I J A B E R, Vol. 13, No. 2, (2015): 477-500

FINANCING METHODS AND RISKS - IMPACT OF RISK ON THE SELECTION OF FINANCING METHODS IN POWER PROJECTS: A STUDY OF INDIAN POWER SECTOR

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Abstract: *The role of power sector is vital in the economic development of a country. In India, now, the Power sector contribution to GDP is 2.4 percent. Presently, the Indian power sector requires an additional power generation capacity of 100,000 MW. And also it requires an investment of USD665 billion up to the year 2030. In this scenario, the government has no sources of fund to invest in power sector. So, to provide enough funds and reduce the imbalance of "demand and supply" of the funds, the government invited private sector investment. The private sector mainly considers the level of risk involved in the projects. If the risk of the project is less, they put more funds in power projects. Based on this fact, the study has been undertaken to identify the possibility of risk reduction in the projects, by using a suitable method of financing. Through the analysis of the collected data, the study identified that, there is a "relationship between the type of financing method and the level of risks involved in power projects".i.e, if the method of finance changes accordingly, the level of risk also changes in the project. When, it compared all methods of financing with each other, the "project financing" greatly, reduced financial risk, operating risk and technology risk.*

Key words: *Power Sector, Project financing, Corporate finance, Partnership finance, Equity, Debt, Risk, Allocation of risk, Investment, Financing methods, impact of risk, GDP, MW, India.*

1. INTRODUCTION

The role of the power sector is vital for the economic development of a country. India initiated several reforms in various sectors among those, power sector is one. The power sector is a growing industry in it, the reforms has been initiated to speed up the investment in the sector. As a part of the reforms, the reforms of electricity markets have led to major changes in the way decisions are taken on power sector investment. In India, Power generating firms are growing in size, they require high amount of investment from promoting companies balance sheets. But the problem of the promoting companies is the scarcity of funds. Even to raise the funds to the required level from the domestic market, the Indian domestic

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debt market is not developed. So, the availability of domestic resources is a decisive factor in the success or failure of power investment programmes in the country. As per as the study concern it believes that, the required investment in power sector would be possible only if there is a substantial expansion in internal generation and extra budgetary resources of public sector, in addition to a significant rise in private investment. Here the hidden fact is, the risks of the power project are the key factors that influence the level of investment in the sector. It should be minimized to get more investments in to the power sector. The present study mainly focused on the identification of the relationship between the level of risk and the selection of financing method in the projects. However, the study believes that, risks of the project will influence the method of financing. This study has been undertaken to test this phenomenon.

1.1. Financing Methods and Risks

The Indian power industry has been dominated by the public sector. Previously 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. According to Sekhara Rao K.S. (2010) "to arrange large amount of funds for power projects in the conventional way has been extremely difficult for promoters and therefore, limited or non-recourse project financing has been adopted for financing private power projects". There are several methods of financing power projects, such as: project financing, equity financing, debt financing, leasing of infrastructure, Public Private Partnerships (PPP's), etc, but in India, only few methods are in use.

If the project risks identified, the likelihood of their occurrence can be assessed and their impact on the project also be determined. The sponsors of the project must know how to reduce those risks. The ways for reducing risk are: absorb the risk, lay off the risk with third parties, such as insurers, and allocate the risk among contractors and lenders. There are different kinds of risks involved in the power sector projects, some risks are homogeneous, and some are heterogeneous to the projects. However, these are dependents on the conditions, policies, investment decisions and other factors of the power projects. The study considered only selected risks which mainly influence the selection of financing methods, they are: Operating Risk, Technology Risk, Financial Risk, Political Risk, Regulatory Risk, and Environmental Risks.

2. LITERATURE REVIEW

Major issue of the power sector is scarcity of investment resources. It is a serious problem in power sector, because of the high risks involved in power project financing. In this context, Marcel Bradu (2010) said "Large investment projects are always connected with the risk". Regarding the investment in India the

governments failed to make credible promise, due to political instability and various financial constraints. Availability of domestic financing of the required magnitude is critical to the development of infrastructure in any location**.** Sometimes the securitization can facilitate the funds to the projects. In relation to this, Ramesh Narayanaswamy (2007) said that, "When right conditions are prevailed, securitization can give borrowers access to funds". However, the selection of suitable method of financing is important to get financial stability and to reduce the volatility in financing which is caused by the risks of project.

