

IPE PROJECT

Choosing the ideal business to pursue is perhaps one of the most important aspect of the whole business industry strategy. Whether it' s an investment or a startup, one should be aware of the inevitable obstacles that will be encountered, if the project chosen fails to make a significant mark on the industry. Therefore, an extensive analysis is needed before getting involved in any business in order to estimate profits or evaluate risks associated with the business.

For our IPE project, we were told to pick 2 product manufacturing business proposals & compare them to find the better one. Here we analyzed paint color and yarn manufacturing the details of the analysis and the result is given below-

Data Collection:

We were told to work on realistic data for this project. Unfortunately, we could not collect adequate information required to propose a brand new business, like the capital required, factory buildup costs and current market value of the products. That' s why we decided to analyze well established manufacturing businesses, like Berger Paints & Alhaj Textiles. We collected annual reports of several years from the company websites and performed our analysis on their given data.

Methods Applied:

A business has many aspects that can be analyzed. Manufacturing of a product depends on several other factors, like the availability of the raw materials in due time, the cost associated with setting up machines and operating them, storing finished goods & raw materials in warehouses etc. Similarly, the selling cost per unit of a product depends on the distribution system, administrative costs and other elements. There are many effective ways to analyze the prospects of a business. For this Project, we computed the following-

- a) Materials Requirement Planning (MRP)
- B) Cost Volume Profit analysis (CVP)
- C) Revenue Forecasting
- D) Capital Budgeting Decision

The description of the methods we followed and the results are given below-

Materials Requirement Planning (MRP)

Companies need to control the types and quantities of materials they purchase, plan which products are to be produced and in what quantities and ensure that they are able to meet current and future customer demand, all at the lowest possible cost.

Material requirements planning (MRP) is a production planning, scheduling, and inventory control system used to manage manufacturing processes. MRP is dependant on time.

There are some keywords related to MRP planning we need to know.

Dependant Demand:

Dependent demand is demand for components to be used in the production of finished goods. Dependent demand tends to be erratic. That means large quantities are used at specific points in time with little or no usage at other times

Lead Time:

A lead time is the latency between the initiation and execution of a process. The time between the placement of an order and delivery from manufacture

Prerequisites for computing MRP

The followings are the prerequisites for computing MRP-

1)Master schedule:

States which end items are to be produced, when these are needed, and in what quantities

2)Bill Of Material:

A listing of all of the assemblies, subassemblies, parts, and raw materials needed to produce one unit of a product

3)Inventory records:

Includes information on the status of each item by time period

Data Type:

The annual report of Berger Bangladesh Ltd. didnt have the exact quantity of products, rather the monetary value of the raw materials & finished goods were given. So, we calculated the MRP for these products by using 1000 BDT as our unit.

For Alhaj Textiles, the produced quantity of yarn was given in kg, for several other elements, monetary value was used. And we calculated MRP using as per the units given in annual report.

Berger Bangladesh

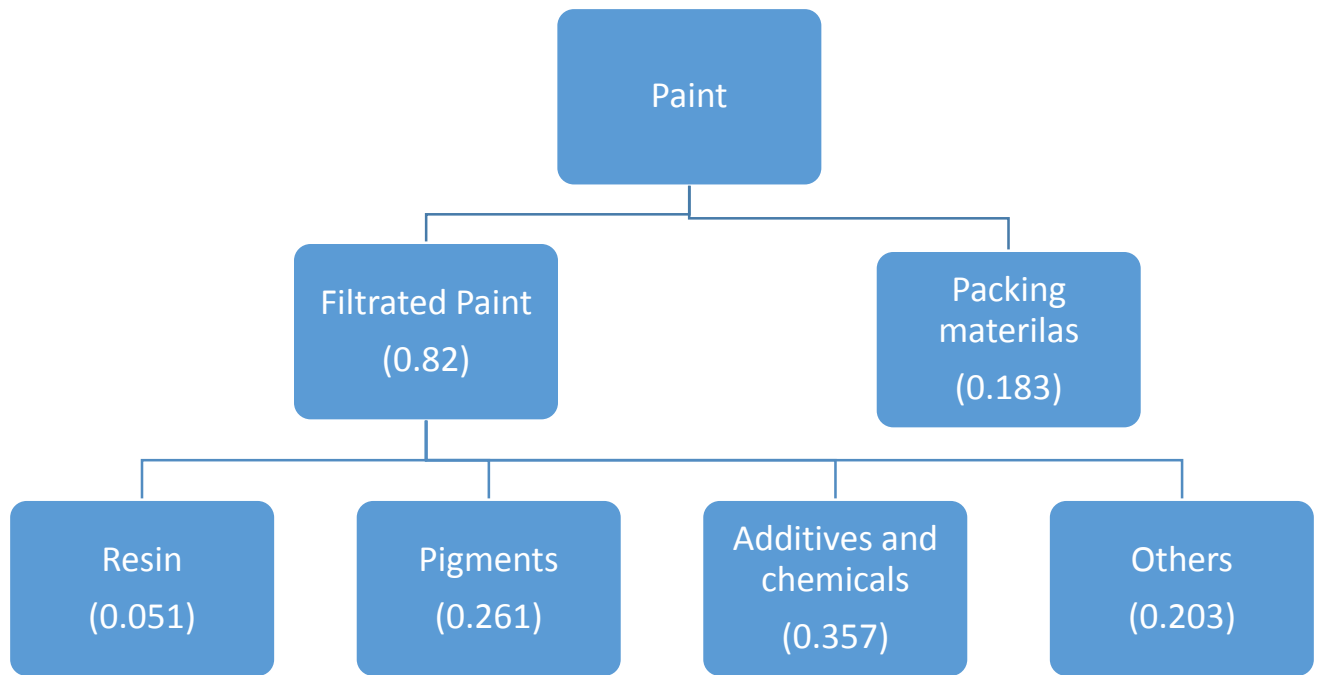


Fig: Product Structure Tree(Berger Bangladesh)

