Making prompt payments to financial institutions and banks reduce their "fear of assets and liability mis-match" of financial institutions, and they can provide enough funds to the projects.

- However, to reduce the impact of those factors on the debt and make the debt is abundantly available for the power projects, the respondents made some suggestions they are: the government should provide adequate funds to power projects. It should provide credit guarantees for obtaining funds from the creditors and also remove the sectoral caps of lending to power projects. To attract commercial loans and private sector investment, the government should implement policies that will improve the investment climate and reduce the risks which affect the projects.

- According to the analysis the financial risk is high. The promoters of the projects should try to reduce it. Financial risk arises due to the inefficient strategies used to design the capital structure of the project. The interest rate risks should be reduced by taking large amount of funds for a long period of time. The promoters should increase their credit worthiness which helps to get loans at cheaper rate. Apart from this, financial risk can be reduced, or mitigated, through the use of derivative instruments.

    1. ***Futures contracts:*** In a project financing, interest rate futures can be used to protect against funding costs and currency future to guard against foreign exchange rate fluctuations.

    2. ***Forward contracts:*** Forward contract on foreign exchange are used for hedging existing, or anticipated, currency exposures. Long term foreign exchange agreements can be used by project companies to manage the currency risk arising from multi currency transactions, and

3. ***Swaps:*** Swaps can mitigate financial risks. There are currency swaps, interest rate swaps and commodity swaps. An interest rate swap can create a source of lower cost debt or higher yielding assets, and provide access to an otherwise unavailable source of funds. Arrangement of floating rate of interest will reduce the financial risk.

- As per the opinions of the respondents it is ascertained that, more foreign debt funds are required for financing power projects. To avoid the financial risk, especially interest rate risk, it is better getting the funds phase wise from the banks or the creditors, instead of taking the whole amount at one time. It can avoid unnecessary payment of interest on the loan amount.

- According to the analysis the construction risk is high. The promoters of the projects should try to reduce it. To mitigate construction risk, turnkey arrangements are useful and popular with contractors since they avoid gaps appearing in the contract structure. Also well defined agreements between the contractor and subcontractors are required to prevent disputes between them. Construction cost overruns can be mitigated by contractual undertakings, e.g., the infusion of additional equity by the project sponsor, other equity participants, or standby equity participants. Similarly, standby funding agreements for additional financing, either from the construction lender or subordinated debt lent by project participants or third parties can be used. Pre-completion risks can be covered via the use of a completion guarantee. Fixed price lump sum contract reduce the likelihood of cost overruns since this is the responsibility of the project company. A delay in completion may be caused by failure of the EPC contractor to perform under the EPC contract, failure of third parties to provide necessary connections to the project if the project company is subject to penalties for late completion. For the projects established in the coastal belt this risk is the major one because of the nature of the soil. For these projects, soil testing is a must. Where ever the soil condition is good for the construction, selecting that location can reduce this risk.

- Operating risk of the power projects can reduce through O&M contract. An O&M contract with an experienced operator provides the greatest degree of comfort to project sponsors. It revealed in the survey that most of the projects had the O&M contractual arrangement this made those projects to reduce operating risk. It is suggested that all projects to arrange proper O&M contracts to reduce the operating risk. It is also needed to adopt the superior technology from multinational companies to minimize the risk of production.

- Added to this is the high cost of prolonged litigation in the event of legal disputed legal risk of the power project is “high”. Promoters of the project should try to reduce it. To reduce this problem, proper agreements with project participants and third party guarantees should be arranged. The promoters try to avoid the untrustworthy partners.

- Political risk involved in the power projects. The promoters should take proper measures to reduce it. To mitigate political risk political risk insurance is available. In foreign countries, governments are providing a guarantee to mitigate this risk .The first type of guarantee is a Partial Credit Guarantee (PCG), which provides coverage for both business and political risks. The second type of guarantee is a Political Risk Guarantee (PRG), which aims to facilitate investment of private capital in cases where there are sovereign or political risks”. According to the suggestions of respondents of the field survey, to reduce political risks strategies are: i) involve international firms or organizations to create leverage with local government authorities, ii) seek assistance from influential individuals or organizations who have rapport with local government authorities, iii) seek local government support and guarantees, and iv) establish contingency credit facilities to cover unanticipated expenses.

- Environmental risk involved in the power projects. The promoters should take proper measures to reduce it. The study has identified reasons for environmental risk such as: disposal of fly ash, forest clearance. Government needs to focus on reduction of emission of pollution in power generation. The promoters should take all necessary precautions for reducing pollution and other hazards in that location with the help of advanced technology. They should develop green belts surrounding the projects. Promoters should use ash management techniques which include filling empty coal mines with bottom ash. Also the promoters should utilise the generated ash for manufacture of fly ash bricks to generate additional returns for the project.

- To reduce the regulatory risk the government should take measures for effective regulation, supported by law. Financial autonomy and decision autonomy are key priorities to protect the interests of investors. Government should liberalise regulatory rules for granting licences/permits and fiscal incentives of tax credits should be not withdrawn before the full repayment of the loan.

- Success of the project depends on individual innovation, such as securing (rare) private input (gas, coal, etc.) contracts and reducing off-take risk by securing captive off-takers. Power projects are highly exposed to the vagaries of fuel markets, both because the price of fuel is the principal cost component of electricity and because control of fuel markets is one of the critical sources of leverage that government have over projects. For the private promoters, fuel procurement has become a burden. To overcome this problem government should reduce import duties on coal or gas and should develop the fuel storage facilities at sea ports.

- The respondents suggested that the power projects need to establish three-tier payment guarantee system that consists of a letter of credit, an escrow agreement and a state guarantee provided by PPA to mitigate major risks in the power sector.

- Most of the projects are opposed by the environmental groups and public because the promoters of the projects are not following the environmental protection guidelines. It is suggested that the government should insist upon them to follow environmental protection measures so that the environmental hazards cannot affect the people at the plant location.

- Land acquisition is a major problem area for the power projects. Lenders will be inclined to lend when the project company has a clear title and access to the project site and any additional land needed during construction. It is suggested that the promoters should carefully deal with this problem. This risk can be mitigated by acquiring clear title lands and following the government revenue department guidelines. The promoters fail to provide good rehabilitation facilities to the people whose lands were acquired for the projects. As a result, the public has tended to lose faith in the projects. The promoters should take care to win the people confidence towards the project.

- For quick land acquisition, the respondents made some suggestions they are: the promoters should educate and counsel the people at the selected plant location and clarify the doubts of public, and market rate for the land should pay. The environmental protection measures to be taken also need to be explained to the public before starting the plant construction. For government portion of land, it is not paying market rate to the land owners, so the owners are reluctant to give their lands. To overcome this problem, some companies have paid the gap amount (market rate – government rate) and settled the problem. These kinds of measures avoid the delay in land acquisition and problems with the public.

- Regarding the time duration for obtaining water availability clearance, to reduce the time duration, the promoters of private sector projects should convince the local government authorities and take its acceptance as early as possible.

- To reduce the time delay in obtaining off-take clearance from concerned state electricity utilities, the promoters of the private sector projects should negotiate with the state electricity authorities and fix the tariff rate for their product as early as possible.

- To reduce the time delay in obtaining pollution control clearance, the promoters of the private sector projects should provide the complete information about the pollution controlling measures that they are planning to introduce in the project, according to pollution control regulations.

- To reduce the time delay in land acquisition the public sector projects should pay the existing market rate for the lands.

- To reduce the time delay in obtaining clearance for transportation of fuel the promoters of the private sector projects should negotiate with local transport agencies, railway authorities and fix the convenient rate as early as possible for transporting coal/input from the source point to the plant location.

- The main reason for power sector failure to attract investment is the delay in getting clearances. The government should reduce the bureaucratic delays by specifying the time duration for providing approvals. Also, the government should improve the interdepartmental coordination while moving the files from one department to another department within the same ministry or between various ministries.
- The government should take the measures for effective regulation, supported by law. Financial autonomy and decision autonomy are key priorities to protect the interests of investors.
- The government should set the time duration for giving each approval to the projects and try to reduce the bureaucratic biases towards the private sector.
- Suggestions made by the respondents for successful financial closure of a power projects they are:
    - Advanced planning of project activities
    - Compliance of statutory obligations in time
    - Acquiring land in time
    - Acquiring all clearances in time from the government as well as other related authorities
    - Preparing detailed project report
    - Getting quick environmental clearances
    - Improving the credibility of the promoter
    - Having good project execution capability by the promoters
    - Strength of promoting company balance sheet
    - Quick arrangement of equity portion by the sponsoring company
    - Quick arrangement of contractual arrangements with the parties involved in the project
    - Quickly completing PPA agreement, and
    - Good ranking of sponsoring company

6.5 Conclusion

To accelerate the development of power sector, reforms are proposed in three directions viz. strengthening the regulation, improving distribution and opening bulk supply to completion and revising tariff to more economic levels. But the implementation of those policies is not up to the expected level. The government should review its performance periodically. The problems faced by developing countries in the power sector are: inefficiency, subsidized electricity prices, mis-management, and undue political influences over technical and financial decision making. The government should take proper measures to reduce the subsidies and to reduce political interference in power sector and it should design a system to develop the skills of the managers to improve the quality of management in the projects.