OXERA (2003) report revealed that, "the different contractual and organisational arrangements, to mitigate or transfer some risks specific to nuclear plant onto other parties, have in turn an impact on the attractiveness of alternative financing structures for a nuclear plant". Whereas, Etsy, B.C (2004) said that, "the allocation of the different construction and operating risks in turns influences the selection of the financial arrangements among different options".

There are different methods in use for financing power projects. Project financing is one of the most important methods. It is more suitable for the improvement of the project. Esty, B. C. (2002) identified that, "Project financing 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."

Debt is another method of financing. It is available easily in a required amount for a required time period. Generally, power projects required long term debt funds which involve high risk. In this context to reduce the risk of the project, Hance, C. N. (2005) said that "Reducing the length of the debt period corresponds to reducing the risk of the investment, thereby decreasing the interest rate". Debt is not intrinsically cheaper than equity. Equity is also another method of financing. Although, equity requires a higher return than debt does, it also bears a greater amount of risk.

Leasing is different kind of financing method to reduce the project risk. Several researchers made their researches on lease financing and its advantages. According to Farrell, L.M. (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 the signing of the contract". 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 found in several ways. Esty, B. C. (2002) suggested that "by isolating the asset in a standalone project company, project finance reduces the possibility of risk contamination".

Miller, R., and Lessard, Donald (2000) said that "the sponsor can further decrease the risk of the project by entering in to a variety of contracts". Financial risk involved in all power projects, it can be reduced by avoiding the inefficient

strategies for designing the capital structure of the project (Mallikharjuna Rao, S. and Sekhara Rao, K.S. 2010). Finally, for the successful implementation of power projects the risk allocation is necessary".

3. OBJECTIVES OF THE STUDY

The broad objective of the study is to study the relationship between project financing methods and the risks involved in the power projects in India. In specific:

1. To study the impact of financing methods on the level of internal risks involved in power projects.
2. To identify the impact of the external risks on the selection of financing methods in power projects.

To show the influence of financing methods on project risks in Indian power projects, the study formulated two hypotheses, they are given below.

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

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

4. RESEARCH DESIGN

4.1. Methodology

For this study a structured questionnaire has been used to collect the primary data from CFO's, project finance managers, finance directors, and other top management people who are looking after the financing aspects of different power projects in India. 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 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.

4.2. Survey Process

Various methods of financing and risks of the power projects are identified from the literature review and incorporated into a questionnaire. The questions used a

five point "Likert" scale. The target population consisted of managerial level staff in public and private sector power companies.

The identified population was contacted in advance to ensure their willingness to participate in the survey. Questionnaires executed to 379 power companies which are located in different states in India.

5. DATA ANALYSIS

This study considered 379 power sector companies which include both public and private sector companies. Each company is using different type of financing; its degree of risks is also different. This study test selected financing methods (project financing, equity, and debt financing methods) and various internal and external risks which influence the power projects such as, financial risk, construction risk, operating risk, technology risk, legal risk, political risk, environmental risk and regulatory risk. The cross tabulation between the method of financing and the degree of the risks is given below. The highlighted cells are representing the highest response to the respective financing method and the degree of risk. For the data analysis the advanced statistical analysis package of SPSS 17.0 version has been used. The entire data is represented through cross tabulation between various financing methods and the risks involved in the projects in power sector were given below.

The table 1 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.

5.1. Project Finance vs. Project Risks

From the table if we observe the "project finance" and the financial risk of the project, most of the opinions 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 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, out of 181 power projects 36.4 percent respondents opined that, their projects financial risk is "low", 16.2 percent respondents opined "very low. 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.

Table 1
Cross Table of the Relationship Between Financing Methods and Project Risks

Financing Methods Vs Risks	Environmental Risk					Regulatory Risk				
	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high
Project financing (SPV's)	64	25	16	60	8	51	61	36	25	0
	37.00%	14.50%	9.20%	34.70%	4.60%	29.50%	35.30%	20.80%	14.50%	0.00%
Corporate financing	0	8	12	7	0	0	7	16	4	0
	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	2	0	0	0	0	2	0
	0.00%	0.00%	0.00%	100 %	0.00%	0.00%	0.00%	0.00%	100 %	0.00%
Debt financing	0	2	1	0	3	1	0	1	4	0
	0.00%	33.30%	16.70%	0.00%	50.0%	16.70%	0.00%	16.70%	66.70%	0.00%
Partner ships	0	2	2	4	1	0	3	2	4	0
	0.00%	22.20%	22.20%	44.40%	11.1%	0.00%	33.30%	22.20%	44.40%	0.00%
Equity a nd Debt	26	62	23	38	13	7	38	36	79	2
	16.00%	38.30%	14.20%	23.50%	8.00%	4.30%	23.50%	22.20%	48.80%	1.20%
Total	90	99	54	111	25	59	109	91	118	2
	23.70%	26.10%	14.20%	29.30%	6.60%	15.60%	28.80%	24.00%	31.10%	0.50%

