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A Comprehensive Study of Techno Economic Viability (TEV) Report of Various Projects

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Abstract

This paper provides a comprehensive analysis of the TEV process, focusing on its application to both greenfield and brownfield projects across various sectors, including manufacturing, infrastructure, energy, and services. The study aims to guide decision-makers by bridging technical assessments with financial analysis to establish project profitability and sustainability. A Techno-Economic Viability (TEV) Study serves as a crucial tool in the decision-making process for both lenders and investors. It offers a detailed assessment of a project's technical feasibility, economic viability, and overall sustainability. It delves into the dual aspects of technical feasibility and economic viability, emphasizing their roles in influencing investment decisions across a wide spectrum of industries, including manufacturing, infrastructure, energy, and services. The findings from this research also illustrate real-world applications, highlighting two case studies with an emphasis on key financial indicators such as the Debt Service Coverage Ratio (DSCR) and Internal Rate of Return (IRR), which are used to measure a project's ability to meet debt obligations and generate profits.

Keywords: Techno Economic Study, Financial Viability, Technical Feasibility, Financial Modelling, Risk Analysis, Investment Decision

Introduction

A Techno-Economic Viability Study is a comprehensive assessment that delves into both the technical and commercial aspects of a proposed project. It serves as a robust decision-making tool by providing in-depth insights into project costing, technical feasibility, financial viability, and sensitivity analysis.

The primary purpose of the project is to evaluate and establish the feasibility, profitability, and sustainability of a proposed initiative by conducting a comprehensive Techno-Economic Viability (TEV) Study. The project aims to provide a robust foundation for decision-making by analysing both technical and economic aspects, ensuring that all critical factors are considered before moving forward with the implementation.

Comprehensive Techno – Economic Viability study report's contents include –

- Company overview and business model.
- Details about the promoters, directors, and so forth.
- Project scope financial projection project benefits in terms of location, commerce, and logistics.
- Marketing strategy and tactics adopted.
- Land, building, and machinery needs (technical analysis).
- Manpower requirement.
- Product line and manufacturing schedule.
- Demand for raw materials.

- Fuel and power requirements.
- Costs of production and operation requirements.
- Overview of a certain industry.
- Risk Analysis of Project Recommendations and SWOT Analysis of Project.
- Conclusions.

Key Takeaways

- The TEV study assists you in determining various risks involved (technological/market/regulatory/financial).
- It helps in understanding the nature of your product/service, financials, management & operations, marketing policies, statutory and compliance environment etc.
- It aims at reducing any risks involved with better-educated decisions.
- The evaluative TEV Study considers everything from technical inputs to the financial model used by the lender and the developer/owner to justify the project funding requirement.

Objectives

- To analyse the technical feasibility of the proposed project.
- To evaluate market availability and sustainability for the project's product.
- To assess financial viability based on technical feasibility and market analysis.
- To understand sector analysis of the auto ancillary industry and study financial statements, working capital methods, and key financial ratios.

Literature Review

The origin of TEV studies can be traced to investment appraisal and capital budgeting techniques, which have long been central to financial decision-making **(Brealey, Myers & Allen, 2008)**. Traditional financial evaluation tools, such as Net Present Value (NPV) and Internal Rate of Return (IRR), were historically used in isolation from technical considerations (Farragher, Kleiman & Sahu, 2001). As industries evolved and projects became more technologically complex, scholars such as White and Bruton (2007) emphasized the importance of integrating technical evaluations into financial analyses, laying the foundation for modern TEV assessments.

Project risk assessment is a crucial component of TEV studies. According to **Chapman and Ward (2003)**, risk management in project evaluation should address uncertainties in technology, market conditions, and financial assumptions. Subsequent works, such as Hillson and Murray-Webster (2007), elaborated on methods to quantify risk, including sensitivity analysis, scenario planning, and Monte Carlo simulations. These methodologies are critical for TEV studies, as they provide insights into potential project pitfalls and help in the formulation of risk mitigation strategies.

The financial aspect of TEV studies relies on robust financial modelling techniques, as discussed by **Damodaran (2012)**. Metrics like Debt Service Coverage Ratio (DSCR), IRR, and payback periods are pivotal in determining the financial viability of projects. Bhattacharya and Hollis (2008) explored the impact of industry-specific factors on these metrics, noting that the accuracy of financial forecasts depends on precise cost estimation and revenue projections. Particularly in infrastructure projects, Altman and Hotchkiss (2010) emphasized the importance of financial ratios like DSCR in evaluating the long-term sustainability of debt financing.

