

## **Economic Feasibility Test of Garden Neighborhood of Pahartoli**

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### **Abstract**

The study aimed to analyze economic feasibility of a neighborhood which is planned to meet the demand for residential areas in Pahartoli Union. There are 167 plots in the neighborhood for various purposes like residential, commercial, religious, water bodies, recreational, institutional and service. The total project of 19 years is divided into 4 phases. The costs are in land, labor, road, building, earth filling, park, drain, lake, utility services, demarcation boundary, streetscape and tree etc. Where the saleable elements are flat, duplex building, commercial spaces, school, community center and hospital. From the calculation the NPV is positive and The BCR is more than 1 which indicate the profitability of the project. The IRR is higher than the assumed market interest rate which illustrates that the safety factor of the project is high. So it can be concluded that the project will be economically feasible.

**Keywords:** *Neighborhood design, economic feasibility, NPV, BCR, NBCR*

### **1 Introduction**

Economic feasibility study is done to decide whether a project will be profitable or not. To do this all the associated cost and expected benefit are calculated considering risk factor and time value of money. If the result of an economic feasibility analysis is positive the project can be taken. Pahartoli Bazar at Pahartoli Union in Raozan Upazila is committed as the growth center as the map drawn by Local Government Engineering Department (LGED). The communication system from this growth center to Chittagong city is good. Besides, there are many job sectors like- Chittagong University of Engineering and Technology (CUET), Steam Power Plant, rubber garden beside CUET and the two bazars. So migration in Pahartoli is increasing day by day resulted in increasing demand for residential areas. To meet the demand some planned neighborhood is necessary. The study aimed to conduct an economic feasibility study of a planned neighborhood for this area.

#### **1.1 Scope**

The local govt. institutions and developers would be benefitted as well as the researchers related to housing would find it helpful for their further studies.

#### **1.2 Limitation**

The time is short as well as the secondary data related to literature review.

### **2 Design of Neighborhood**

There are 167 plots in the neighborhood. There are 907 saleable units in the neighborhood. There are residential, commercial, religious, water bodies, recreational, institutional, service and so other types of land use here. It is developed under Private Housing Project and Land Development Rules, 2004.

Table 1. Plot Distribution of the Project

Area (Katha)	Use	Number
4	Residential	51
3.5	Residential	24
7	Residential	26
5.5	Residential	25
5	Residential	3
12	Residential	16
10	Residential	7
4	Commercial	3
5.5	Commercial	2
2.5	Commercial	4
4	Mosque	2
43	School	1
14	Hospital	1
5	Community Centre	1
11	Graveyard	1
<b>Total</b>		<b>167</b>