The government should develop the corporate bond market, which is still underdeveloped with illiquid primary and secondary markets, absence of risk management and credit enhancement instruments. It should also help the projects in their fuel linkage which is an important issue for the power project for attracting investment.

It is suggested that the projects should repay the loans intime. Hence, the financial institutions need to provide the required amount of loans at a lower cost of capital. It is also suggested that, the financial institutions should remove the sectoral cap on investment.

Finally, the government should take measures to have a transparent policy environment, and design a suitable mechanism to handle "corruption" at all stages of activities in power sector and motivate investors these will make the power sector to grow with good pace and attract more private investments.

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Annexure –I

TABLE FOR DETERMINING SAMPLE SIZE FROM A GIVEN POPULATION

N	S	N	S	N	S	N	S	N	S
10	10	100	80	280	162	800	260	2800	338
15	14	110	86	290	165	850	265	3000	341
20	19	120	92	300	169	900	269	3500	246
25	24	130	97	320	175	950	274	4000	351
30	28	140	103	340	181	1000	278	4500	351
35	32	150	108	360	186	1100	285	5000	357
40	36	160	113	380	181	1200	291	6000	361
45	40	180	118	400	196	1300	297	7000	364
50	44	190	123	420	201	1400	302	8000	367
55	48	200	127	440	205	1500	306	9000	368
60	52	210	132	460	210	1600	310	10000	373
65	56	220	136	480	214	1700	313	15000	375
70	59	230	140	500	217	1800	317	20000	377
75	63	240	144	550	225	1900	320	30000	379
80	66	250	148	600	234	2000	322	40000	380
85	70	260	152	650	242	2200	327	50000	381
90	73	270	155	700	248	2400	331	75000	382
95	76	270	159	750	256	2600	335	100000	384

Note: "N" is population size
"S" is sample size.

Krejcie, Robert V., Morgan, Daryle W., "Determining Sample Size for Research Activities", Educational and Psychological Measurement, 1970.

Annexure –II

PLAN-WISE GROWTH OF ELECTRICITY SECTOR

Sl.No	As on	Installed Capacity (MW) Utilities	Installed Capacity (MW) Non-Utilities	No.of villages Electrified	Length of T& D Lines (Ckt. Kms.)	Per Capita Electricity Consumption (kWh)
1	31.12.1950	1713	588	3061	29271	18.17
2	31.03.1956 (End of 1st Plan)	2886	760	7294	85427	30.88
3	31.03.1961 (End of 2nd Plan)	4653	1001	21754	157887	45.94
4	31.03.1966 (End of 3rd Plan)	9027	1146	45148	541704	73.9
5	31.03.1969 (End of 3rd Annual Plans)	12957	1339	73739	886301	97.9
6	31.03.1974 (End of 4th Plan)	16664	1793	156729	1546097	126.24
7	31.03.1979 (End of 5th Plan)	26680	2618	232770	2145919	171.59
8	31.03.1980 (End of Annual Plan)	28448	2860	249799	2351609	172.41
9	31.03.1985 (End of 6th Plan)	42585	5120	370332	3211956	228.7
10	31.03.1990 (End of 7th Plan)	63636	8116	470838	4407501	329.21
11	31.03.1992 (End of 2dn Annual Plans)	69065	9301	487170	4574200	347.51
12	31.03.1997 (End of 8th Plan)	85795	12079	498836	5140993	464.55
13	31.03.2002 (End of 9th Plan)	105046	17145	512153	6030148	559.2
14	31.03.2007 (End of 10th Plan)	132329	22335	482864	6939894	671.89
15	31.03.2008 (1st year of 11th Plan)	143061	24986	487347	7287413	717.13
16	31.03.2009 (2nd year of 11th Plan)	147965	26980	497236*	7472873*	733.54
17	31.03.2010 (3rd year of 11th Plan)	159398	28474*	500920*	7846496*	778.71*

Source: CEA

Annexure –III

GROWTH OF INSTALLED ELECTRICITY GENERATION CAPACITY- MODE WISE-UTILITIES

Sl.No	As on	HYDRO (Renewable)	THERMAL (Including Steam, Gas & Diesel)	Nuclear	Renewable energy sources (R.E.S).	TOTAL
1	31.12.1950	560	1153	0	0	1713
2	31.03.1956 (End of 1st Plan)	1061	1825	0	0	2886
3	31.03.1961 (End of 2nd Plan)	1917	2736	0	0	4653
4	31.03.1966 (End of 3rd Plan)	4124	4903	0	0	9027
5	31.03.1969 (End of 3rd Annual Plan)	5907	7050	0	0	12957
6	31.03.1974 (End of 4th Plan)	6966	9058	640	0	16664
7	31.03.1979 (End of 5th Plan)	10833	15207	640	0	26680
8	31.03.1980 (End of Annual Plan)	11384	16424	640	0	28448
9	31.03.1985 (End of 6th Plan)	14460	27030	1095	0	42585
10	31.03.1990 (End of 7th Plan)	18307	43746	1565	18	63636
11	31.03.1992 (End of 2dn Annual Plan)	19194	48054	1785	32	69065
12	31.03.1997 (End of 8th Plan)	21658	61010	2225	902	85795
13	31.03.2002 (End of 9th Plan)	26269	74429	2720	1628	105046
14	31.03.2007 (End of 10th Plan)	34654	86014	3900	7761	132329
15	31.03.2008 (1st year of 11th Plan)	35909	91907	4120	11125	143061
16	31.03.2009 (2nd year of 11th Plan)	*36878	93725	4120	13242	147965
17	31.03.2010 (3rd year of 11th Plan)	36863	102454	4560	15521	159398

Source: CEA

Annexure –IV

ALL INDIA CAPACITY ADDITION TARGETS & ACHIEVEMENTS DURING VARIOUS PLANS

Plan	Targets (MW)	Achievements (MW)	Achievements (%)
1st Plan (1951-1956)	1300	1100	84.6
2nd Plan (1956-1961)	3500	2250	64.3
3rd Plan (1961-19660	7040	4520	64.2
Annual Plans (1966-1969)	5430	4120	75.9
4th Plan (1969-1974)	9264	4579	49.4
5th Plan (1974-1979)	12499	10202	81.6
Annual Plan (1979-1980)	2813	1799	64
6th Plan (1980-1985)	19666	14266	72.5
7th Plan (1985-1990)	22245	21401	96.2
Annual Plans (1990-1991)	4212	2776	65.9
Annual Plans (1991-1992)	3811	3027	79.4
8th Plan (1992-1997)	30538	16423	53.8
9th Plan (1997-20020	40245	19119	47.5
10th Plan (2002-2007)	41110	21180	51.5
1st year of 11th Plan (2007-08)	16335	9263	56.7
2nd year of 11th Plan (2008-09)	7530	3454	45.9
3rd year of 11th Plan (2009-10)	14507	9586	66.1

Source: CEA

Annexure –V

THE RELATIONSHIP BETWEEN FINANCING METHODS AND THE TYPE OF POWER PROJECT

		Financing Methods						
Fuel Type		Project finance (SPV's)	Corporate finance	Equity finance	Debt finance	Partnership's/Joint ventures	Equity and Debt	Total
Coal	Count	46	16	0	1	1	35	99
	Percentage	46.5%	16.2%	.0%	1.0%	1.0%	35.4%	100.0%
Gas	Count	23	0	0	2	0	8	33
	Percentage	69.7%	.0%	.0%	6.1%	.0%	24.2%	100.0%
Hydro	Count	55	11	2	2	0	95	165
	Percentage	33.3%	6.7%	1.2%	1.2%	.0%	57.6%	100.0%
Solar	Count	5	0	0	0	0	5	10
	Percentage	50.0%	.0%	.0%	.0%	.0%	50.0%	100.0%
Wind	Count	13	0	0	0	0	9	22
	Percentage	59.1%	.0%	.0%	.0%	.0%	40.9%	100.0%
Bio-mass	Count	23	0	0	1	0	8	32
	Percentage	71.9%	.0%	.0%	3.1%	.0%	25.0%	100.0%
Other	Count	16	0	0	0	0	2	18
		88.9%	.0%	.0%	.0%	.0%	11.1%	100.0%