contd. table 1

Financing Methods Vs Risks	Operating Risk					Technology Risk				
	Very low	Low	Neither high nor low	High	Very high	Very low	Lcw	Neither high nor low	High	Very high
Project financing (SPV's)	51	95	22	5	0	55	79	32	7	0
	29.50%	54.90%	12.70%	2.90%	0.00%	31.80%	45.70%	18.50%	4.00%	0.00%
corporate financing	0	4	6	15	2	0	4	8	15	0
	0.00%	14.80%	22.20%	55.60%	7.40%	0.00%	14.80%	29.60%	55.60%	0.00%
Equity financing	0	2	0	0	0	0	0	0	2	0
	0.00%	100.0%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	100.00%	0.00%
Debt financing	0	1	2	3	0	1	2	1	2	0
	0.00%	16.70%	33.30%	50.00%	0.00%	16.70%	33.30%	16.70%	33.30%	0.00%
Partner ship's	0	5	1	3	0	0	0	4	5	0
	0.00%	55.60%	11.10%	33.30%	0.00%	0.00%	0.00%	44.40%	55.60%	0.00%
Debt& Equity	16	31	51	36	28	11	36	42	71	2
	9.90%	19.10%	31.50%	22.20%	17.3%	6.80%	22.20%	25.90%	43.80%	1.20%
Total	67	138	82	62	30	67	121	87	102	2
	17.70%	36.40%	21.60%	16.40%	7.90%	17.70%	31.90%	23.00%	26.90%	0.50%

contd. table 1

Financing Methods Vs Risks	Legal Risk					Political Risk				
	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
	2.90%	23.10%	9.20%	31.80%	32.90%	25.40%	31.80%	14.50%	27.20%	1.20%
Corporate financing	0	16	11	0	0	0	17	8	2	0
	0.00%	59.30%	40.70%	0.00%	0.00%	0.00%	63.00%	29.60%	7.40%	0.00%
Equity financing	0	0	0	0	2	0	1	1	0	0
	0.00%	0.00%	0.00%	0.00%	100 %	0.00%	50.00%	50.00%	0.00%	0.00%
Debt financing	1	1	1	1	2	0	2	0	3	1
	16.7%	16.70%	16.70%	16.70%	33.30%	0.00%	33.30%	0.00%	50.00%	16.70%
Partner ships	0	4	5	0	0	0	2	3	4	0
	0.00%	44.40%	55.60%	0.00%	0.00%	0.00%	22.20%	33.30%	44.40%	0.00%
Equity and Debt	6	63	55	31	7	0	57	48	39	18
	3.70%	38.90%	34.00%	19.10%	4.30%	0.00%	35.20%	29.60%	24.10%	11.10%
Total	12	124	88	87	68	44	134	85	95	21
	3.20%	32.70%	23.20%	23.00%	17.90%	11.60%	35.40%	22.40%	25.10%	5.50%

contd. table 1

Financing Methods Vs Risks	Environmental Risk					Regulatory Risk				
	Very low	Low	Neither high nor low	High	Very high	Very low	Low	Neither high nor low	High	Very high
Project financing (SPV's)	64	25	16	60	8	51	61	36	25	0
	37.00%	14.50%	9.20%	34.70%	4.60%	29.50%	35.30%	20.80%	14.50%	0.00%
Corporate financing	0	8	12	7	0	0	7	16	4	0
	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	2	0	0	0	0	2	0
	0.00%	0.00%	0.00%	100 %	0.00%	0.00%	0.00%	0.00%	100 %	0.00%
Debt financing	0	2	1	0	3	1	0	1	4	0
	0.00%	33.30%	16.70%	0.00%	50.0%	16.70%	0.00%	16.70%	66.70%	0.00%
Partner ships	0	2	2	4	1	0	3	2	4	0
	0.00%	22.20%	22.20%	44.40%	11.1%	0.00%	33.30%	22.20%	44.40%	0.00%
Equity a nd Debt	26	62	23	38	13	7	38	36	79	2
	16.00%	38.30%	14.20%	23.50%	8.00%	4.30%	23.50%	22.20%	48.80%	1.20%
Total	90	99	54	111	25	59	109	91	118	2
	23.70%	26.10%	14.20%	29.30%	6.60%	15.60%	28.80%	24.00%	31.10%	0.50%

contd. table 1

Regarding the construction risk of these projects, the respondents' opinions have been equally distributed in the both sides of the scale. It shows that, this risk of 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 level of risk will be increased.

