

Chapter 9

लागत लाभ विश्लेषण

ECONOMIC & FINANCIAL ANALYSIS

ATTESTED

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CHAPTER 15

FINANCING OPTIONS, FARE STRUCTURE
AND FINANCIAL VIABILITY

15.1 INTRODUCTION

The Ghaziabad Metro Extension covering a length of 9.41 Km is proposed to be constructed from April-2014 to March -2017. The fixed cost at May-2013 prices is estimated to be of Rs.1677.00 Crores including the cost of land and Central taxes and duties.

15.2 Costs

15.2.1 Investment Cost

15.2.1.1 For the purpose of calculating the Financial Internal Rate of Return (FIRR), the completion cost with central taxes has been calculated by taking escalation factor @ 7.50 % PA. It has been assumed that UP State Government will exempt the local taxes or reimburse the same and provide the land worth Rs. 40.00 crore free of cost.

The project is expected to be completed on 31.03.2017 and Revenue Opening Date (ROD) has been assumed as 01.04.2017. The total completion costs duly escalated is placed in Table –15.1 as below.

Table 15.1 Year –Wise Investment (Completion Cost)
Figures in Crores

Financial Year	Construction cost at May-2013 Price Level	Completion cost
2014-15	177.00	189.00
2015-16	422.00	486.00
2016-17	505.00	624.00
2017-18	327.00	437.00
2018-19	246.00	353.00
Total	1677.00	2089.00

15.2.1.2 Although the construction is expected to get over by 31st March 2017, the cash flow spills up to March 2019 on account of payment normally required to be made to the various contractors up to that period necessitated by contractual clauses.

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15.2.2 Additional Investment

Total investment provided in the FIRR calculation towards requirement of additional rolling stock duly escalated @5% PA is placed in table 15.2 as under: -

Table 15.2 Additional Investment towards Rolling Stock
Figures in Crores

With Taxes & Duties			
2022-23		2032-33	
No of Cars	Amount	No of Cars	Amount
44	854.00	76	2405.00

15.2.3 Operation & Maintenance (O&M) Costs

15.2.3.1 The Operation & Maintenance costs can be divided into three major parts: -

- (i) Staff costs
- (ii) Maintenance cost which include expenditure towards upkeep and maintenance of the system and consumables
- (iii) Energy costs

The requirement of staff has been assumed @ 35 persons per kilometre. The escalation factor used for staff costs is 9% per annum to provide for both escalation and growth in salaries.

The cost of other expenses is based on the actual O & M unit cost for the Delhi Metro Phase-II project. The average rate of electricity being paid by Delhi Metro for its Phase-I and Phase-II operations in Delhi is Rs. 5.80 per unit whereas in UP operation the applicable rate is Rs. 5.00 per unit. The latter has been used for all calculations. The O&M cost (excluding staff cost) has been obtained by providing an escalation of 7.50% per annum. The O&M costs have been tabulated in Table 15.3 as below:

Table 15.3 Operation and Maintenance Costs
Figures in Crores

YEAR			Staff	Maintenance Expenses	Energy	Total
2017	-	2018	18.53	11.67	11.10	41.29
2018	-	2019	20.20	11.93	11.93	44.05
2019	-	2020	22.02	12.82	12.82	47.66
2020	-	2021	24.00	13.78	13.78	51.56
2021	-	2022	26.16	14.82	14.82	55.79
2022	-	2023	28.51	15.93	23.94	68.38

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15.3.2 Traffic

15.3.2.1 a) The projected ridership figures years are as indicated in table 15.4 as below: -

Table 15.4 Projected Ridership

Year	Trips per day (lakhs)
2017-18	1.49
2021-22	1.98

b) The growth rate for traffic is assumed at 7.50% Per Annum upto 2020-21 thereafter @ 3% per annum

15.3.2.2 Trip Distribution

The trip distribution has been worked out by considering average lead of 15.50 KM and, which is placed in Table 15.5 below: -

Table 15.5 Trip Distribution

Distance in km	Percent distribution
0-2	5.00%
2-4	5.00%
4-6	10.00%
6-9	10.00%
9-12	15.00%
12-15	15.00%
15-18	7.00%
18-21	7.00%
21-24	5.00%
24-27	5.00%
27-31	5.00%
31-35	5.00%
35-39	2.00%
39-44	2.00%
>44	2.00%
Total	100.00%

The graphic presentation of the same is placed below in Figure-15.1

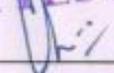
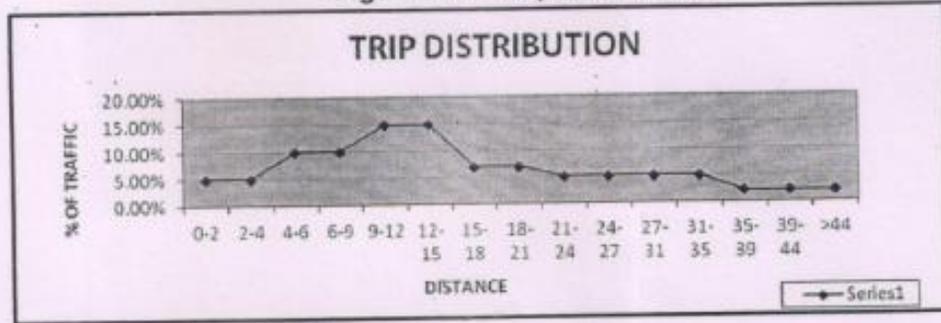
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Figure 15.1 – Trip Distribution



15.3.3 Fare Structure

The Delhi Metro Fares structures as fixed by a fare fixation committee in 2009 have been assumed, which have been duly escalated @15% for every two years, which is placed in table 15.6.