The application of TEV studies varies across sectors. In the auto ancillary sector, continuous technological innovation makes technical feasibility assessments critical **(Kathuria & Raj, 2013)**. TEV studies in this sector focus on evaluating the viability of implementing new technologies and the market's capacity to absorb them. In the food processing industry, Kumar and Ali (2010) highlighted supply chain complexities, government regulations,

and raw material availability as key considerations in TEV studies. Both sectors underscore the importance of aligning technical solutions with market dynamics and regulatory frameworks.

The increasing emphasis on sustainability has led to a greater focus on environmental, social, and governance (ESG) factors in TEV studies. **Darnall, Jolley, and Handfield (2008)** argued that sustainability is now a central component of project feasibility, particularly in industries subject to stringent environmental regulations. Peng and Lin (2011) further discussed how government policies, including incentives and subsidies, can significantly alter the financial viability of projects, especially in sectors such as agriculture and food processing.

One of the ongoing challenges in TEV studies is the integration of technical and financial assessments. **Mohanty and Deshmukh (2013)** proposed an iterative approach to TEV analysis, where technical and financial evaluations are updated continually throughout a project's lifecycle. This ensures that technical innovations are feasible within the project's financial constraints. Such an approach is particularly relevant for projects involving cutting-edge technologies, where both technical and market risks must be continually reassessed.

Practical case studies have illustrated the application of TEV studies in various sectors, particularly in emerging markets. **Mukherjee and Roy (2017)** studied infrastructure projects in India, highlighting the role of TEV studies in balancing modern technological requirements with financial limitations in developing economies. Case studies on manufacturing and energy projects have demonstrated that successful TEV assessments rely on accurate data collection, market forecasting, and alignment with government policies (Smith et al., 2015).

Project Details

Study at MITCON Consultancy & Engineering Services Limited started with industry analysis of Auto Ancillary Sector. Calculated financial statements of Belrise Industries of the Auto Ancillary Sector.

Studied the Detailed Project Report (DPR) provided by the client, which contained the technical, financial assumptions, market scenario, project cost, manufacturing process, details of company shareholding, project objectives, and scope. The primary objective was to understand the project holistically, including its technical, financial, and operational aspects.

Analyzed the financial model provided by the client to evaluate assumptions, financial forecasts, revenue models, and cost structures. Identified key parameters such as initial investments, operating costs, and projected revenues, means of finance.

Collaborated with the technical team to assess the project’s technological and infrastructural feasibility, land requirements, including machinery requirements, operational efficiencies, and alignment with financial projections.

Project 1

A particular company has approached MITCON Consultancy and Engineering Services Limited (“MITCON”) to carry out Techno-Economic Viability (“TEV”) study of its project. Due to the confidentiality of the Client’s Project the client shall henceforth be referred to as ABC/Company. Core objective is to assess the Technical and Financial aspects of the proposed project located in Pune.
ABC is coming up with cold storage of blast freezing of sweet corn at particular location with capacity of 3000 MT per year (“Project”). The project is of processing (blast freezing) unit for frozen fruits and vegetables mainly frozen sweet corn including cold storage at Gat/Survey No. 67/4, Khed, Dist. Pune, Maharashtra.

Some findings from project are as follows

Debt Service Coverage Ratio

Particulars	Projected Years							
	Mar-24	Mar-25	Mar-26	Mar-27	Mar-28	Mar-29	Mar-30	Mar-31
	(Rs in Lakhs)							
Profit After Tax	4.79	12.13	26.36	41.09	56.29	72.04	88.45	104.81
Depreciation	13.28	24.56	20.87	17.74	15.08	12.82	10.90	9.26
Interest on New Term Loan	7.56	13.32	10.92	8.51	6.11	3.71	1.30	0.00
Total Cash Availability	25.63	50.01	58.15	67.35	77.48	88.57	100.65	114.07
Principal Amount	9.62	19.23	19.23	19.23	19.23	19.23	19.23	0.00
Interest Amount	7.56	13.32	10.92	8.51	6.11	3.71	1.30	0.00
Total Repayment obligation	17.18	32.55	30.15	27.74	25.34	22.94	20.53	0.00
Debt Service Coverage Ratio	**1.49**	**1.54**	**1.93**	**2.43**	**3.06**	**3.86**	**4.90**	
Average D.S.C. Ratio	**2.74**							

DSCR is ratio of cash generation to repayment obligation. It is ability of organization to service its debts obligations. Standard ratio is 1.5 i.e. every organization borrowing funds should have at least cash generation 1.5 times than its repayment obligations.

