# Risk Analysis In Feasibility Study Of Road Construction Project: Case Study Construction Of The Four Laning Of Amravati – Talegaon Section Nh-6.

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## Abstract

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. This paper aims to know the feasibility of project investment by calculating the risk factors and treatment. Risk probability matrix is used to obtain the risk priority, which then continued with financial analysis for the feasibility study and also sensitivity analysis. The study shows that the parameter investment value will be increased when treatment is done on risk.

**KEY WORDS:-** Risk, feasibility study

## 1. INTRODUCTION:-

Every construction project should give benefits for the investor. These benefits consist of profit, business development, resources utilization, job opportunities, 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, which 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 so the not happening for risks will be the addition advantage for the investor.

## 2 RISK ANALYSIS IN CONSTRUCTION PROJECT FEASIBILITY STUDY

Project is a temporary work to produce a unique product whereas no exactly match among the projects [1]. Construction project's cycle consist of three phase i.e. Feasibility, including the form of project, feasibility study, etc.; Planning and Design, including base design, time and cost planning, contract and work planning; Construction, including procurement, distribution, construction, installation and testing; Turnover and start-up, including final instalment, operation and maintenance.

| Code | Description of construction investment risk variable |
|------|------------------------------------------------------|
| **A. Marketing aspect** | |
| A.1 | Decreasing in market demand to the type of property in surrounding location. |
| A.2 | Oversupply for property now. |
| **Code** | **Description of construction investment risk variable** |
| A.3 | Market demand exchange for type of property in the next 10 years. |
| A.4 | Growth of property in the next 10 years exceed the market demand. |
| A.5 | Difficulty for reaching the target market. |
| A.6 | Sell/rent price competition for property in surrounding location. |
| A.7 | Sell/rent price competition for property in surrounding location in the next 10 years. |
| A.8 | Unsatisfied consumer for the products or services. |
| A.9 | Not good in promotion. |
| **B. Technical and technology aspect** | |
| B. 1 | Influences of difficulties to access location. |
| B.2 | Influences of difficulties to access location to the main road and toll road. |
| B.3 | Influences of traffic jam around location. |
| B.4 | Influences of public transportation accessibility. |
| B.5 | Unsupported facilities and other infrastructures around location. |
| B.6 | Imprecise technology in construction phase. |
| B.7 | Imprecise technology in operation/maintenance phase. |
| B.8 | Limited human resources to support investment. |
| **C. Political aspect** | |
| C. 1 | A non - conducive politic climate for investment. |
| C.2 | Leak of law enforcement. |
| C.3 | Misuse of political power. |
| C.4 | Clean government doesn't achieve. |
| C.5 | Exceeded NGO involvement in investment plan. |
| C.6 | Leak of people approval in surrounding areas. |
| **D. Regulation and policy aspect** | |
| D. 1 | Regulation in export-import limitation. |
| D.2 | Influences of increasing in taxes policy. |
| D.3 | Influences of domestic product and resources use policy. |
| D.4 | Policy in stopping subsidy. |
| D.5 | Complicated and difficult bereaucracy in giving construction permission. |
| D.6 | Complicated and difficult bereaucracy in giving operational permission. |
| D.7 | Policy in increasing of loan interest rate. |
| **E. Social and cultural aspect** | |
| E. 1 | Investment plan doesn't influence in increasing surrounding citizen welfare. |
| E.2 | Investment plan doesn't give new work field for surrounding citizen. |
| E.3 | Investment plan doesn't influence in increasing land price in surrounding location. |
| E.4 | Investment plan influence exchange in people behaviour. |
| **F. Environment and spatial plan aspect** | |
| F. 1 | Decreasing land price in location and surrounding due to investment plan. |
| F.2 | Exchange in city plan due to investment plan. |
| F.3 | Air pollution happened in location due to project. |
| F.4 | Ground water pollution happened due to project. |
| F.5 | Noise pollution happened due to project. |
| **G. Financial aspect** | |
| G. 1 | Payback Period longer than expected. |
| G.2 | Break Even Point (BEP) longer than expected. |
| G.3 | High of Debt / Equity Ratio |
| G.4 | Profits achieved don't like expected. |
| G.5 | Fluctuation in foreign curency. |
| G.6 | Increasing in loan interest rate. |
| G.7 | High overhead cost. |
| G.8 | Exceeded investment in unappropriate time. |
| G.9 | Cancellation in giving loan. |
| G. 10 | Exceeded loan. |

Investment in construction projects needs a big amount of money with high uncertainty. Even high profits can be achieved but to reduce the uncertainty, it has to make the good forecast and feasibility study. The efforts to reduce the uncertainty and increase the certainty of project successfulness is depend on the plan. One of the most phases in planning is feasibility study that is the study of feasible or not the project to be constructed with succeeds [2]. The plan needs not only uneasy efforts but also cost in a not small amount. Decision, which is taken based on the planning, will reduce risks that will be faced. The risks can make project into failed even in the construction, operation or marketing of the building. In the project cycle, the biggest opportunity to reduce total cost of project is in the planning and feasibility study phase [3].