Annexure –VI

GARRETT RANKING CONVERSION TABLE

The conversion of orders of merits into units of amount of "socres"

Percent	Score	Percent	Score	Percent	Score
0.09	99	22.32	65	83.31	31
0.20	98	23.88	64	84.56	30
0.32	97	25.48	63	85.75	29
0.45	96	27.15	62	86.89	28
0.61	95	28.86	61	87.96	27
0.78	94	30.61	60	88.97	26
0.97	93	32.42	59	89.94	25
1.18	92	34.25	58	90.83	24
1.42	91	36.15	57	91.67	23
1.68	90	38.06	56	92.45	22
1.96	89	40.01	55	93.19	21
2.28	88	41.97	54	93.86	20
2.69	87	43.97	53	94.49	19
3.01	86	45.97	52	95.08	18
3.43	85	47.98	51	95.62	17
3.89	84	50.00	50	96.11	16
4.38	83	52.02	49	96.57	15
4.92	82	54.03	48	96.99	14
5.51	81	56.03	47	97.37	13
6.14	80	58.03	46	97.72	12
6.81	79	59.99	45	98.04	11
7.55	78	61.94	44	98.32	10
8.33	77	63.85	43	98.58	9
9.17	76	65.75	42	98.82	8
10.06	75	67.48	41	99.03	7
11.03	74	69.39	40	99.22	6
12.04	73	71.14	39	99.39	5
13.11	72	72.85	38	99.55	4
14.25	71	74.52	37	99.68	3
15.44	70	76.12	36	99.80	2
16.69	69	77.68	35	99.91	1
18.01	68	79.17	34	100.00	0
19.39	67	80.61	33		
20.93	66	81.99	32		

Source: Henry, E. Garret and R.S. Woodworth, "Statistics in Psychology and Education", Vakils, Feffer and Simons Private Ltd., Bombay, 1969, p.329.

Appendix- A

FINANCING POWER PROJECTS: A STUDY OF INDIAN PRACTICES
Questionnaire

Preliminary Information

0. The respondent belongs to the management level of
   Top level ☐ Middle level ☐ Low level ☐
1. Is your organization a: (Mark √ in appropriate box)
   1. Government undertaking 2. Private sector organization
   3. Cooperative organization 4. International fund based organization
   5. If any other, specify: ______________________________________
2. The company is subsidiary unit? (Please put code number in the box) ☐
   Code: Yes -----1 No-----2
3. From how long the organization is continuing in the field of power generation? (Give no: of years) _____________
4. Your project belongs to the fuel type of: (Please Mark √ in appropriate box)
   1. Coal ☐ 2. Gas ☐ 3. Hydro ☐ 4. Naphtha ☐ 5. Solar ☐ 6. Wind ☐ 7.Bio-mass ☐ 8.Other ☐
5. Your project belongs to installed production capacity range of :
   1. <10 MW ☐ 2. 10MW – 50MW ☐ 3. 50MW – 100MW ☐ 4. 100MW – 500MW ☐ 5. >500MW ☐
6. What is an approximate value of the project? _______________________________
7. What is the expected cash inflow of the project? ______________________

Factors Influence Investment

8. Government policy initiatives, Regulatory factors, Economic factors, Political factors and project specific factors influence the investment in power projects. According to your experience, kindly indicate your response to the below mentioned factors, which have influence on investment in projects. (Please √ your answer in appropriate boxes)

Level	Very Low	Low	Neither High nor Low	High	Very High
Code	1	2	3	4	5

Sl:No	***Factors***	√	√	√	√	√
	Policy Initiatives					
1	Development of domestic debt capital market	1	2	3	4	5
2	Permitting foreign equity flows into infrastructure	1	2	3	4	5
3	Inducing foreign investors and multilaterals to raise rupee loans	1	2	3	4	5
4	Liberalizing the rules for investment of pension fund, provident fund and insurance in to the power sector.	1	2	3	4	5
5	Government sponsored infrastructure financing facilities	1	2	3	4	5
	Regulatory Factors					
6	Independence of regulatory mechanism.	1	2	3	4	5
	Economic Factors					
7	Gross Domestic Savings (GDS)	1	2	3	4	5
8	Tax incentives	1	2	3	4	5
	Project Specific Factors					

9	project size	1	2	3	4	5
10	Ability to complete the project on time	1	2	3	4	5
11	Project contractual arrangements such as PPA & Fuel supply agreements.	1	2	3	4	5
12	Track record of past ventures	1	2	3	4	5

9. Some factors restrict financing infrastructure projects. From the items given below, what is the impact on your organization while financing funds? Please give the level of influence of each factor (please mark √ in appropriate box)

Level	Very Low	Low	Neither High nor Low	High	Very High
Code	1	2	3	4	5

Sl:No	***Factors Restrict Financing***	√	√	√	√	√
1	Many requirements to obtain project approval.	1	2	3	4	5
2	Accusations of corruption and corrupt tendencies	1	2	3	4	5
3	Poor credit worthiness of power off-takers	1	2	3	4	5
4	High Risks involved in project	1	2	3	4	5
5	Strong political opposition to investor friendly reforms	1	2	3	4	5
6	Lengthy legal process for settlement of loan agreements, etc.	1	2	3	4	5
7	Resistance from Environmental groups(due to hazards, such as carbon emission	1	2	3	4	5
8	Frequent changes in government policies.	1	2	3	4	5
9	Frequent increases in interest rates by commercial banks and financial institutions	1	2	3	4	5

Financing Methods& Risks

10. What are the "Financing Methods" you are following to finance the project? (Please put the code number in the box, codes are given below) ☐

CODES*: Project financing (SPV's) ---1, Corporate financing ---2, Structured financing---3, Equity financing---4, Debt financing---5, Leasing of infrastructure ---6, Partnership's/Joint ventures---7, Equity and Debt---8 If any other, specify--9*

11. If the power project use each method of financing above mentioned, what is the probability of availability of required funds? Please mark √ on the most appropriate number of each variable which corresponds most closely to your desired answer.

Level	Very Low	Low	Neither High nor Low	High	Very High
Code	1	2	3	4	5

Sl:no	***Financing Methods***	√	√	√	√	√
1	Project financing (SPV's)	1	2	3	4	5
2	Corporate financing	1	2	3	4	5
3	Structured financing	1	2	3	4	5
4	Equity financing	1	2	3	4	5
5	Debt financing	1	2	3	4	5
6	Leasing of infrastructure	1	2	3	4	5
7	Partnership's/Joint ventures	1	2	3	4	5

12. What kind of problems are arising while implementing financing method:__________
____

13. Which method of financing is more suitable for financing the power projects in India?
1.________________________________

14. "Risk" is one of the major components for the selection of Financing methods. What is the impact of various risks on your project performance? Please mark √ on the most appropriate number of each variable which corresponds most closely to your desired answer.

Level	Very Low	Low	Neither High nor Low	High	Very High
Code	1	2	3	4	5

Sl:no	***Risk***	√	√	√	√	√	N.A
1	Financial Risk	1	2	3	4	5	
2	Construction Risk	1	2	3	4	5	
3	Operating Risk	1	2	3	4	5	
4	Technology Risk	1	2	3	4	5	
5	Legal Risk	1	2	3	4	5	
6	Political Risk	1	2	3	4	5	
7	Environmental Risk	1	2	3	4	5	
8	Regulatory Risk	1	2	3	4	5	
9	Overall project Risk	1	2	3	4	5	

Debt Financing

15. Some factors influence Debt finance, the list of factors given in table below. As per your experience and knowledge which are most influencing factors, give the ranks to factors. (Please put 1 to 5 ranks in appropriate box).

Sl:no	***Factors Influence Debt***	***Rank***
1	Fear of assets & liabilities mis-match of financing Institutions	
2	Interest rates	
3	Project Risks	
4	Term of financing	
5	Demand at the point of time	

Financial viability

16. What is the performance of financial viability indicators given below in your organization? (Please choose your answer from the given scale from 1-5 mark √ in appropriate box)

1	2	3	4	5
Very Low	Low	Neither High nor Low	High	Very High

Sl:no	***Financial Viability***	√	√	√	√	√
1	Self financing ability	1	2	3	4	5
2	Internal Rate of Return on Equity(IRRE)	1	2	3	4	5
3	Financing ratios	1	2	3	4	5
4	Debt service cover ratio	1	2	3	4	5
5	Any other (plz. specify)--------------------------------	1	2	3	4	5

Financial closure

17. Some statutory clearances are required for financial closing of the project, the list of important clearances is given in table below. As per your knowledge, indicate what is the time duration of getting clearance of those factors, so that to get early financial closure? (Please indicate your response in appropriate box**)**.