Payback Period, IRR & NPV

Sr No	Particulars		Projected Years							
			Mar-24	Mar-25	Mar-26	Mar-27	Mar-28	Mar-29	Mar-30	Mar-31
	Cash Accrual	(177.00)	18.06	36.69	47.23	58.83	71.37	84.86	99.34	114.07
	Cummulative Cash Flow		18.06	54.75	101.99	160.82	232.19	317.05	416.40	530.47
	Payback period is	**4.2**								
	PAT		4.79	12.13	26.36	41.09	56.29	72.04	88.45	104.81
	Depreciation		13.28	24.56	20.87	17.74	15.08	12.82	10.90	9.26
	Net flow	(177.00)	18.06	36.69	47.23	58.83	71.37	84.86	99.34	114.07
	IRR	**24%**								
	Net Cash flow		18.06	36.69	47.23	58.83	71.37	84.86	99.34	114.07
	Discounting Factor @12.50%		0.89	0.79	0.70	0.62	0.55	0.49	0.44	0.39
	Present Value of Cash flow		16.06	28.99	33.17	36.73	39.60	41.86	43.56	44.46
	Present Value of Cash inflow	284.43								
	Present Value of Cash outflow	177.00								
	NPV	**107.43**								

With the proposed project, the Firm would be able to deliver 24% returns on investment. The borrowing rate is assumed at 12.50% on Term loan, so the proposed investment is going to earn more returns than the cost of borrowed funds.

Project 2

The current study is to prepare Techno Economic Viability ("TEV") study for the proposed Project of XYZ ("Company") which is setting up proposed manufacturing unit of bakery products having capacity of 100MT, 110MT per annum respectively for products Croissant and Cake at Howrah ("Project"), for submission to Bank ("Lender").

Findings from project

	Cost of Project	As per Estimate / Quotation
Sl. No.	PROJECT COST	Rs. In Lacs
1	Land	86.00
2	Building Construction	164.00
3	Plant & Machinery - Phase - I	1120.00
4	Plant & Machinery - Phase - II	480.00
5	Interest during construction	23.33
6	Pre-operative expenses	16.67
7	Security Deposit	10.00
8	Margin money for working capital	100.00
	Total	2000.00

Sl. No.	MEANS OF FINANCE	Rs. in lacs	In (%)
1	Term Loan -I	840.00	60.00%
2	Term Loan -II	360.00	
3	Promoters Contribution		
	--Equity Share Capital & Premium	200.00	10.00%
	--Unsecured Loan from Directors	600.00	30.00%
	Total	2000.00	100.00%

The Cost of the Project envisaged is Rs. 2000.00 lakhs with a funding mix of 60% debt and 40% equity contribution.

Internal Rate of Return

Internal rate of return is defined as minimum acceptable required rate return to be earned on investment. Generally, Project is acceptable only if IRR of project is above the borrowing cost of the loan.

With the proposed project, the Company would be able to deliver 37.64% returns on investment on standalone basis. The borrowing rate is assumed at 10.00% on proposed Term loan, so the proposed investment is going to earn more returns than the cost of borrowed funds.

In Lakhs

Year	2024-25	2025-26	2026-27	2027-28	2028-29	2029-30	2030-31	2031-32
Cash In Flow								
PAT	19.48	516.96	560.35	601.09	643.74	688.31	734.73	778.54
Depreciation	18.18	109.06	109.06	109.06	109.06	109.06	109.06	109.06
Interest on Term Loan -I	14.00	82.60	74.80	64.10	51.00	35.50	17.60	1.50
Interest on Term Loan -II	-	35.76	33.26	29.29	24.23	18.10	10.88	2.77
A	51.66	744.38	777.47	803.54	828.03	850.97	872.28	891.87
Cash Outflow								
Capex	1,900.00							
B	1,900.00	-	-	-	-	-	-	-
Net Cash Inflow (A - B)	(1,886.00)	744.38	777.47	803.54	828.03	850.97	872.28	891.87
IRR	37.64%							

Other study done while preparing TEV

Analysis of financial statements, working capital methods, and financial ratios to assess the financial health and operational efficiency of a company. The study begins with the analysis of financial statements, including the balance sheet, income statement, and cash flow statement, to evaluate key financial indicators such as revenue, profitability, liquidity, and capital structure.