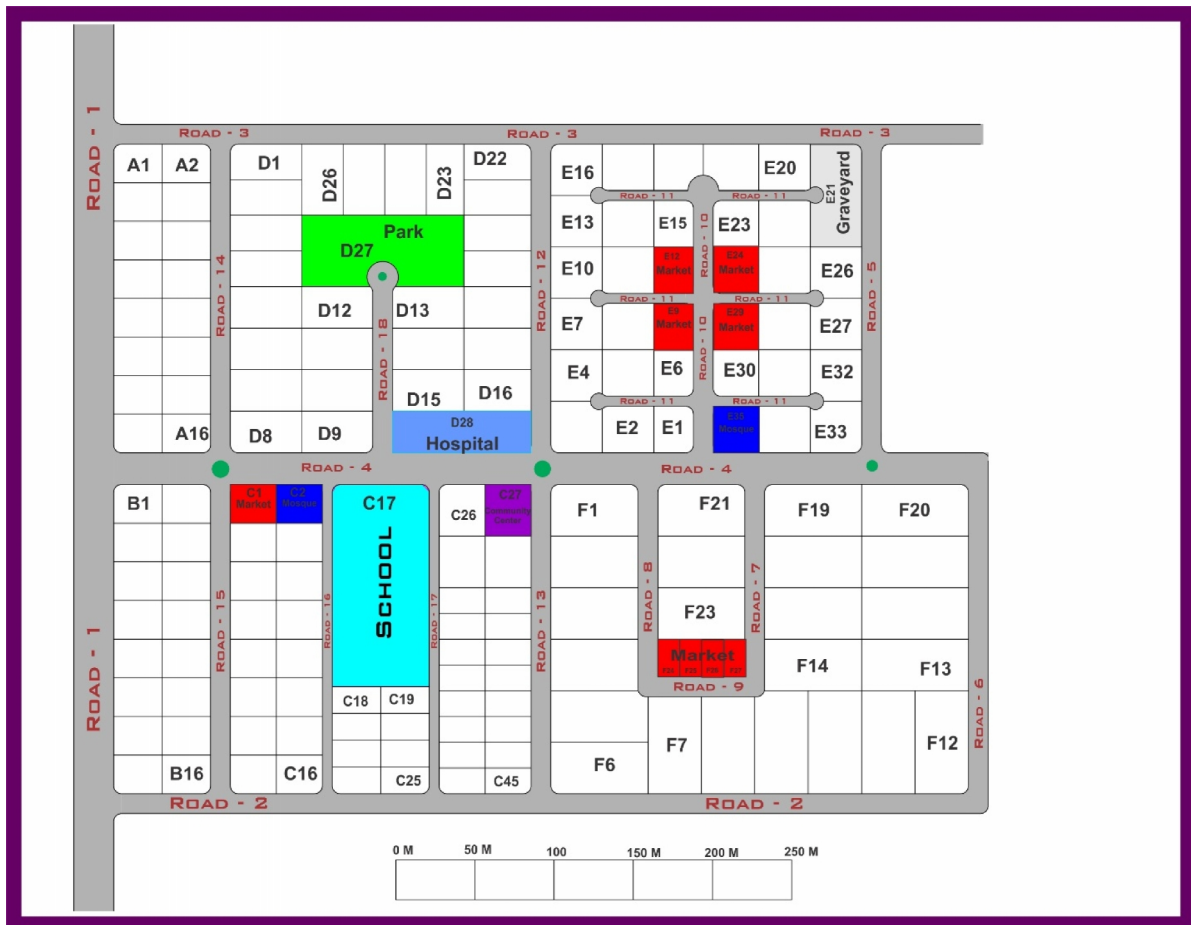


Figure 1. Layout of Garden Neighborhood in Pahartoli Union

### 3. Methodology

In this study, an economic feasibility study of a neighborhood development project is conducted. In this project three types of housing with utility services and community facilities will be sold. All costs and benefits are estimated in Bangladeshi Taka (BDT). Only economic cost and benefit is considered. Social cost and benefit, environmental cost and benefit are excluded here.

To conduct the economic feasibility study, following steps are followed.

Step 1: Estimating the total cost of the project.

Step 2: Estimating the total benefit (return) from the project.

Step 3: Dividing the project some phases

Step 4: Estimating the phase wise cost and benefit

Step 5: Calculating the cash flow

Step 6: Calculating the Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR) and Net Benefit Cost Ratio (NBCR) of the project

Step 7: Finally, making decision whether the project is economically feasible or not.

The detailed description of each step is discussed below.

#### 3.1 Cost Calculation

Following costs are considered here:

##### Land Cost

The total project area is 30 acre or 1800 Katha. In the project site the market price per Katha land is around two lakh taka. 20% risk factor is considered in land cost as some people don't want to sell their land.

##### Labor Cost

Labor cost for road and building construction is added with the road cost and building construction cost. To calculate Labor cost for earth filling, 400 BDT is considered as per man-day cost.

##### Road Cost

Per sq. ft. road cost is considered 1250 BDT. By multiplying the total road area of the project with 1250, the road cost is calculated.

##### Miscellaneous Cost

Following Cost are considered as miscellaneous cost

- Earth Filling
- Park
- Lake
- Utility Service cost
- Drain
- Demarcation Pillar
- Streetscape Design
- Tree

#### Building Construction Cost

Total 166 buildings will be built here. At first the total floor space and ground space of the buildings will be built according to Chittagong Imarat Nirman Bidhimala, 2008. The total floor space of the buildings is multiplied with the per sq. ft. construction cost and per sq. ft. labor cost. These two costs are added to determine the total construction cost of a building. For lower middle class apartment per sq. ft. cost is 1000 BDT, for middle class apartment per sq. ft. cost is 1100 BDT, and for commercial building per sq. ft. cost is 1500 BDT. For duplex house per sq. ft. cost is considered 2500 BDT.

#### 3.2 Return Calculation

##### Saleable Elements

Graveyard and Mosque (3 plots) will not be sold. The saleable elements of the project are-

- 3 types of Flat for Lower Middle Income (810, 875, 925 sq. ft.)
- 4 types of Flat for Middle Income (1130, 1260, 1300, 1450, 1500 sq. ft.)
- 2 types of Duplex Building (5000 and 6000 sq. ft.)
- School
- 3 types of Commercial Space (550, 750 and 1200 sq. ft.)
- Community Centre
- Hospita

Table 2. Saleable units of the Project

Building Type	Number	Saleable Unit
Lower Middle Class Building	24	252
Middle Class Building	105	579
Duplex	23	23
School	1	1
Commercial Building	9	50
Community Centre	1	1
Hospital	1	1
Total	164	816

Price for each type of saleable unit is considered as market price. By multiplying the total number of unit with the price total return is calculated. The total return from the project is 4668400000 BDT.

#### Phase wise Cost-Benefit Calculation & Cash Flow

The total project is divided into 4 phase. Following are the phases of the project

- Phase 1 (3 years)
- Phase 2 (5 year)
- Phase 3 (5 year)
- Phase 4 (5 year)

Except phase 1, the total cost of each project is divided into number of years need to complete the phase. Then each year same amount of money will be expensed. In case of phase 1, it has been fixed that half of the cost will be expensed in first year and second half will be expensed in the next three years.