Sl:no	*Clearances*	*Time Duration*
1	Water Availability	
2	Off-take agreement	
3	Pollution Control Clearance (Water and Air)	
4	Financing	
5	Land acquisition clearances	
6	Equipment procurement	
7	Transportation of Fuel	

18. Please offer suggestions for reducing difficulty in financial closing
____
____
____

19. The investment of a particular power project depends on the investors preferences of that project. As per your opinion, identify which are primary preferences and which are secondary preferences of investors, from the given items below. (Please mark √ in appropriate box)

Investors preferences	*Primary*	*Secondary*
Credibility of the promoter		
Statutory clearances		
Regulatory issues		
Contractual arrangements		
Non-statutory clearances (land availability, fuel linkage and financing)		
Project risks		
Government support to project		
Political support to project		
Country specific factors		
Environmental groups support to project		
Strength of the project		
Sector specific factors		
Liquidity of the market		

Optional Information

E-mail: ID: ____

Contact No: ____

Company Address: ____

Thanks for your kind cooperation

Appendix – B

LIST OF PUBLICATIONS IN PEER REVIEWED JOURNALS AND EDITED BOOKS

1. Private Investment in Power Sector - A Study on “The Role of Government to Attract Investment in Power Sector” Indian Scenario, International Journal of Power System Operation and Energy Management. Vol. I-Issue 2, 2011, ISSN: 2231-4407
2. Financing Strategies in Power Projects Financing for the Development of Economy – Investment Opportunities and Challenges – A Study of Indo-Canadian Experiences” Published in International Journal of Research in Commerce and Management (IJRCM), ISSN NO:0976-2183
3. Financing Power Projects-Opportunities and Challenges: A Study of Indo-Canadian Experiences, Published in Samir Joshi, Walid Hejazi and Nivedita Bhadarka (2012) (Eds.). Changing Economic Environment and Performance of the Nations Canada and India. Excel India Publications, ISBN: 978-93-81361-83-2, pp 67-80.
4. “A Study of Factors Influencing Debt Financing in Power Projects- Project Facilitators’ Experiences in India” Published in Ram Kumar Mishra, et.al. (2011). Power Sector Reforms: Achievements Opportunities and Challenges Ahead, Mc Milan 2011, ISBN 978-935-059-026-3 pp 198-213.
5. “Reforms in Power Distribution-Lessons from Indian and Canadian Experiences”, Published in Parimal H. Vyas (2011). “Global Business Perspectives and Dimensions: India and Canada”, Manglam Publications, 2011, 356 p, ISBN: 9789381142325.
6. “Financing Road Projects – A Study of Indian Experiences” Published in Edited Book Shantanu Mehta and Neeraj Amarnani (2010). Sustaining Shareholder Value: Role of Investors and Regulators - Excel Publishers - 2010.
7. “Risk Sharing Mechanism in Power Project Financing - A Study on Indian Experiences” published in Rrudra. P. Pradhan (2011). “Infrastructure Finance - Issues and Challenges” Mc Milan India Ltd. ISBN 10: 0230-33215-3 pp 520-547.
8. “Public-Private Partnership - A Study of Determinants for Successful Implementation of Infrastructure Projects in Andhra Pradesh” Published in Rrudra. P. Pradhan (2011). “Infrastructure Finance - Strategies” Mc Milan India Ltd.

FINANCING POWER PROJECTS: A STUDY OF INDIAN PRACTICES

A synopsis submitted to the University of Hyderabad in partial fulfillment for the award of the degree of

DOCTOR OF PHILOSOPHY

By

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UNIVERSITY OF HYDERABAD

SEPTEMBER, 2012

1.0 INTRODUCTION

Economic growth of a country can be largely influenced by the present state of the infrastructure at its disposal. The infrastructural development, in turn, leads to the development of the economy. The infrastructure may be classified as: physical infrastructure, economic infrastructure, and social infrastructure. Infrastructure comprises public works like railways, roads, major irrigation, public utilities like power, telecommunication, tap-water supply, sanitation and sewerage, etc. The importance of adequate infrastructure is that it can facilitate economic growth, poverty alleviation, and environmental sustainability. Infrastructure has been defined by various organizations. Some of these definitions are:

"Infrastructure" means The basic facilities, services, and installations needed for the functioning of a community or society, such as transportation and communications systems, water and power lines, and public institutions including schools, post offices, and prisons.

- The American Heritage Dictionary (2000)

"Infrastructure is generally defined as the physical frame work of facilities through which goods and services are provided to the public"

- India Infrastructure Report

India is the fastest growing economy next to China. Indian Infrastructure sector is growing very fast when it compare with other developing countries. Infrastructure sector contribution to the GDP is very significant for the development of economy. The growth of the Indian economy made the power sector to account for 10 percent growth or more, to support the GDP growth rate of around 9 percent per annum. However, the power sector contribution to Indian GDP is 2.4 percent p.a, further it should increase at a significant level. Indian power sector includes renewable and non-renewable power projects such as coal, gas, nuclear, hydro, wind, solar and bio-mass, etc. The structuring of these projects is different for each project.

1.1 Opportunities and challenges of Indian power sector

1. Since over 90,000 MW of new generation capacity is required in the next seven years, a corresponding investment is required in transmission and distribution networks.

2. Large demand-supply gap: All India average energy is shortfall of 7 percent and peak demand shortfall 12 percent.
3. The implementation of key reforms is likely to foster growth in all segments:

Unbundling of vertically integrated SEBs

“Open access” to transmission and distribution network

Distribution circles to be privatized

Tariff reforms by regulatory authorities

4. Opportunities in generation for: coal based plants at pithead or coastal locations (imported coal) natural gas/CNG based turbines at load centres or near gas terminals

5. Hydro power potential of 150,000 MW is untapped as assessed by the government of India.

6. Opportunities in transmission network ventures - additional 60,000 circuit km of transmission network expected by 2012, total investment opportunity of about US$ 200 billion over a seven year horizon

7. 100% FDI permitted in generation, transmission and distribution - the government is keen to draw private investment into the sector. Incentives include: income tax holiday for a block of 10 years in the first 15 years of operation; waiver of capital goods import duties on mega power projects (above 1,000 MW generation capacities)

2.0 INVESTMENT OF POWER SECTOR IN INDIA

The investment achieved in Indian power sector in Eighth Plan is Rs 6,16,750 million, the target for Ninth Plan (1997-02) was Rs 12,45,260 million, and achieved amount was Rs 5,75,760 million. The expert committee estimation for 1996-2001 was Rs 24,64,000 and for 2001-2006, Rs 37,80,000 (Karker, R., et.al, 2001). The investment in power sector during the Tenth Plan was Rs 1, 75,203 crore. The investment requirement for power generation during Eleventh Plan (2007-12) was Rs 2,50,000 crores. Another Rs 2,50,000 crore would be required for transmission, distribution and rural electrification (Canning & Pedroni, 2004; Calderon & Servén, 2004). It is estimated that, investment of about Rs. 9, 75,000 crores are needed to meet the capacity addition requirement during Eleventh Five Year Plan. The details about the investment of central, state and private sectors are given in the table below.

Table 1: Public and private investment in electricity in India during the period 2002-03 to 2009-10

(*Rs in crores*)

Year	Centre	State	Private	Total
2002-03	14219	20467	12926	47612
2003-04	17336	20566	15583	53485
2004-05	19708	18819	18428	56956
2005-06	22867	18329	21017	62268
2006-07	28332	19372	23825	71529
2007-08	29,386	27,252	54,497	1,11,134
2008-09	36,769	30,109	50,215	1,17,093
2009-10	39,528	31,193	55,237	1,25,958

Source: Ministry of power 2010, GOI

Power projects are financed by using different methods of financing around the globe. These include: equity, debt, project finance, partnerships including PPPs, joint ventures, leasing of infrastructure, corporate financing and many other innovative finance methods. In India, only a few methods are in vogue. However, the selection of financing method depends upon the risks involved in the projects. At every stage of the project, different kinds of risks are involved.

