Chapter – 13
Benefit Cost Ratio and Financial Return

13.1 General

Par-Tapi-Narmada Link project is a major multipurpose project. It envisages an annual irrigation of 1.69 lakh ha comprising of 0.52 lakh ha enroute and 1.17 lakh ha. in the Narmada command of Miyagam Branch Canal of Narmada Main Canal and annual energy generation of the order of 93 Mkwh from the proposed power house.

13.2 B.C. Ratio of the project

In order to examine the economic viability of the scheme the benefit cost ratio have been worked out based on the guidelines given in the Working Group Report 'Guidelines for preparation of detailed project reports of irrigation and multi-purpose projects prepared by Govt. of India, Ministry of Irrigation. The expected value of produce without and with introduction of irrigation are worked out. The gross value of the benefits of the project for the pre-project and post project conditions are computed adopting the yields and prices of commodities collected from Agricultural and marketing departments. The net benefit from irrigation works out to Rs. 33.512 lakh per 100 ha of cropped area. The benefits from power production are also considered under gross benefits. Net value of the benefits is computed after allowing for the loss in the area coming under submergence, due to excavation of canal and distributaries and land going out of cultivation in project area etc. The annual cost is computed allowing for 8 % of interest on total estimated cost of project. The working details of B.C. ratios are given below.

13.2.1 Par-Tapi-Narmada link project

I – Estimated cost of the project	Rs. in lakhs
i) Unit–I Headworks and their appurtenant works	2,61220
ii) Unit- II Canals & Canal structures including command area development	3,15,389
iii) Unit-III Hydro electric installation	25,035
Total	**6,01,644**

II- Annual benefits

a) Post project

Total net value of produce for 1,69,339 ha @ Rs.5,35,038/- per 100 ha **90,603**

b) Pre project

Total net value of produce for 1,69,339 ha @ Rs.19,99,308/-per 100 ha (as worked out in phase-I B.C.Ratio) (-) 33,856

c) Loss in agriculture production in area coming under submergence and land going out of cultivation in project area,canal distribution system etc.
(1% of gross value of produce before irrigation) (-) 446

Net value of annual benefits from irrigation 56,301

d) Annual benefits from power @ Rs.6.00 per unit (based on existing power tariff for commercial use, obtained from South Gujarat Electricity Company, Valsad) 5,523

Total benefits from irrigation and power **61,824**

III - Annual costs

a) Interest at 8% of estimated total cost of the project 48,132

b) Depreciation of the projects at 1% of the cost of project 6,016

c) Annual operation and maintenance charges (Rs.223/- per ha for 1,69,339 ha) 395

d) Maintenance of the headworks
(1% of the cost of head works) 2,612

Total annual cost **57,155**

IV – Benefit cost ratio **61,824 / 57,155 = 1.082**

The benefit cost ratio of the project has been computed based on the annual cost of the project and annual benefit from the project and works out to 1.082 which shows that the scheme is economically viable.

13.3   Internal rate of return (IRR)

The internal rate of return for the project has been computed without considering distributional and employment effect and works out to 7.56 %. The details are given Table - 13.1. After considering distributional and employment effects the internal rate of return works out to 8.82 %. The details are furnished in Table - 13.2.

Table - 13.1
Internal Rate of Return (IRR)

1.	Life of the project after completion	100 years
2.	Construction period	7 years
3.	Cost of Project	6016 Crores
4.	Annual Benefits	618 Crores
5.	Maintenance cost @ 1% of the cost of head works	26 Crores
6.	Rate of discounting	8%

Year(s)	Cost	Benefits	Net benefit	Discounting Factor		Present worth of the net benefits	
	(Rs. in Crores)		(Rs.in Crores)	7%	8%	7%	8%
1	308	-	-308	1.000	1.000	-308	-308
2	415	-	-415	0.930	0.920	-386	-382
3	624	-	-624	0.865	0.846	-540	-528
4	1246	-	-1246	0.804	0.778	-1002	-969
5	1362	-	-1362	0.748	0.716	-1018	-975
6	1218	-	-1218	0.696	0.659	-848	-803
7	843	-	-843	0.647	0.606	-545	-511
8							
9							
10	26	618	592				
11							
-							
107		,		8.6346	6.9445	5111.66	4111.16
					Total	464.24	-364.65

Internal Rate of Return = (7 + (1 X 464.24) / 828.89) = 7.56 %

Table - 13.2
Internal rate of return (IRR)
Considering distributional and employment effect

1.	Life of the project after completion	100 years
2.	Construction period	7 years
3.	Cost of project	6016 Crores
4.	Annual benefits	618 Crores
5.	Maintenance cost @ 1% of the cost of head works	26 Crores
6.	Distributional and employment effect (20% of annual benefits)	124 Crores

Year(s)	Cost	Benefits	Net benefit	Discounting factor		Present worth of the net benefits	
	(Rs. in Crores)		(Rs.in Crores)	8%	10%	8%	10%
1	308	-	-308	1.000	1.000	-308	-308
2	415	-	-415	0.920	0.900	-382	-374
3	624	-	-624	0.846	0.810	-528	-505
4	1246	-	-1246	0.778	0.729	-969	-908
5	1362	-	-1362	0.716	0.656	-975	-893
6	1218	-	-1218	0.659	0.590	-803	-719
7	843	-	-843	0.606	0.531	-511	-448
8							
9							
10							
11	26	742	716				
-							
-							
-							
107				6.9445	4.8039	4972	3440
				Total		496	-715

Internal Rate of Return = (8 + (2 X 496) / 1211) = 8.82 %