

Feasibility Study of Residential Building

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Abstract – Residential apartment are being adopted in India by project promoters. Before commencement of any project it is very essential to perform feasibility study. Project cash flow affected by many factors during construction period. Those factors can be identified by risk assessment and known as Critical factors. Considering those critical factors and their combinations will form possible situations which may occur during the construction period. This paper uses method of internal rate of return after analysing of each possible situation with cost of capital of company and able to determine the practical feasibility of residential and commercial project for each situation. For improving decision making how sensitivity analysis is superior for exploring model is to aid the decision maker. To develop effective interactive visualization techniques and to assist people who are using models for decision making but who need to explore the often complex relationships between the values of model variables and the model output is the ultimate goal of this study. Hence, before commencement of project feasibility study is essential. After preparing a sensitivity model of residential and commercial project, this model can be implement to other projects. After preparing sensitivity model of residential building it has been observed that, the cost of capital of company is 10.74% and also if booking rate is 40-50% then project is observed to be not feasible.

Key Words: Critical Factors, Internal Rate of Return, Net Present Value, Sensitivity Analysis, etc.

1. INTRODUCTION

Every construction project should give benefits for the investor. These benefits consist of profit, business development, resources utilization etc. Profits are achieved in long period and should have an accurate investment forecast so the investors still have willingness to invest their money. Effective and efficient use of land not only reduces the routine expenditures but also exchange into income source. Project feasibility study is used to get the alternatives of optimal land use that give the highest profits. Feasibility study analysis also gives information about the value of investment and the benefits that investors will get. Definite return of investment can be seen from feasibility study. Commonly, Net Present Value (NPV), Internal Rate of Return (IRR) and Payback Period are value that used by investor to consider this project is

feasible or not. According to the characteristic of construction industry, this has high uncertainty, so it will occur many risks during construction phase and or operational building. Risks can influence the profit and it will decrease the feasibility parameter until infeasible condition for investing the project. To those assumption, risks should have been anticipated and calculate it into the feasibility analysis.

Investment in construction project is able to give higher benefit beside of its high uncertainty. The uncertainty depends on many risk factors. The influence of the identified risk then has to be evaluated and calculated towards the project feasibility. Before investment, the feasibility of the project has to be done that gives figures of cash flow on the following years. This can be one of the considerations for making a decision whether this project is feasible or not. Risks that overshadow the construction project have to be calculated as an influential factor towards the failure of a project. To know the feasibility of residential building by calculating the risk factors and the feasibility study can be calculated with financial analysis of residential building by using sensitivity analysis. To determine critical factors and their combination this will represent a possible situation.

2. LITERATURE REVIEW

Anna Regina Bjornsdottir (2010) studied the role of financial feasibility analysis in the decision-making process and ways to conduct financial feasibility analysis. A general model, which can be used to assess the financial feasibility of investment projects, was presented and effective model-building techniques were introduced [1].

Jean Imbs (2003) studied the sensitivity analysis for the results described in the main paper. All conclusions continue to prevail with a variety of alternative measurement strategies, using different data sources, in an international dataset pertaining to U.S States, and when alternative controls for cycle synchronization are included [3].

Nerija Banaitiene and Audrius Banaitis identified that risk management is knowledgeable area propagated by the project management institute. It is a comprehensive and systematic way of identifying, analysing and responding to risks to achieve the project objective. Large construction project are exposed to uncertain environment because of such factors as planning, design and construction complexity, presence of various interest groups, resources availability, environmental factors, the economic and political environment and statutory regulations. Construction projects can be unpredictable. Managing risk in construction project has been recognized as a very important process in order to achieve project objectives in terms of time, cost, quality, safety and environmental sustainability. It is an iterative process and is beneficial when it is implemented in a systematic manner. Risk factors on construction projects can be split into two major groups mainly internal risks and external risk [7].

3. FINDING AND SUMMARY STATISTICS

Case Study: Shree Tirumala Riviera, which is the first ever project in Nashik that is IGBC Gold pre-certified. 'Zero discharge' concept is used in this project the grey water discharged is filtered and recycled for the use of horticulture, washing and crushing. So all the water which is used is recycled water. Around 90 per cent process is being recycled and reused in the project.

The project is under construction phase.