Operating risk of the power projects is less, which are using "project finance". From the total sample 84.4 percent of the respondents indicated their responses as "low" and "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. This is confirmed by the above data (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.

The legal risk of the power projects, which are using "project finance", is high (64.7 percent of respondents' opinioned). 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. the respondents opined that, proper negotiations with the land owners, payment of market rates to the acquired lands and conducting public debates and clarifying the doubts of the public in the villages surrounding the plant location are required. And also providing proper rehabilitation facilities to the people, who lost their lands for project establishment, providing employment in the plant to those people, may avoid so many legal problems in 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 problems.

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. These regulatory authorities go for public hearing, after considering all parties opinions the acceptable price 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 produced power in the open market, at the high prices which can off-set the high production costs.

5.2. 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, 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 high level of 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 root 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 of 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 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 inputs, 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-standard 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 in 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, 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 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, it 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.

5.3. 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 of this risk are: capital provided by the promoters at the initial stage of the 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, the lack of sufficient equity funds, leads to incur lose by 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 can avoid the cost of capital on funds used for the construction of the 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).

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 will be 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 using technology is outdated. To acquire new technology, additional funds are required, and arranging new funds is a big problem to the projects now. Through equity method the projects cannot procure 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, whereas, the tariff fixed by the concern state distribution authorities is less. To avail provisional tariffs from concerned state power corporations on cost plus basis, some projects filed suits against state power corporations in the court of law. 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, which 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. However, environmental risk of these projects is high. 100 percent of respondents 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.

5.4. 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. 16.7 percent of respondents opined that, this risk is "low" for their projects and the remaining 16.7 percent of respondents opined, this risk is "very high" for their projects.

Construction risk under debt financing is in between from medium to low 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 make arrangement of 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 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 in 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, both technologically advanced projects (which are using super critical technology) and technologically poor projects are equally included. For large projects huge amount of debt funds can available, and they can acquire and afford the costly technology. Whereas, medium and small projects, which are using this method, cannot afford the advanced technology because, their financial position is not so strong. Here, the important thing to identify is, for getting more coal efficiency, the large projects are importing technologically advanced turbines from foreign countries, which can reduce the cost of per unit of production. So, it can reduce 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 distributed 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.

5.5. 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 selected projects, which

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 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 partners.

Construction risk under the partnership/ venture capital financing is high. 100 percent of responses fall in 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 in their partnership projects.

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 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 these respondents, whatever funds 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, until that maintenance of the plant was a major problem.

The technology risk of the power projects under partnership/ venture capital financing is in between 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 can 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 influence 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 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 can 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 it is low.

5.6. 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, the high cost of capitals. Frequent changes in interest rate on debt can leads to the payment of excess interest rate 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 having turnkey contract (Engineering Procurement and Construction (EPC) contract and other construction contracts, etc. because of all these factors, the construction risk is high. To mitigate this risk equity should be used at the initial stage 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. Here domestic coal is not sufficient; due to this reason most of the large projects are 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 is another reason. The O&M contracts arrange after two years of initial start of the plant. Until that, the maintenance of the plant was the major problem. However, 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 requires huge amount of funds, which cannot be 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 portion of power in the open market by some projects (IPP's) but later, it is withdrawn by the government. Finally, the legal issues pertaining to fixing tariff per unit, etc., are also causes 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

fall 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 fall 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 designated 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 low.

Finally, 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. From the analysis of the above table, it can be clearly understand that, the relationship between the financing methods and the level of various risks.

Table 2
Financing Methods and the Degree of Risks in Power Projects, in India

Financing Method	*Financial Risk*	*Const-ruction Risk*	*Operating Risk*	*Techno-logy Risk*	*Legal Risk*	*Political Risk*	*Environ-mental Risk*	*Regula-tory 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 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 involved in this method is low. 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.

5.7. Empirical Analysis

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 examine, whether the two variables are independent or not. If the significance 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.