Some aspects that is examined in the phase of feasibility study are [3]: Market aspect, learn about demand, supply and prices; technical aspect, discuss the direct relation with operational effort, such as production capacity, technology that is used, production scale, process, location, etc.; management aspect, learn thinks which have relation with the management of the project; financial aspect, discuss about cash flow, money sources and financial projection even input or output.

A risk is such condition where exist possibilities of bad deviation from the wanted or expected result [4]. A risk will be influencing when it produce a change to the result and have a possibilities to happen. Risk management is done to manage risk so that the main goal of the project can be achieved. There are some phase to be done in risk management that is: risk identification to search and find out a type of risk that could be happen; risk evaluation to the identified risks so it can be known the impact of risks; risk allocation to determine who will be took the responsibility of possible risks that could be happen; risk mitigation is used to transform risks to other parties that could not be take by ourselves.

The risk variables include 8 aspect of investment feasibility that is consist of marketing aspect, technical and technological aspect, political aspect, regulation and policy aspect, social and cultural aspect, environment and city planning aspect, financial aspect, economical aspect.

## 3.1 RESEARCH METHOD

Data needed for this research consist of impact and frequency of risks and also primary and secondary data about policy of feasibility study. Method used for collecting data is by spreading questionnaires to the experts in construction industry who have good knowledge and experience in risk management.

Risk judgments are given by respondents in the form of impacts and frequency of risks. The judgment of impact shows level of risk variables will influence to the successfulness of project and frequency shows possibilities to the risk occur. Risk variables that are used in this research can be seen in Table 1.

### 3.2 Construction investment risk variable

Risk probability matrix is used as initial analysis to clasified risk factors from the highest until the lowest risk which called risk ranking. The function of risk ranking is to know that the highest risk have to be given treatment first before the others.

The second analysis in this research is financial analysis. Financial analysis used to calculate parameter values in order to know whether the investment is feasible or not. The values of this parameter compared with the assumption and standard that we have to give recommendation to the investment plan. Investment judgement can be done by several methods that are Net Present Value (NPV), Internal Rate of Return, Payback Period, Average Rate of Return, Profitability Index and Benefits of Costs Ratio .

In order to find out relation between calculation in feasibility study and investment parameter values is used sensitivity analysis. From this analysis can be seen how much the changes in feasibility parameter values due to the exchange of economic variables. The used of assumption in the calculation is not always be exactly in the real world.

## 4 RESEARCH RESULT

Risk probability matrix analysis uses risk variables judgment to determine the risk priority and classifying risks. The process will find out risk that has the highest influences to the failed of project. Level of risks classification divided into four level, that are E = Extreme, H = High, M = Moderate, and L = Low. This classification can be obtained by dividing the difference of the highest and the lowest risks by four.

Top ranks of risk variables have relation with economical aspect and financial aspect. This shows that economics are easy to change and unpredictable so be an important aspect in project investment. The changes of economics factors have a direct influence to the benefits that will be achieved by investors. The examples are devaluation and inflation will cause the increasing of materials price and services costs, increasing in interest rate

and high overhead cost will cause increasing in expenditures that have to pay by investors.

Analysis is done by determining the preliminary feasibility study before it is influenced by risks and treatment (before process). Then, the study is done with calculating risk without treatment (in process). Finally, the final feasibility study is analyzed by including treatment to the previous study (after process). Risk variables which are calculated only its have the extreme level. This is done with considered that extreme level have the highest influences to the project and able to represent the other risk variables.

## 5 CONCLUSIONS

Feasibility study analysis with calculating risk factors cause a decrease in investment feasibility parameters and if treatments are done against the risks, hence the parameters will increase.

In this case study, risk factors give a significant influence to the investment plan of research object. Risk factors that have the highest influence to the construction project are those that have relation with economical and financial aspect.

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