



Technical Analysis of Project: A Review of Literature

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ABSTRACT

Technical analysis is one of the very important components of project analysis whereby the technical feasibility of the proposed project is studied in terms of inputs, throughput and output. It involves analysis of materials, machinery, plant size, location, capacity, technical arrangements etc. The study by means of review of the past literature tries to capture the significance of the process of technical analysis in the overall analysis of the project. It aims at ascertaining the different factors that are considered while technically analyzing the project and to find out the relative significance of the different factors. The importance given to the environmental factors during the technical analysis is also examined by means of the past studies. It is found that economic factors have much higher significance in the technical analysis of a proposed project in comparison to the social and environmental factors. Further technical analysis tends to dominate the overall feasibility study of any project.

KEYWORDS : Technical, Analysis, Project, Factors

Introduction

Project analysis refers to examining the feasibility of the project with regard to different aspects of the project implementation. It implies inspecting whether the project will have value in the market? Is the technology available and affordable for undertaking the project? What are the financial requirements and will the firm be able to meet that requirement or not? What are the economic and ecological implications of undertaking the project? etc. Project analysis thus involves market analysis, technical analysis, financial analysis, economic analysis and ecological analysis.

In the technical analysis of a project the technical aspects of a typical project idea can be scrutinized in detail to evaluate its technical feasibility, as distinct from commercial, financial, economic and managerial feasibility. The broad purpose of technical analysis is:

To ensure that the project is technically feasible in the sense that all the inputs required to set up the project are available.

To facilitate the most optimal formulation of the project in terms of technology, size, location etc (CII Institute of Logistics, n.d.).

The different issues that are studied in the technical analysis of the project can be classified into three categories which are inputs, throughputs and outputs.

Input analysis

Input analysis refers to the identification, quantification and evaluation of the inputs to be used in the project. Thus all the inputs like materials and machinery are studied under this aspect of technical analysis. Input analysis is very important since it helps in ensuring that right type of inputs of the right quality will be available at the appropriate time and cost throughout the life of the project. To ensure continuous availability of the desired inputs the firms may be required to enter into long term contracts with the suppliers of inputs. If the desired inputs are not readily available then the firms might have to take a step forward and explore the new sources for the supply of desired quality of inputs. For instance to ensure proper quality of its products in India McDonalds developed sustainable sources of supply of potatoes and other ingredients for the various products in their menu. One of the important aspects of input analysis is the supply chain management which ensures that the right kind of inputs is available at the right place and at the right time.

Throughput analysis

Throughput analysis refers to the study of the transformation stage in which a number of operations are undertaken to convert the inputs into the required output. It refers to the production process that adds value to the inputs so as to result into the production of the desired output. The inputs usually pass through a number of stages before they are converted into the final products. In the throughput analysis a number of aspects like location of the facility, sequence of the

transformation process, layout of the plan, quality control measures are studied in depth so as to ensure a proper conversion of the inputs into the output.

Output analysis

Output analysis involves studying the various dimensions of the output to be produced so as to ensure the marketability of the product and to develop input for the various processes involved in production. Output analysis thus involves specification of the product in terms of its physical features like weight, color, length, height etc.; chemical inputs; functional features etc. The products should also be in accordance with the standards set by the various standard setting organizations like ISO, BIS, ISI etc (Sen, n.d.).

Technical analysis of a project requires that due consideration must be given to technical arrangements, material inputs and utilities, product mix, plant capacity, location and site, machineries and equipments, structures and civil works, environmental aspects, project charts and layouts, and schedule of project implementation (Chandra, 2009).

Objectives

The objectives of the study are:

- To ascertain the importance of technical feasibility analysis in determining the viability of the project.
- To determine the factors which are considered during technical feasibility analysis of a project.
- To determine the extent to which environmental factors are considered in the feasibility analysis of a project.

Review of Literature

A number of studies have been undertaken to study the various aspects related to the technical feasibility of the project.