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 3
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	Value	210.933	229.663	92.431	Accept
Financing methods and	df	20	20	1	
Financial risk	Asymp. Sig. (2-sided)	0	0	0	
Relationship between	Value	127.223	146.519	63.051	Accept
Financing methods and	df	20	20	1	
Construction risk	Asymp. Sig. (2-sided)	0	0	0	
Relationship between	Value	165.673	182.649	81.406	Accept
Financing methods and	df	20	20	1	
Operating risk	Asymp. Sig. (2-sided)	0	0	0	
Relationship between	Value	131.642	154.227	83.415	Accept
Financing methods and	df	20	20	1	
Technology risk	Asymp. Sig. (2-sided)	0	0	0	

The above table contains the outcome of chi-square statistics, which is calculated by using SPSS. The Pearson chi-square statistic tests the issue "whether the two

variables are independent or not". If the significance 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.

From the above analysis it is concluded 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" can also 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.

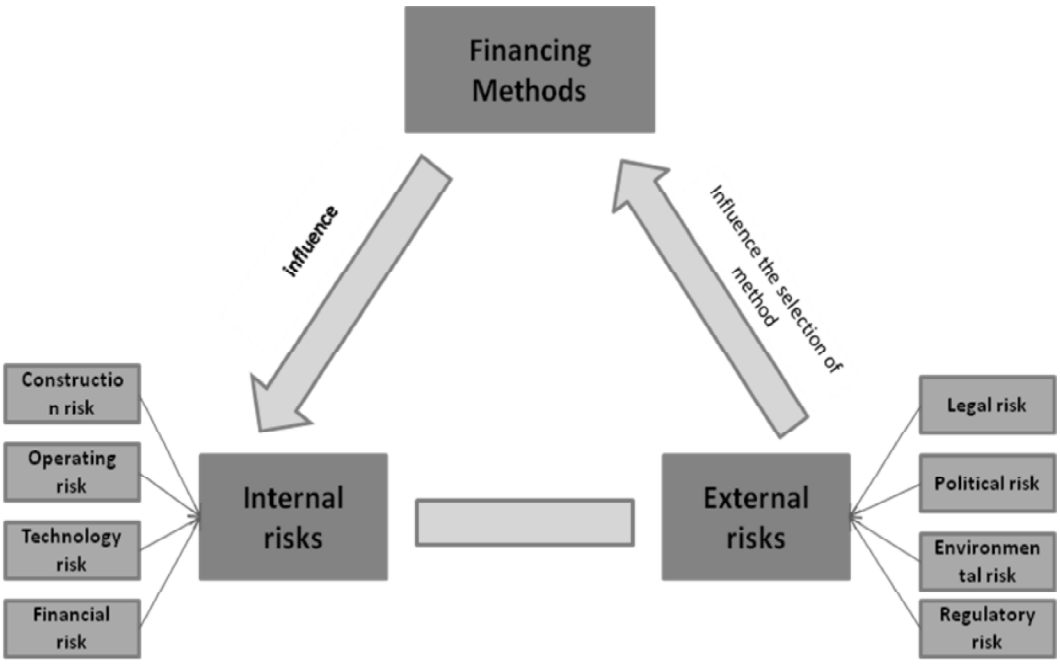
Table 4
Chi-Square Test between Project External Risks and the Selection of Financing Methods in the Power Projects

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	

From the above analysis, it is observed that, the hypothesis H2 has four sub-hypotheses. In all those 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" can also 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 in the diagram show the direction of the influence between the variables.

Figure 1: Relationship between the Methods of Financing and Project Risks



6. CONCLUSION

Through the above analysis it is observed the presence of relationship between methods of financing and the level of risks involved in power projects. When it compares all methods of financing, "project financing" reduced financial risk, Operating Risk and Technology Risk. The combined financing of "equity & debt" also significantly reduced the Construction Risk and Operating Risk. It is also identified that, when the external risks are present in the project, the selection of "project financing" method gives good results to reduce those risks. However, through the analysis all hypotheses are proved, which are taken to test in this

study. All hypothesis are accepted based on the respective Pearson Chi-Square values ($p<0.05$). Through this study it is proved that, the method of financing influencing the degree of the internal risks such as, Financial risk, Construction Risk, Operating Risk, Technology Risk, , and also proved that, the external risks such as: Legal Risk, Political Risk, Environmental Risk and Regulatory Risk are influencing the selection of financing method. Among all kinds of financing methods the "project financing" is very important, because, whatever the companies used this method are having "very low "or "low" level of all risks.

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.

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