3.0 SIGNIFICANCE OF THE STUDY

The power sector in India has grown from nascent to developing stage, it requires investment of a huge amount of funds for a long-period of time, which involve high amount of risks. Indian power sector has the potential for development. At present, over 43,600 MW of power plants are under execution with a total investment of Rs 2.31 lakh crores. According to an estimate of CRISIL about Rs 7, 50,000 crore is likely to be invested in the power sector by 2013-14. Of this, Rs 4, 80,000 crore is expected to be invested in the power generation (KPMG 2010). Now–a-days the power sector in India has been facing acute scarcity of funds. The government estimation shows that gap in the debt resources (debt requirement and debt availability) is around 20 percent. Government alone cannot satisfy the entire funds requirement of the power sector. The private sector capital is too very essential. It means the private sector should be encouraged to invest more funds. In India, the share of private participation in Tenth Five Year Plan for power sector was 31.47 percent; in Eleventh Plan, the government estimated 27.83 percent. Surprisingly, this is 3.64 percent less.

In the present scenario, it is difficult for getting private investment; investors are generally reluctant to invest funds in the power sector. It is due to the high level of risks which are involved in the projects. The risks should be minimised. There are several ways to reduce the risks, including the adoption of appropriate methods of financing to reduce the risk in power projects.

Keeping this in view the study has been undertaken to identify the influence of financing methods on project risks and vice-versa, factors that influence the inflow of investment and its degree of influence, the investor's priorities for investment, and finally to identify the factors causes for delay in financial closure.

As of now, many academicians and practitioners have undertaken various researches on infrastructure finance. But very limited research has been done at the national level before and after the economic liberalization. This study systematically plans to make a significant contribution for the development of the power sector, and draw inferences from the experiences from the Indian power sector during the last ten years.

4.0 SCOPE OF THE STUDY

The study scope covers only the economic infrastructure, which has the characteristics of commercialization of its product. The scope of the study is very wide within the economic infrastructure. It covers various components of the power project financing. The study covers both public and private sector projects in India and their experiences of financing projects. The study is mainly focused on factors facilitating investment, restricting investment, project risks, and financial closure of power projects in India. The study also covers the national and inter-national methods of financing, in public and private sector projects and surrounding investment environment, and its impact on the projects.

5.0 REVIEW OF LITERATURE IN BRIEF

5.1 Relationship between methods of financing and project risks

According to Modigliani and Miller (1958), "any financing choice that is made in a competitive scenario and that does not change a project's cash flows and risks, the risk must be borne by the parties financing it".

In contrast Gupta & Sravat (1998), Vaaler, James, & Aguilera (2008) stated, "the risk profile of the projects decides the financial structure of the project". It means the risk profile of the project well decide the method of financing.

Schaufelberger et.al (2003) identified that the level of risk and its mitigation planning depends on the selection of an appropriate financing strategy. It means the risk is mitigated by an appropriate method of financing.

Etsy (2004) said that, mitigating or transfer of risks specific to power plant has an impact on the attractiveness of alternative financing structures".

Hence, all these statements are evidences for understanding "the method of financing influence the level of risk and the risk of the projects influence the selection of the financing method".

5.2 Factors influencing investment

Heron (1985) identified that investment climate can reduce risks, and added that the creation of good investment climate will attract the commercial loans and private sector investment.

Singh (2007) opined that, the project specific factors include a number of contractual issues (such as power purchase agreement, fuel supply agreement, land acquisition, environmental issues, etc.) influence the investment decisions of the investors and these are linked to the legal framework of the country.

Peterson (2010) said, "in fact, provided that the project developer is reliable and boasts a sufficient track record, the strength of the PPA is the foundation on which a bank will base its entire deal".

5.3 Factors influencing debt

Ballestero (2000) spoke about, "the carefulness of undesirable high levels of risk" at the initial stages of the projects

Schwabe et.al (2009) stated that, the "Interest rates" are important to raise debt capital. Harris & Tadimalla (2008) identified the danger of "asset-liability mismatch" of financial institutions when they provide the short-term deposits for the long-term loans. Most often, commercial banks may be bound by exposure norms and difficulties arising from a maturity mismatch inherent in financing the infrastructure projects (Economic Survey 2007-2008).

Wiser & Kahn (1996) mentioned that, "loan maturity" (duration of loan) is important for lending.

5.4 Relationship between size of the project and project risk

Vimmerstedt (1998) identified the relationship between risk and the size (capacity) of the power project. His research revealed that risks are very less for small geothermal projects which are less than 5 MW and risks are high for big geothermal projects in Latin America, the Caribbean, and the Philippines.

5.5 Factors influencing financial closure

Kumar et. al (2010) highlighted the importance of various project clearances for financial closure of the project. He said that, land acquisition consists of three types of land 1) forest, 2) government and 3) private. Generally, 12 - 18 months time is required. Regarding transportation, insufficient port capacity and rail wagon availability may restrict import of raw-materials. He mentioned about equipment procurement, "power plant equipment is typically customized it will take more time to manufacture and deliver"

Ghimire (1998) mentioned that, the promoters are also failing to ensure for the people for the use of advanced environmental pollution control measures. Environmental factors comprises pollution related issues such as noise, air pollution, water pollution, and visual disturbances and those related to natural resources, such as unsustainable use of natural resources including minerals, water, and land, etc.

5.6 Factors influencing priorities of investors

According to Bosshard (2002), "financial institutions will usually require some guarantees from the parent company when they fund private power projects". The reason for the investors asking the guarantees is to reduce the risk of financing to power projects.

6.0 RESEARCH GAP

From the review of literature (including theoretical and empirical studies), the study has identified various issues pertaining to the investment and the risks of power projects, such as: impact of external risks on selection of financing methods, impact of method of financing on internal risks, the factors that influence debt financing and the factors that influence the financial closure. These issues have gained importance for conducting research on Indian power projects, which has not been done in power sector hitherto. This is the first study that has attempted to analyse those issues in the context of the power sector in India.

7.0 RESEARCH QUESTIONS

The study has chosen to test some hypotheses. To formulate the hypotheses (to be tested), certain research questions were developed. These questions have been formulated from the literature on infrastructure financing which includes, national and international experience to finance infrastructure projects. The research questions are:

1. What are the factors that influence the investment of power projects?
2. Is there any relationship between financing methods and the level of project risks?
3. Is the risk of the project similar to projects with different capacities?
4. Is the time duration for financial closure similar to all projects?
5. What are the factors causing the delay in financial closure?
6. What are the investment priorities of investors?

8.0 OBJECTIVES OF THE STUDY

Broadly the objective of the study is to analyze the financing methods and its relationship with risks in power generation projects in India. The specific objectives are:

1. To study the factors, that influence the investment in to power projects in India.
2. To examine the relationship between financing methods and the risks involved in the power projects in India.
3. To analyse the factors that influence the debt finance in the power projects in India.
4. To examine the impact of the risk on projects with different capacities in the power sector.
5. To analyse the factors that influence the financial closure of public and private sector power projects in India.
6. To identify the investment priorities of investors to invest funds in the power projects.

9.0 HYPOTHESES OF THE STUDY

H1. Financing methods influence the internal risks in power projects.

H2. External risks influence the selection of financing methods in power projects.

H3. Project risks differ for each power project, based on its level of capacity.

H4. Time duration to get statutory clearances differs for public and private sector power projects in India.

10.0 RESEARCH METHODOLOGY

The study is "explorative" in nature regarding financing issues of the power projects. It focuses on identifying the variables pertaining to the investment in power sector and the investors' priorities of investment. It also focuses on the measurement of influence of financing methods on project risks, and the variability of risks for public and private sector projects with different capacities. The study will draw the inferences from both qualitative and quantitative inputs.

10.1 Research Outline

The study is designed keeping the objectives of the study in mind.