Shen, Tam, Tam, & Ji (2010) introduced a new approach for conducting project feasibility study by including the principles of sustainable development. The authors have talked in the context of construction industries in China and have adopted a case study approach wherein the research team collected 87 feasibility study reports for four types of projects. The examination of these cases led to the understanding on what and how attributes are adopted in the current practice for project feasibility study.

The authors found that existing practice of conducting project feasibility study varies largely among different types of projects. To study the various factors that affect the feasibility study of the various projects the attributes were divided into three major attributes, namely economic performance attributes, social performance attributes and environmental performance attributes.

The authors concluded that some attributes are more commonly used than others, indicating that individual factors are given different level

of significance in the practice. The results also indicated that economic factors are considered more often in the feasibility study than the social and environmental factors. The study revealed that some social and environmental factors have been given limited or no consideration at all among the surveyed projects. The authors found that there is a need for shifting the traditional approach of project feasibility study to a new approach for embracing the principles of sustainable development. The authors suggest that the implementation of this new approach requires the intensive actions and inputs from all project stakeholders, including government, architects, contractors, clients, engineering consultants, and suppliers (Shen, Tam, Tam, & Ji, 2010).

Mackenzie & Cusworth (2007) found that the technical issues tend to predominate when assessing the development potential of a project in the process of 'doing a feasibility study'. They present a framework for the conduct of 'feasibility studies' and provides guidance on minimum standards and best practice that allows consistency in evaluation approach across a wide range of projects.

As per the literature review done by the authors the feasibility study process involves three phases, namely the conceptual or scoping phase, the preliminary or prefeasibility phase, and the final or definitive phase. As per the database collected, average project feasibility study cost approximately 2.3 percent of the total estimated project cost and the feasibility study creates value by ensuring that viable opportunities are identified and developed.

The researchers conclude that factors that contribute to the failure of studies are failure to progress through the study phases, failure to integrate study disciplines, failure to challenge and validate the study outcomes with an outsider's eyes, failure to plan for the next study, failure to recycle through study phases, failure to fix study scope, failure to involve all stakeholders.

Finally they conclude that a feasibility study should ultimately be used to show the technical and economic capability of a business opportunity based on the planned project, reveal the capacity of the project, establish the risk profile of the project, assist in the procurement of adequate funds to develop the project in a timely manner, and support a recommendation to proceed with the investment (Mackenzie & Cusworth, 2007)

Dey (2004) has tried to develop a Decision Support System by using Analytic Hierarchy Process (AHP) for project evaluation and selection in Indian oil pipeline industry by analyzing a cross-country petroleum pipeline project in western India. In AHP, the technical analysis, the environmental impact assessment and the socio-economic impact assessment is conducted simultaneously. The project under study involved identification of alternative pipeline routes and of various factors and sub-factors that are involved in the selection of an optimal project and creation of the project selection model in an AHP framework.

Dey found that the route selected is not the shortest route from economic consideration, but environmental and social factors play an important role from the overall profitability of the pipeline operations. Giving high importance to environmental and social factors in selecting the route not only contributes towards sustainable development but also helps in increasing the organizational productivity. This becomes possible because such a practice minimizes the number of failures and facilitates uninterrupted operations throughout the life of the project. AHP can be applied universally across various project selection problems. However considerable research is required for each application.

Teijlingen & Hundley (2001) have studied the importance of pilot studies. They explain that in social science research pilot study has two different meanings. On one hand it refers to the small versions of the large scale study which is also referred to as feasibility study. On the other hand it refers to specific pre-testing of a particular research instrument such as a questionnaire or interview schedule. The authors focused on the advantages of the pilot study, the problems of pilot studies and discussed why pilot studies are not reported.

They explain that pilot studies are useful since they can bring to notice about where the main research project could go wrong, where

research protocols may not be followed, or whether planned methods or instruments are unsuitable or too complex. Pilot studies may also have a number of limitations. These include the possibility of making imprecise predictions or assumptions on the basis of pilot data; troubles arising from contamination; and problems related to financial support. Pilot studies are usually not reported because of publication bias which may occur because of a tendency for journals to accept only papers that have statistically significant results and not to report non-significant effects based on pilot studies.