Estimated cost of project: 2.73 cr

Estimated cost of construction: 8 cr

Area: 8.5 acre (Rs.11000 per sq. yard)

- **Construction period:** 2 years.
- **Debt-Equity ratio:** 30:70
- **Maintenance cost:** Rs.145 per sq.ft.(one time maintenance)
- **Loan period:** 2 years
- **Cost of debt:** 12%
- **Cost of Equity:** 12%

Tc: Effective tax rate applied to interest: 12%

For this project we are going to calculate the cost of capital by using Weighted Average Cost of Capitals (WACC) method. The definition of weighted average cost of capitals is calculation of a firm's cost of capital in which each category of capital is proportionately weighted.

All capital sources- common stock, preferred stock, any other long term debt are included in WACC calculation.

All else help equal, the WACC of a firm increases as the beta and rate of return on equity increases, as an increase in WACC notes a decrease in valuation and a higher risk.

The formulae for the calculation of WACC are given below:

$$WACC = E/V * Re + D/V * Rd * (1-Tc)$$

The critical variables, which will affect the project, are given below:

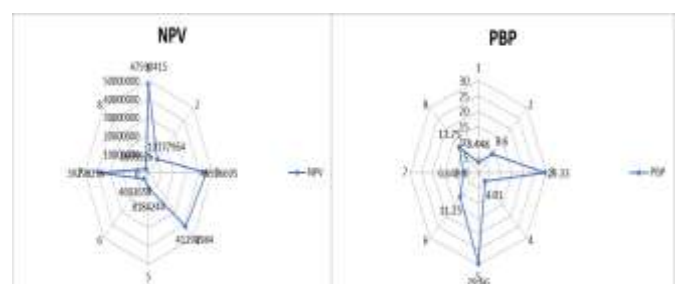
1. Booking
2. Loan period
3. Delay in construction period (Generally 15% cost increase per yr.)

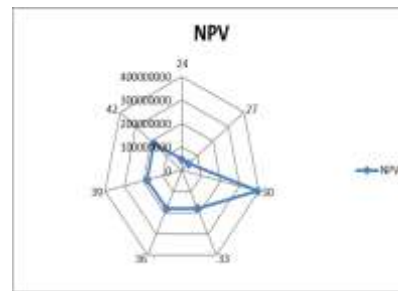
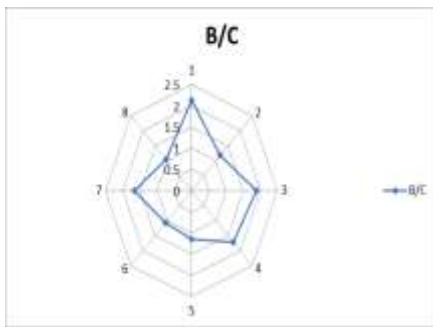
The determination of critical factors which affects the cash inflows of a project and preparation of cash flow statement gives net present value for each situation considering the critical factors and their combinations. In this study, the following results are comes out, which helps us to determine the feasibility of Residential project.

Graphical representation of Sensitivity Analysis:

NORMAL SITUATION:

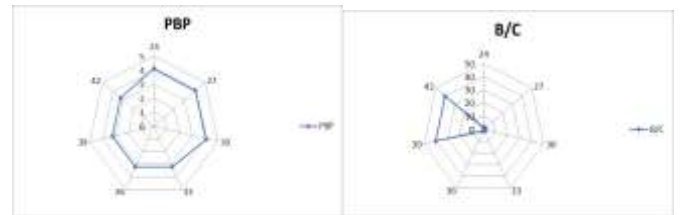
SITUATION NO	NPV	PBP	B/C
1	47590415	3.448	2.13
2	10177964	8.6	1.18
3	45596695	29.33	1.88
4	41291984	4.01	1.708
5	8184244	29.66	1.14
6	4693654	11.25	1.073
7	39298256	6.648	1.659
8	2699926	11.75	1.041