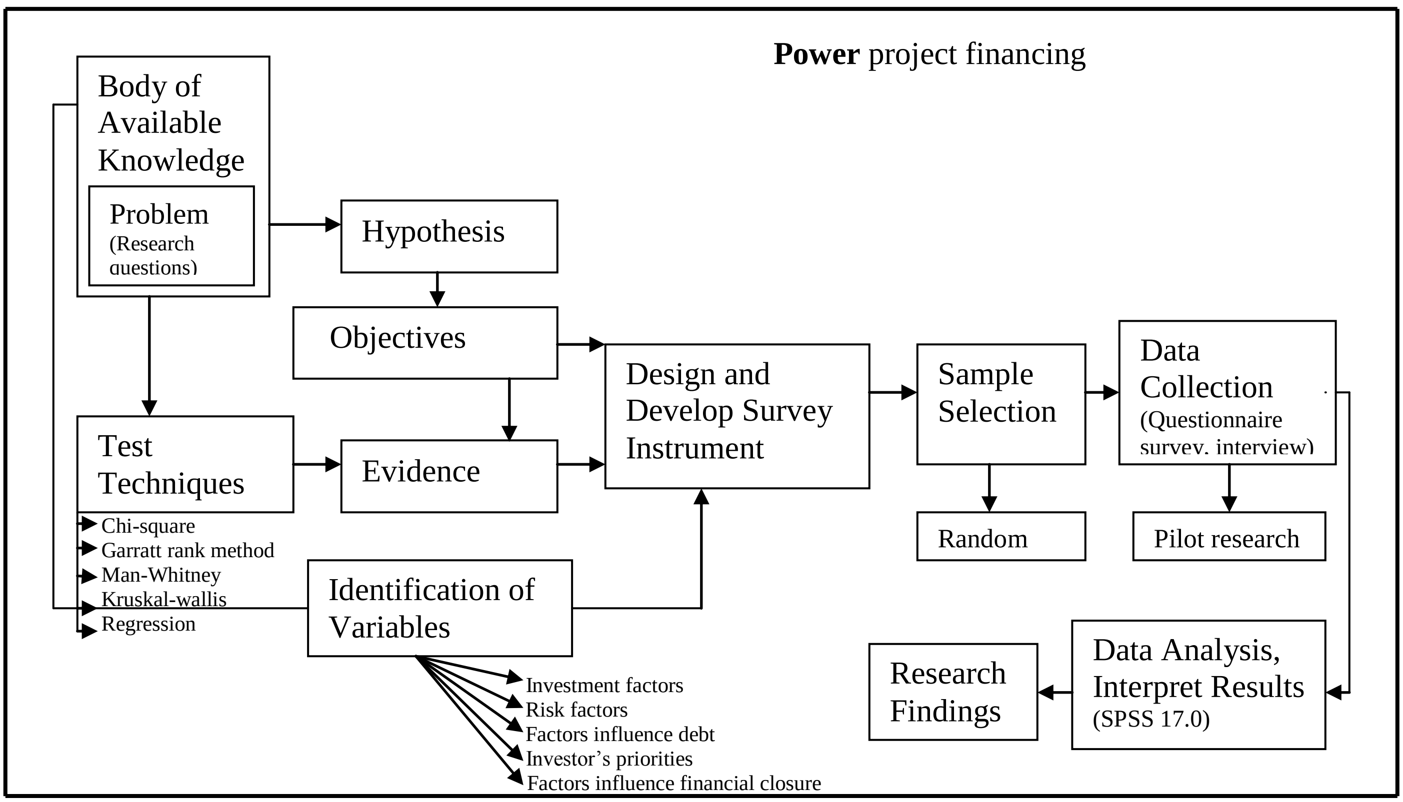

Fig 1: Flow chart of research process

10.2 Sample Size and Sampling Technique

10.2.1 Sample Size: The study considers Krejcie & Morgan (1970) method of determining the sample size needed to be representative of a given population. To calculate the representative sample size they given the following formula:

$$\boldsymbol{S} = X\ 2NP\ (1-P) \div d\ 2\ (N-1) + X\ 2P\ (1-P).$$

s = required sample size.

$X2$ = the table value of chi-square for 1 degree of freedom at the desired confidence level (3.841).

N = the population size.

P = the population proportion (assumed to be 0.50 since this would provide the maximum sample size).

d = the degree of accuracy expressed as a proportion (0.05).

Based on this formula, they have developed a table which includes the total population (N) and the representative sample size (S). According to that table, for a size of 3000 population the representative sample size is 341 and for the population 3500, the representative sample size is 346. The study population is 3073. According to the above mentioned criterion, the study needed 400 as the size of the representative sample. From the determined sample size, only 379 responses have been received from the respondents.

10.2.2 Sample Technique: The study has chosen the simple random sample technique to select the representative sample size. Through this method, the sample has been selected from different states in the country.

The total number of power projects in India is 3073. It includes the projects already in operation and the projects that have achieved financial closure. The projects which are in operation are 2080. Among these projects public sector projects are 1363 and private sector projects 717. The projects which have achieved financial closure are 993. Among these public sector projects are 61 and private sector projects 932.

Table 2: Study population of power projects, including public and private sector projects

Power projects in operation	
Public sector projects in operation	Private sector projects in operation
1363	717
Power projects that achieved financial closure and are in different stages of construction	
Public sector projects that achieved financial closure	Private sector projects that achieved financial closure
61	932
Total	
1424	**1649**

Source: CMIE investment report 2008
CMIE provice data base on power sector 2011
CEA 2011 database on power projects in India
Manish Kumar Urele: "A Study of Indian Power Sector-Enthralling Private investors" ICRA Limited
sikkim_teesta_rangit_basin.pdf
Database of Private Hydro Electric Projects, Dec 2010
www .cea.nic.in, Hydro Power Policy 2008 and Project Monitor
http://greenworldinvestor.com/2011/02/17/list-of-current-and-future-solar-photovoltaic-energy-and-solar-thermal-plantsprojects-in-india/
http://www.iitr.ac.in/departments/AH/pages/Testing+Hydropower_Stations.html
http://thermalpower.industry-focus.net/industry-overview/342-list-of-upcoming-thermal-plants-in-india.html
http://www.energy-business-review.com/archive/4294967287-4294939993/page/2?SearchTerms=powewr+generation+companies+in+india&btnSubmit=
From the five regions of India the total distribution of respondents of the study is given below.
http://biomass-power.industry-focus.net/

The study obtained a total of 379 responses from both public and private sector projects.

The total numbers of responses from the projects in different states are given below.

Table 3: Responded representative sample size of power projects, including public and private projects

Power projects in operation	
Public sector projects in operation	Private sector projects in operation
99	49
Power projects that achieved financial closure and are in different stages of construction	
Public sector projects that achieved financial closure	Private sector projects that achieved financial closure
30	201
Total	
129	250

10.2.3 Reliability and Cronbach's Alpha: The overall questionnaire's reliability of pilot study is 0.786 for 47 items are considered and the number of cases (responded questionnaires) 169. Later on, the study has been modified, keeping in the view the results of the pilot study. A few items were deleted and a few new items were added to the final questionnaire. The final form of questionnaire included 74 items and for these items, the overall α is 0.738. The numbers of cases are 379, and the excluded cases are 0. Hence, the overall reliability ('α') of the questionnaire items used for primary survey is 0.738. It is the value which representing a good consistency in the responses given by the respondents. This value is certainly in the region indicated by Kline, (1999) so this is probably indicates good reliability. For public sector projects, Cronbach's alpha (1951) is 0.645 and for the private sector projects, it is 0.807.

11.0 DATA ANALYSIS

The study mainly focused on the identification of factors influencing the investment in to the power sector, the relationship between size of investment and operating cash flow, the relationship between the method of financing and risks, factors influencing the debt and the investor's priorities of their investments.

11.1 Factors that Influencing (Facilitating) the Investment of Power Projects

The study selected some factors from the literature. These are, development of domestic debt capital market, permitting foreign equity flows into infrastructure, inducing foreign investors and multilaterals to raise rupee loans, liberalizing the rules for investment of pension fund, provident fund and insurance, government sponsored infrastructure financing facilities and tax incentives, project size, ability to complete the project on time, project contractual arrangements such as Power Purchase Agreement (PPA) and fuel supply agreements and track record of past ventures.

This part of the study is mainly focused on identifying the major factors that influence the investment inflow of the power projects in India. To measure the opinions "Likert" scale was used. The scoring of 1 represents "very low", 2 represents "low", 3 represents neither low nor high", 4 represents "high", and 5 represents "high". The total representative sample size is 379.

Mean scores and variances were calculated for those factors that influence investment. From these scores, it is observed that development of domestic debt capital market (Mean score 3.72) (Variance, 0.485), government sponsored infrastructure financing facilities (Mean score 4.48) (Variance 0.679), tax incentives (Mean score 3.92) (Variance 0.673), ability to complete the project in time (Mean score 4.23) (Variance 0.418), project contractual arrangements such as PPA and fuel supply agreements (Mean score 4.65) (Variance 0.338), and track record of past ventures (Mean score 4.20) (Variance 0.503) are influencing "high". It means these factors are highly facilitating the investment to power projects.

Independence of regulatory mechanism (Mean score 2.66) (Variance 1.029) and Gross Domestic Savings (GDS) (Mean score 2.46) (Variance 0.751) according to it mean and variance scores its influence is "low".

11.2 Financing Methods

There are several methods for financing power projects globally, but in India a limited number of methods are in use due to several limitations and hurdles for obtaining finance from fund suppliers. Now-a-days popularly using methods are: equity financing, debt financing, Public Private Partnerships (PPPs), corporate finance, project finance and debt and equity. The survey revealed that project finance is the most popular method of financing from the total sample 45.6 percent projects are used it. The next popular method is equity & debt it is used by 42.7 percent projects. Corporate finance is used by 7.1 percent projects. Equity is used by 0.5 percent, debt finance used by 1.6 percent and partnership finance used by 2.4 percent projects.