Table 15.6 Fare Structure in 2017-18

Distance in kms.	Fare (Rs)
0-2	12
2-4	15
4-6	18
6-9	22
9-12	23
12-15	26
15-18	28
18-21	31
21-24	32
24-27	34
27-31	37
31-35	40
35-39	41
39-44	42
>44	44

15.3.4 Other sources of revenues

Other revenues from Property Development and advertisement have been estimated at 10% of the fare box revenues during operations. Apart from development of property on metro stations and depot it is possible to raise resources through leasing of parking rights at stations, advertisement on trains and tickets, advertisements within stations and parking lots, advertisements on viaducts, columns and other metro structures, co-branding rights to corporate, film shootings and special events on metro premises.

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15.4 Financial Internal Rate of Return (FIRR)

15.4.1 The Financial Internal Rate of Return (FIRR) based on costs for 30 years business model are placed in table 15.7: -

Table 15.7 –FIRR (with Central taxes and land cost)

Figures in Crores

Year	Outflow					Inflow			IRR
	Completion Cost	Additi onal Cost	Runni ng Expe nses	Repla ceme nt costs	Total Costs	Fare Box Reve nue	PD & ADVT	Total Reve nue	
20 - 20	189				189			0	-189
20 - 20	486				486			0	-486
20 - 20	624				624			0	-624
20 - 20	437	0	41		478	134	13	147	-331
20 - 20	353	0	44		397	144	14	158	-239
20 - 20	0	0	48		48	179	18	197	149
20 - 20	0	0	52		52	192	19	211	159
20 - 20	0	0	56		56	236	24	260	204
20 - 20	0	854	68		922	243	24	267	-655
20 - 20	0	0	74		74	288	29	317	243
20 - 20	0	0	80		80	297	30	327	247
20 - 20	0	0	86		86	351	35	386	300
20 - 20	0	0	93		93	362	36	398	305
20 - 20	0	0	101		101	428	43	471	370
20 - 20	0	0	109		109	442	44	486	377
20 - 20	0	0	118		118	524	52	576	458
20 - 20	0	0	128		128	538	54	592	464
20 - 20	0	0	138		138	638	64	702	564
20 - 20	0	2405	162		2567	658	66	724	-
20 - 20	0	0	175		175	779	78	857	682
20 - 20	0	0	189		189	802	80	882	693
20 - 20	0	0	205		205	950	95	1045	840
20 - 20	0	0	221		221	979	98	1077	856
20 - 20	0	0	239		239	1159	116	1275	103
20 - 20	0	0	259	280	539	1194	119	1313	774
20 - 20	0	0	280	294	574	1414	141	1555	981
20 - 20	0	0	303	0	303	1457	146	1603	130
20 - 20	0	0	328	0	328	1725	173	1898	157
20 - 20	0	0	354	0	354	1777	178	1955	160
20 - 20	0	0	383	0	383	2105	211	2316	193
Total	2089	3259	4334	574	10256	19995	2000	21995	10.7

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15.4.2 The various sensitivities with regard to increase/decrease in capital costs, O&M costs and revenues are placed in Table 15.8 below :-

Table 15.8 –FIRR Sensitivity

Capital Cost with Central Taxes and land cost			
10% increase in capital cost	20% increase in capital cost	10% decrease in capital cost	20% decrease in capital cost
10.10%	9.51%	11.54%	12.44%
REVENUE			
20% decrease in Fare Box revenue	10% decrease in Fare Box revenue	10% increase in Fare Box revenue	20% increase in Fare Box revenue
7.77%	9.35%	12.09%	13.29%
O&M COSTS			
10% increase in O&M cost		10% decrease in O&M cost	
10.49%		11.06%	

These sensitivities have been carried out independently for each factor.

15.5 Financing Options

15.5.1 Involvement of the Government: - Rail based mass transit systems are characterised by heavy capital investments coupled with long gestation periods leading to low financial rates of return although the economic benefits to the society are immense. Government contribution is essential to keep debt-serving levels low with a view to maintaining overall sustainability of the system. Government involvement also generates considerable amount of confidence in other players involved in the process of construction & operation.

15.5.2 Since the governing objective of setting up these systems is social the fares are set at levels which are publicly and politically acceptable thus setting in the vicious cycle of deficits leading to a fallback on subsidies/government support.

15.5.3 Financing of Ghaziabad Metro Extension: - The Ghaziabad system should be basically funded on the same pattern as has been agreed recently for NOIDA. The funding pattern is given as per table 15.9 below:-

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Table 15.9 Funding Pattern

Rs/Crore		
Grant By GOI	288.50	14.08%
Grant By GOUP	1041.50	50.83%
SD for CT by GOUP (50%)	121.50	5.93%
SD for CT by GOI (50%)	121.50	5.93%
Rolling Stock by DMRC	476.00	23.23%
Total	2049.00	100.00%
Land free by GDA	40.00	
Total	2089.00	

Ghaziabad Development Authority (GDA) may release the grant amount including the share of GOI in three equal instalments. Land (Rs. 40 crore) should be made available free of cost and free from all encumbrances when the project starts. DMRC shall bear the cost of rolling stock. In addition to the above, State Taxes of Rs.60.00 crore on completion cost basis has to be reimbursed or to be exempted by state government.

15.6 RECOMMENDATIONS

The FIRR of the project is 10.78% and therefore, recommended that the same can be taken up only as a deposit work on similar terms of NOIDA metro extension. However, in order to have the funds available in time, an agreement may be entered into with GDA by incorporating a penal interest clause for any delay in the release of payment to DMRC by GDA.

The cash flow statement of the metro extension to Ghaziabad is placed in Table 15.10

The funding pattern is depicted in the pie chart i.e., Figure 15.2 as under: -

Figure 15.2 –Funding Pattern