A significant part of the project focuses on the study of working capital management methods, with particular emphasis on the **Maximum Permissible Bank Finance (MPBF)** method. This method, commonly used to regulate the financing of working capital, will be explored to understand how businesses maintain optimal levels of current assets and liabilities for smooth operations. Other working capital methods, such as the Net Working Capital and Cash Budgeting methods, studied to understand their practical applications across industries.

The analysis of financial ratios will play a crucial role in understanding financial statements. Ratios such as liquidity, profitability, solvency, and efficiency ratios will be examined to evaluate various aspects of a company's financial health. Liquidity ratios will help measure the firm's ability to cover short-term liabilities, while profitability ratios will assess the company's efficiency in generating profits. Solvency ratios will provide insights into long-term financial stability, and efficiency ratios will be used to understand how effectively the company utilizes its assets.

Lastly, the study of the working capital cycle, which helps in analyzing the cash conversion cycle of the company. This provides a clear understanding of how cash flows through inventory, receivables, and payables, and how businesses can optimize their operations to minimize the amount of capital tied up in day-to-day activities.

Challenges

Data Accuracy – The DPR provided by the client may lack detailed technical or financial data, making it difficult to fully understand. Assumptions are exaggerated revenue projections or underestimation of costs, leading to potential misalignment with reality. Reliability of analysis depends heavily on the data provided by the client.

Time Constraints – Discussion with team members, clients take time which delay into resolution of query and finalizing of report. Client generally gives deadline to complete the project within a week or 15 days which gets challenging.

Client Reluctance – Client becomes reluctant to acknowledge certain risks, means of finance also if it challenges the feasibility of their project.

Integrating Analysis – Sometimes it become challenging to integrate findings from technical team as it needs to be submitted within the proposed deadline

Sensitivity to External Factors - External factors like changes in market conditions, raw material prices, or regulatory changes, government initiatives may not be adequately considered in the financial model.

Limitations

Resource Limitations - Conducting a comprehensive TEV study involves gathering and analyzing vast amounts of technical, financial, and market data. Time and resource limitations might restrict the depth of analysis for certain projects, potentially leading to oversights or incomplete evaluations, especially when working across multiple sectors.

Dependence on Historical Data: Many of the financial and technical evaluations are based on historical data or industry benchmarks. This dependence on past performance might not fully account for future uncertainties, emerging trends, or disruptive changes that could affect the project's success.

Long-Term Projections: Many financial metrics like NPV and IRR rely on long-term cash flow forecasts, which are inherently uncertain. The assumptions used in the projections, such as revenue growth, operating costs, and discount rates, may not hold over extended periods, leading to potential inaccuracies in the economic viability assessment.

Limited Scope of Market and Industry Data: Although secondary data sources such as IBEF and industry reports are used, there may be limitations in the availability and depth of market data for specific sectors or regions. Additionally, the data might be generalized and not entirely reflective of the specific conditions facing a particular project.

Conclusion

This experience has provided valuable insights into both the theoretical and practical aspects of project evaluation. By engaging deeply with projects such as the cold storage for blast freezing of sweet corn and the bakery product manufacturing unit, learned how critical it is to assess not only financial parameters like Debt Service Coverage Ratio (DSCR) and Internal Rate of Return (IRR), but also technical factors such as land and machinery requirements.

This process has reinforced the importance of integrating technical feasibility with financial analysis. Understanding the interactions between production capacities, cost structures, and market conditions was essential in determining the overall viability of the projects. By collaborating with the technical team and analyzing detailed project reports, gained practical knowledge of how theoretical models are applied to real-world scenarios.

Furthermore, the exposure to working capital management methods and financial ratios deepened understanding of how businesses maintain operational efficiency.

Overall, this has enhanced analytical skills and provided a comprehensive understanding of the complexities involved in evaluating and executing large-scale projects. It has highlighted the necessity of interdisciplinary collaboration in decision-making, combining technical, financial, and operational perspectives for successful project implementation.

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