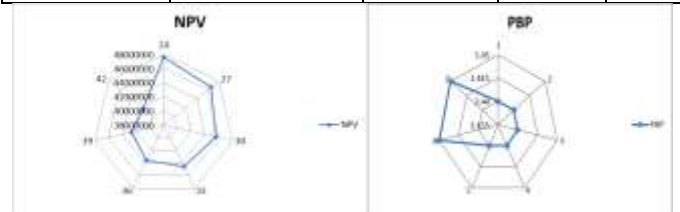
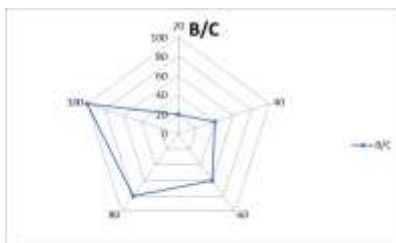
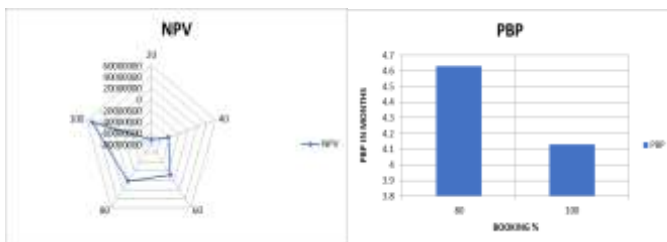
BOOKING SITUATION:

SITUATION NO	% BOOKING	NPV	PBP	B/C
1	20	-6000000		0.035
2	40	-4000000		0.34
3	60	-8000000		0.79
4	80	1766055	4.63	1.32
5	100	47590415	4.13	1.94



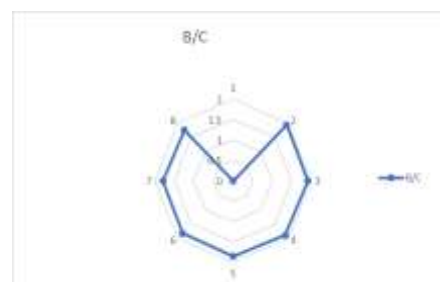
LOAN PERIOD:

SITUATION NO	PERIOD IN MONTH	NPV	PBP	B/C
1	24	47590415	3.44	1.94
2	27	46587334	3.44	1.91
3	30	45596681	3.44	1.88
4	33	44612847	3.44	1.853
5	36	43632090	3.44	1.822
6	39	42661683	3.45	1.792
7	42	41702387	3.45	1.762



CONSTRUCTION PERIOD:

SITUATION NO	BOOKING %	NPV	PBP	B/C
1	24	47590415	4.13	1.94
2	27	44354286	4.06	1.81
3	30	43667120	4.12	1.65
4	33	40897610	3.21	1.62
5	36	38176098	3.22	1.565
6	39	36541098	3.23	40.14
7	42	33519877	3.24	40.1



Combination of critical factors will make different situations, which may arise in residential project and commercial project, they are listed below:

- Normal situation:-Booking 100%, Loan Period-2 years, Construction Period-2 year in each phase.
- Only change in booking:-75%booking

- Only change in loan period:-Loan period increase by 30 months.
- Only change in construction period:-Delay in construction period by 30 months
- Only change in booking and loan period:-75% booking and loan period increase by 30 months.
- Change in construction period and booking:-construction period increase by 30 months and 75 % booking.
- Change in construction period and loan period:-delay in construction period by 30 months and loan period by 30 months.
- Change in all variable:- Loan period increase by 30 months, construction period increase by 30 months and booking is 75%

4. CONCLUSIONS

Study of Residential suggest that, it is not that much easy to predict the feasibility of project. To check the feasibility of such project, there is need to list out those factors which cannot be control by project promoters, but such factors greatly affect on the project cash flows. And after determining those factors, we would able to perform sensitivity analysis of such project.

In residential project every project investment proposal, there should be at least 10% profit over the total expenditure in worst possible case also. 'Situation 8' is the worst possible case among all, as in this case there is change in all critical factors.

After performing sensitivity analysis of residential project, there is positive NPV for situation no all. Which indicate residential project is feasible for these four situations. And there is negative NPV for situation no. 2, 5, 6 & 8 which indicate the project is not feasible for these four situations. Hence, it is needed to overcome on infeasible situations by adopting suitable measures.

After performing Parameter sensitivity of Residential project, it was found that, 'Booking' is the one parameter, which gives a very sensitive model. As the percentage of booking varies, it greatly affects on project cash flow.

Parameter sensitivity Suggest that, 'Delay in construction' is the one parameter, which gives a moderate sensitive model. As the construction period increases, it moderately affects on project cash flow.

Parameter sensitivity also suggest that, 'Loan period' is the one parameter, which gives low sensitive model. As the result shows, there is slight variation in project cash flow as compare to other two parameters.

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