The authors argue that researchers have an ethical obligation to make the best use of their research experience by reporting issues arising from all parts of a study, including the pilot phase as well-designed and well-conducted pilot studies can inform about the best research process and occasionally about likely outcomes (Teijlingen & Hundley, 2001).

Machacha & Bhattacharya (2000) have considered the issue of uncertainty of subjective judgment that prevails at the time of the selection process. They have tried to facilitate the process of decision making that becomes difficult due to the non availability of adequate information. The decision making becomes difficult when the available information is incomplete or imprecise. This kind of problem exists while selecting a project. The authors have tried to ease this difficulty by developing a system that uses fuzzy logic for selecting a project. Fuzzy logic permits to imitate the human reasoning process and make decisions based on vague or inaccurate data. The approach is based on uncertainty reduction.

The authors have used a case study, in which they have considered the problem of selecting a software product when uncertainty is present, and have proposed a system based on fuzzy logic. The problem of software product selection is of significant interest because of the multitude of software available in the market; also, there are a number of critical factors such as cost, risk, and uncertainty that are involved in the process of selection. They have applied the proposed system to the problem of selection for database software packages. The proposed method based on fuzzy logic could be easily applied to many other project-selection problems where uncertainty is present (Machacha & Bhattacharya, 2000).

Friedman, Gerlowski & Silberman (1992) tried to find out the factors that attract Foreign Multi National Corporation's (FMNC's) and influence their plant location decision. The authors maintain that the investment decision about new plants is different from decisions about the other types of FDI. They have analyzed the factors that affect the location choice of foreign manufacturing plants in the United States and the differences in the determinants of foreign plant location by nationality are investigated by separately analyzing all FMNCs, Japanese MNCs, and European MNCs. The location decision was modeled using McFadden's (1974) conditional logit model.

A number of factors like manufacturing wages, access to markets, promotional efforts by the state, taxes etc that can influence the location decisions of FMNC's were considered. The results indicated that access to markets, labor market conditions, state promotional efforts to attract foreign investment, and state and local personal taxes are significant factors in the location decision. The decision determinants for Japanese and European MNCs were found to be different.

Conclusion

After looking into the various aspects of the technical analysis of a project and the review of literature it can be concluded that:

- Technical feasibility analysis tends to dominate the feasibility study of a project where technical issues are given more importance than determining the overall business potential of the project.
- There are number of critical factors like site, location, availability of raw materials, technology etc which are considered during the technical analysis of a project.
- The factors can have different influence on different projects and different organizations may respond differently to the same factors.
- The technical feasibility analysis of a project primary revolves around the economic factors and very little or no significance is

given to the social and environmental factors. However the sustainability of operations and overall profitability can be improved over the life of the project by giving importance to the environmental and social factors.

- Pilot studies which are the mini versions of full scale feasibility studies can prove to be very useful and can provide early warnings related to project failure, faulty research methods etc. However care should be taken regarding the contamination of data, inaccurate predictions made on the basis of pilot studies. Also pilot studies cannot guarantee the success of the full scale survey.

Recommendations

Based on the literature review the following recommendations can be made:

- Technical feasibility analysis should not be considered as the primary focus of the feasibility study and should be considered only as a prerequisite for determining the project's viability. Feasibility study should also demonstrate the economic viability of the project, highlight the risk profile of the project, the project scope etc.
- The technical feasibility analysis of a project should give due importance to the environmental factors in addition to the economic factors. This will lead to sustainable development.
- The techniques like Analytic Hierarchy Process should be preferred for project selection as such an approach considers technical analysis, environmental impact assessment and socio-economic impact assessment simultaneously.
- Investigators should be encouraged to report their pilot studies which can keep people informed about the best researches and improve further research.

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