11.3 Method of Financing vs. Size of the Project (in Terms of Capacity)

The relationship between financing methods and the risks can also be seen between the projects which are operating with different capacities. However, the methods of financing are not similar for different capacities of projects. From the analysis, it is observed that, equity and debt financing method is majorly used for the projects with capacity level of < 10MW (55 percent) and 50MW-100MW (78.6 percent). Project finance is mainly used in the projects with capacity level of 10MW-50MW (56 percent), 100MW-500MW (45.1 percent) and with capacity level of > 500MW (47.7 percent).

11.4 Financing Methods vs. Project Risks

The study identified the relationship between the selection of financing methods and the risks involved in the power projects in India. The study selected eight kinds' risks, such as financial risk, construction risk, operating risk, technology risk are the internal risks and legal risk, political risk, environmental risk and regulatory risk are the external risks. Chi-square technique has been used to prove the hypothesis that "financing methods influence the internal risks in power projects". The P- value of the hypothesis is significant ($p < 0.05$) so that it can be accepted. Similarly, the external risks influence the selection of financing methods in power projects, the P- value of the hypothesis is significant ($p < 0.05$), so that it too can be accepted.

11.5 Factors Influencing the Debt Finance – Garrett Ranking Technique

Debt is the major source of financing to the power projects. The study tested five factors that influencing the debt, to know which are highly influencing and which slightly influencing factors. Garret's rank method was used to assign ranks. The first rank allotted to "project risks", second, to "interest rates", third, to "term of financing", fourth, to "demand for the funds at the point of time" and fifth, to "fear of assets and liabilities mis-match" of the financial institutions.

11.6 Risks Vs. Size of the Projects (in Terms of Capacity)

The study attempts to prove whether the risks are similar to all kinds of capacity levels of power projects or not. To test this phenomenon, the study divided all kinds of power projects into five categories such as < 10 MW projects, 10-50 MW projects, 50-100 MW projects, 100-500 MW projects and >500 MW projects. "Eight" kinds of risks were selected such as: financial risk, construction risk, technology risk, operating risk, legal risk, regulatory risk, environmental risk, and political risk. The Kruskal-Wallis test was used to analyse the above phenomenon. From this analysis, it is observed that, the *P-value* of the hypothesis is significant ($P < 0.05$). So the hypothesis that "project risks differ for each power project based on it level of capacity" can be accepted.

11.7 Determination of Time Duration for Obtaining Statuary Clearances for Public and Private Sector Projects

Several clearances are required to start a power project. The study sought to identify whether the time duration for getting those clearances is similar for public and private projects or not. The selected clearances are: water availability, off-take agreement, pollution control clearance (water and air), land acquisition clearance, equipment procurement, and transportation of fuel. Mann-Whitney test U statistics test was used to compare the public and private power projects, in terms of time duration for getting clearances from various government authorities to establish a power project. The P-value of the U test is significant ($P < 0.05$). So the hypothesis that "time duration to get statutory clearances differs for public and private sector power projects in India" can be accepted.

11.8 Investors' Priorities for Investment

The last analysis adopted in this study was to analyse the investor's priorities of investing funds in power projects. From the data analysis, it can be observed that the opinions of the respondents, credibility of the promoter, statutory clearances, non-statutory clearances (land availability, fuel linkage and financing), contractual arrangements, project risks, country specific factors, environmental groups support to project, strength of the project, and sector specific factors are the primary priorities for the investors. The remaining factors government support to the project, political support to the project, regulatory issues, liquidity of the market are secondary priorities for investors to invest in power projects in India.

12.0 FINDINGS AND SUGGESTIONS

12.1 Investment

1. The study selected some factors which influence (facilitate) the investment. From those factors, it is observed, according to its mean scores and variances, the most influential factors are: government sponsored infrastructure financing facilities, tax incentives, ability to complete the project on time, project contractual arrangements such as PPA and fuel supply agreements, and track record of past ventures. This is also supported by the proportion of the respondents' opinions. A total of 90.8 percent, 78.9 percent, 91.1 percent 95.8 and 85.5 percent respectively of respondents' opinions were given for the above mentioned factors. These percent of opinions are the total of right hand side of the scale. Based on these analyses, it is suggested that the government should improve the liquidity of the market. It should also give the sovereign guarantees on the debt instruments. Then only the domestic debt market will be developed.
2. The least influencing factors are independence of regulatory mechanism and Gross Domestic Savings (GDS). This is also supported by the proportion of the respondents' opinions. The percent of opinions on the left hand side of the scale were totaled. The total percent of opinions are 47.5 percent and 56.8 percent respectively. To attract

investors, the regulatory system requires a transparent regulatory process and sound tariff setting process. Then only it can attract funds from domestic, as well as foreign investors.

12.2 Financing Methods

3. From the data analysis, it is observed that "project financing" is the most popular method of financing. From the total sample, 45.6 percent projects are using it. The next popular method is equity & debt. This is used by 42.7 percent projects. Corporate finance is used by 7.1 percent projects. Most of the projects have chosen project finance because it can reduce the overall risk of the project, and the funds are also easily available. From the results of this analysis it is identified that the project finance is the popularly used method of financing.
4. It is observed that, "equity and debt" financing method is mainly used for the projects in the capacity level of < 10MW (55 percent) and in between 50MW-100MW (78.6 percent) capacities. Project finance is mainly used in the projects 10MW-50MW (56 percent), 100MW-500MW (45.1 percent) and > 500MW (47.7 percent) capacity levels. This is sufficient to prove that projects with different capacities are not using similar methods of financing. The analysis shows small capacity projects are mainly using equity and debt method and large capacity projects are using project finance method. For the large capacity of projects, project finance is that most suitable method. Now-a-days, most of the projects are following this method globally. In India also the projects are following this method, but the number of projects is less. There is need to increase this number in future.
5. Regarding the relationship between method of financing and the risks, 48.8 percent respondents opined that financial risk is high. The reasons for high level of this risk are: increase in interest rates, fluctuations in currency exchange, inflation, and bankruptcy of project partners. These factors should be handled carefully through project agreements with parties. The analysis shows financial risk is low under "project financing", since it can handle financial risk efficiently. It is better to adopt project finance method to reduce financial risk.
6. Construction risk of the sample is "high" under all kinds of financing methods. This type of risk is high, because of construction delays, land expropriation and acquisition

problems, default by concession company, late design changes, poor quality workmanship, and excessive contract variation. It is the result of the non-availability of the funds at the right time and in the right amount. Among all kinds of financing methods, project finance is best suited to handle the risk. From the analysis, it is concluded that it is better to adopt project finance to reduce the construction risk.

7. Operating risk of the power projects is low under project finance. The majority (84.4 percent) of the respondents (from the total projects 173) indicated as low in the left side of the scale, under "partnerships/venture financing", 55.6 percent of the respondents (from the total projects 9) indicated as low in the left side of the scale. The risk is minimised by proper O&M contract with the operating agency and the use of advanced technology in the plant. Generally, this risk arises due to technology used, tariff mechanisms, operating cost overruns, operational revenues below expectation, low operating productivity, and maintenance costs being higher than expected. To handle these factors and to reduce the operating risk, project financing method is suitable.
8. Technology risk of power projects is low under project finance and debt finance methods. This risk generally arises due to: poor quality of technology, lack of technology warranty and guarantee, etc. For project finance, the left side of the scale indicates 77.5 percent of responses. It is because of the use of advanced technology and the use of super critical technology in those projects to reduce this risk, and also the agreement with the technology provider for providing guarantees and warranty. The project finance can be reduced more efficiently by providing required amount of funds in time to procure these technologies.
9. Legal risk of the power projects is low. Under "corporate finance" (59.3 percent of 27 projects), "partnerships/venture financing" (44.4 percent from 9 projects) and "equity and debt" (42.6 percent from 162 projects) responses were indicated. Among these methods to reduce legal risk, corporate finance is suitable, because it does not involve any agreements with project parties, and there is no problem of default of agreements.
10. Political risk of the power projects under project finance is low. More than half (57.2 percent) of the respondents (total of 173 projects) opined. Generally, this risk arises due to: unstable government, adverse government action, payment failure by

government, corruption and bribery and bureaucratic delay for late approvals. It is concluded that project finance is better to reduce the political risk.

11. The environmental risk is low under project finance (51.5 percent of 173 projects), and “equity and debt” (54.3 percent from 162 projects) methods. These two are the best methods to reduce this risk. Mainly, this risk arises due to lack of funds to implement the measures to handle ash, waste water and other waste materials etc. Based on the analysis by using any one of the two methods above mentioned, it can be reduced.
12. The regulatory risk of the power projects under “project finance” method is low (64.8 percent from 173 projects gave their views). To reduce the regulatory risk, it is better to select the project finance method.
13. The summary of the above findings is presented in the table for a clear understanding.