In phase 1 no benefit will be gotten as the saleable units will be under construction during this phase. From phase 2 benefits will be received. It is assumed that the benefit from phase 2 will be started at the 2<sup>nd</sup> year of the phase 2 and will be continuous for 5 years. It is also assumed that the amount will be same over the 5 years. Same assumption is considered for phase 3 and phase 4.

The year wise cost and benefit calculation has been done. 1% of fixed cost is considered as variable or hidden cost. Adding these twos the total cost is calculated. By subtracting the cost of each year from the benefit the cash flow is calculated.

#### NPV, IRR, BCR and NBCR Calculation

- NPV is calculated by following formula:

$$NPV = \sum \frac{C_n}{(1+r)^n} \quad (1)$$

Where,

C<sub>n</sub>= Cash Flow at the end of the n<sup>th</sup> year

r = interest rate

n= years

- IRR is calculated using the formula of NPV. In IRR the r is calculated for which the NPV is 0.
- The BCR IS calculated by following formula

$$BCR = \frac{PV \text{ of Benefit}}{PV \text{ of Cost}} \quad (2)$$

Where,

PV= Present value

PV is calculated using  $\sum \frac{A_n}{(1+r)^n}$  formula where A<sub>n</sub> can be cost of benefit.

- The NBCR is calculated by following formula

$$NBCR = 1 - BCR$$

#### 4. Feasibility Study

Total cost of the project is shown below:

Table 3. Total Cost of the Project

<b>Item</b>	<b>Cost (BDT.)</b>
Land Cost	432000000
Building Construction Cost	1750552200
Road Cost	320940000
Labor Cost	360000
Miscellaneous Cost	83200000
<b>Total Cost</b>	<b>2587052200</b>

Total Return from the project is shown below:

Table 4. Total Return of the Project

<b>Type</b>	<b>Floor Space</b>	<b>Number</b>	<b>Price per unit</b>	<b>Total Price</b>
Flat( Lower Middle Income)	810	30	2300000	69000000
	875	150	2500000	375000000
	925	72	2500000	180000000
Flat( Middle Income)	1500	128	4000000	512000000
	1450	60	3850000	231000000
	1300	96	3600000	345600000
	1260	95	3500000	332500000
	1130	200	3200000	640000000
Duplex	5000	7	75000000	525000000
	5000	10	80000000	800000000
	6000	6	90000000	540000000
Commercial	550	24	1400000	33600000
	750	18	1900000	34200000
	1200	8	3500000	28000000
School	28000	1	7500000	7500000
Hospital	7200	1	7500000	7500000
Community Centre	4860	1	7500000	7500000
<b>Total</b>		<b>907</b>		<b>4668400000</b>

The cash flow is prepared according to the phasing of the project illustrated in methodology.

The following table shows the cash flow of different years:

**Table 4: Cash Flow of the Project**

Year	Fixed Cost	Variable Cost	Total Cost	Return	Cash Flow
Year 1	418250000	4182500	422432500	0	-422432500
Year 2	209125000	2091250	211216250	0	-211216250
Year 3	209125000	2091250	211216250	0	-211216250
Year 4	107829440	1078294.4	108907734.4	0	-108907734.4
Year 5	107829440	1078294.4	108907734.4	196900000	87992265.6
Year 6	107829440	1078294.4	108907734.4	196900000	87992265.6
Year 7	107829440	1078294.4	108907734.4	196900000	87992265.6
Year 8	107829440	1078294.4	108907734.4	196900000	87992265.6
Year 9	71216000	712160	71928160	196900000	124971840
Year 10	71216000	712160	71928160	378600000	306671840
Year 11	71216000	712160	71928160	378600000	306671840
Year 12	71216000	712160	71928160	378600000	306671840
Year 13	71216000	712160	71928160	378600000	306671840
Year 14	171065000	1710650	172775650	378600000	205824350
Year 15	171065000	1710650	172775650	358180000	185404350
Year 16	171065000	1710650	172775650	358180000	185404350
Year 17	171065000	1710650	172775650	358180000	185404350
Year 18	171065000	1710650	172775650	358180000	185404350
Year 19	0	0	0	358180000	358180000

From this Cash Flow NPV, IRR, BCR and NBCR are calculated. The interest is considered as 10% over the project period.

- The NPV of the project is 144804914 BDT.
- The IRR of the project is 11.7625564663%
- The BCR of the project is 1.09792
- The NBCR of the project is 0.09792

## 5. Conclusion

From above calculation and discussion followings can be concluded-

- The NPV is positive and higher in value which indicates the profitability of the project
- The IRR is higher than the assumed market interest rate which illustrates that the safety factor of the project is high
- The BCR is more than 1 which indicates that the project will be profitable

So it can be concluded that the project will be economically feasible.

## Reference

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