Table 4: Financing methods and degree of risks in power projects

Financing method	**Financial Risk**	**Construction Risk**	**Operating Risk**	**Technology Risk**	**Legal Risk**	**Political Risk**	**Environmental Risk**	**Regulatory Risk**	**Total Risk**
Project finance	Low	High	Low	Low	High	Low	Low	Low	Low
Corporate finance	High	High	High	High	Low	Low	Medium	Medium	High
Equity finance	Low	High	Low	High	High	Low	High	High	High
Debt finance	High	High	High	Low	High	High	High	High	High
Partner ship's/jv's	Low	High	Low	High	Medium	High	High	High	High
Debt & equity	High	High	High	High	Low	Low	Low	High	High

Finally, it is concluded that “project finance” is the only the method that can reduce the overall risk of the project. The remaining financing methods involved high level of risk, when compared with project finance. From the above findings in “the financing methods Vs. risks” it is concluded that financing methods influencing the degree of internal risks (financial risk, construction risk, operating risk and technology risk) in the power projects and external risks (legal risk, political risk, environmental risk and regulatory risk) influencing the selection of financing methods in power projects.

14. The study identified five factors that influence the debt finance. Those factors are ranked by using "Garrett ranking" technique. According to this technique, ranks assigned to the factors, first rank was given to "project risks" second to "interest rates", third to "term of financing" fourth to "demand for the funds at the point of time" and the fifth to "fear of assets and liabilities mis-match" of the financial institutions. Based on the analysis, it is very clear that by using more debt funds, project risks should be reduced. To reduce the impact of above factors, the government should develop the domestic debt market. The government should also encourage the domestic investors.

12.3 Project Risks

15. Regarding the project risks, it is identified that among 379 sample,
    1) Financial risk "high" for 48.8 percent of the respondents,
    2) Construction risk "high" for 64.3 percent of the respondents,
    3) Operating risk "low" for 54.1 percent of the respondents,
    4) Technology "low" for 49.6 percent of the respondents,
    5) Legal risk "high" for 40.9 percent of the respondents,
    6) Political risk "low" for 47 percent of the respondents,
    7) Environmental risk "low" for 40.3 percent of the respondents, and
    8) Regulatory risk "low" for 44.4 percent of the respondents.
16. From the analysis, it can be understand that there is a strong relationship between size (capacity) of the project, risk and the method of financing it. It is observed that,
    - Projects with less than 10 MW capacity and in between 50MW-100MW capacity level have a "high" level of risk which is using "equity & debt" financing method.
    - The projects in between 10MW-50MW capacity level and 100MW-500MW have "low" level of risk which is using "project finance" method.

    From the analysis of financing method vs. risk it is proved that projects which are adopting the "project finance" method for financing have a "low" risk, under the remaining methods the projects have high level of risks. It means financing methods have an influence on the level of risk and the level of risk depending on the capacity of the projects. If the "project finance" is used for financing the projects in less than 10 MW capacity and 50MW-100MW capacities, the overall risk can be reduced.

This analysis also shows, except financial risk, all other risks are not similar to the above mentioned capacities of projects because of “project finance” method. It reduced the risks very efficiently through various agreements with the parties involved in the projects. The diagram below represents the projects with different capacities, project risk and the financing methods.

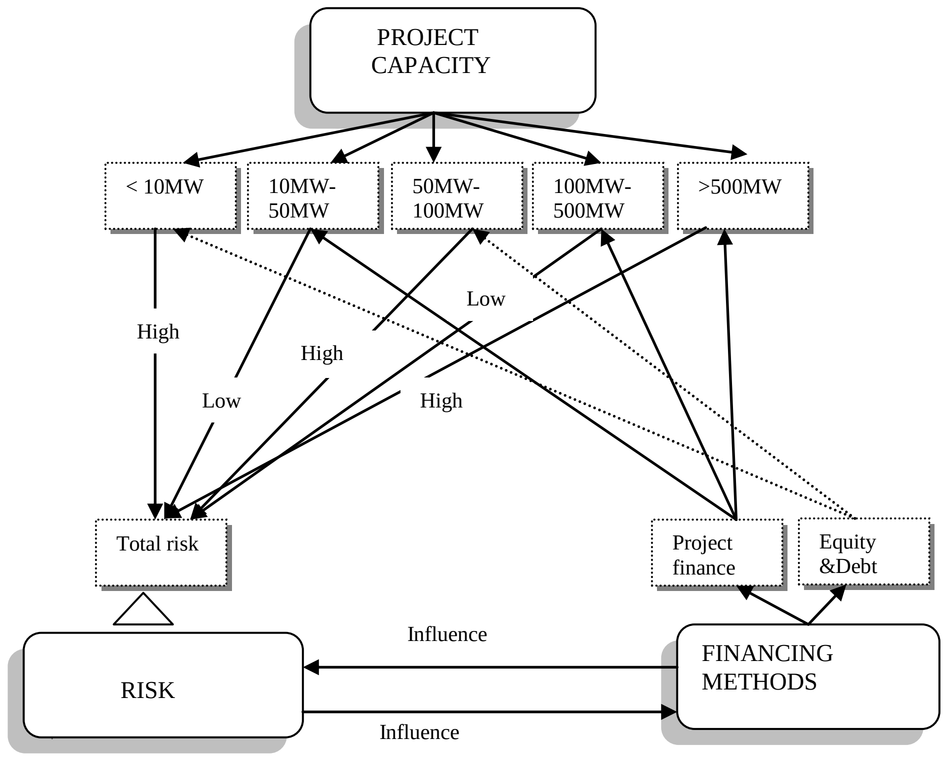

Fig 2: Relationship between size of the project, financing method and risk

12.4 Financial Closure

17. The study has attempted to identify whether the time duration for getting statutory clearances is similar to public and private projects or not. Regarding finance (equity) clearance and equipment procurement clearance, the time duration is same. Time duration for getting water availability clearance, off-take clearance, pollution control clearance, land acquisition clearance and clearance for transportation of fuel differs for public and private sector projects. To reduce the time delays for getting the approvals, interdepartmental coordination and transference in the process is required.
18. The study identified that credibility of the promoter, statutory clearances, non-statutory clearances (land availability, fuel linkage and financing), contractual arrangements,

project risks, country specific factors, environmental groups support to project, strength of the project, and sector specific factors are the primary priorities of investors for their investment decisions. The secondary priorities are: government support to the projects, political support to the projects, regulatory issues and liquidity of the market.

Table 5: Summary of hypothesis statements and its results

Hypothesis	Statement of Hypothesis	Statistical techniques	P-value	Result
H1	Financing methods influence the internal risks in power projects.	Chi-Square	$P < 0.05$	Accept
H2	External risks influence the selection of financing methods in power projects	Chi-Square	$P < 0.05$	Accept
H3	project risks differ for each power project, based on its level of capacity	Kruskal-Wallis test	$P < 0.05$	Accept
H4	Time duration to get statutory clearances differ for public and private sector power projects in India	Mann-Whitney U test	$P < 0.05$	Accept

13.0 Limitations of the Study

The study is a new venture in the field of financing the power sector in India. The study is started with an aim of identifying new opportunities in financing, which are to be explored by the projects for increasing investment. Though the study is very comprehensive in nature, it is subjected to certain limitations, like:

1. The study has not covered all components in the infrastructure sector.
2. Non-availability of the data from the projects because of confidentiality considerations. And fear of officials to provide the required information.
3. Non-availability of key respondents because of their busy time schedules, some officials were not interested to interact and to give interviews.
4. Scope of the study is wide but to cover each aspect of the study, the time and financial resources became major constraints.

14.0 Conclusion

Finally it is concluded that, the financing infrastructure projects is critical because, it require large amount of funds for a long-period of time. The financing structure also differs from project to project. A separate structure should be designed, based on the method of financing. The final result whether it is profit or loss should be borne by the parties involved in that project. Indian projects are using only a few types of financing methods because of investors investing norms. The amount of investment in power projects should be increased. To enhance it, the risk of the project should be reduced. Several kinds of risks are involved in the power projects but its level of influence depending on the promoters' creditworthiness and the prevailing situational factors in the project. However, for the development of the power sector, the private sector investment should be increased, which is subjected to the level of risk involved in the project. To reduce the risk, promoters should select suitable methods of financing.

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From the five regions of India the total distribution of respondents of the study is given below.

http://biomass-power.industry-focus.net/