Master Schedule for paint

Week No.	1	2	3	4	5	6	7	8	9	10
Quantity					583088					583088

LT	Item		Week											
			1	2	3	4		5	6	7	8	9		10
						5d	2d					5d	2d	
2 days	Paint	Gross Requirement						583088						583088
		Schedule Receipt												
		Projected on Hand	0	0	0	0		0	0	0	0	0		0
		Net Requirement						583088						583088
		Planned Order Receipt						583088						583088
		Planned Order Releases					583088						583088	

LT	Item		Week											
			1	2	3	4		5	6	7	8	9		10
						5d	2d					5d	2d	
5 days	Filtrated Paint	Gross Requirement					476281						476281	
		Schedule Receipt					476281						476281	
		Projected on Hand	0	0	0	0	476281	0	0	0	0	0	476281	0
		Net Requirement					476281						476281	
		Planned Order Receipt					476281						476281	
		Planned Order Releases				476281						476281		

LT	Item		Week											
			1	2	3	4		5	6	7	8	9		10
						5d	2d					5d	2d	
5 days	Packaging Materials	Gross Requirement					106808						106808	
		Schedule Receipt		53404			106808						106808	
		Projected on Hand	0	53404	53404	53404	53404	0	0	0	0	0	106808	0
		Net Requirement					53404						106808	
		Planned Order Receipt					53404						106808	
		Planned Order Releases				53404						106808		

LT	Item		Week											
			1	2	3	4		5	6	7	8	9		10
						5d	2d					5d	2d	
1 week	Resin	Gross Requirement				24697						24697		
		Schedule Receipt												
		Projected on Hand	0	0	0	0	0	0	0	0	0	0	0	0
		Net Requirement				24697						24697		
		Planned Order Receipt				24697						24697		
		Planned Order Releases			24697						24697			

LT	Item		Week											
			1	2	3	4		5	6	7	8	9		10
						5d	2d					5d	2d	
1 week	Pigments	Gross Requirement				124760						124760		
		Schedule Receipt												
		Projected on Hand	0	0	0	0	0	0	0	0	0	0	0	0
		Net Requirement				124760						124760		
		Planned Order Receipt				124760						124760		
		Planned Order Releases			124760						124760			

LT	Item		Week											
			1	2	3	4		5	6	7	8	9		10
						5d	2d					5d	2d	
1 week	Additives and chemicals	Gross Requirement				170266						170266		
		Schedule Receipt												
		Projected on Hand	0	0	0	0	0	0	0	0	0	0	0	0
		Net Requirement				170266						170266		
		Planned Order Receipt				170266						170266		
		Planned Order Releases			170266						170266			

LT	Item		Week											
			1	2	3	4		5	6	7	8	9		10
						5d	2d					5d	2d	
1 week	Others	Gross Requirement				96698						96698		
		Schedule Receipt												
		Projected on Hand	0	0	0	0	0	0	0	0	0	0	0	0
		Net Requirement				96698						96698		
		Planned Order Receipt				96698						96698		
		Planned Order Releases			96698						96698			

AlHaj Textiles

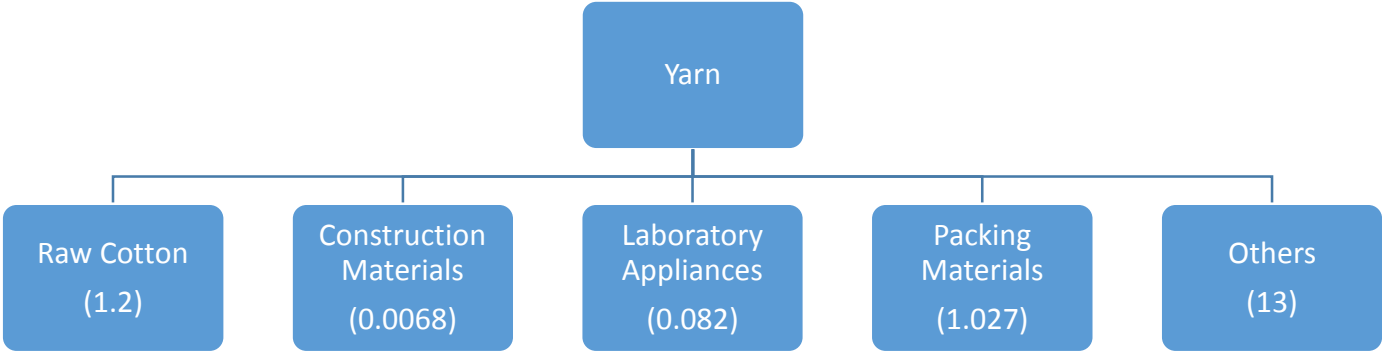


Fig: Product Structure Tree(AlHaj Textiles)

Master Schedule for paint

Week No.	1	2	3	4	5	6	7	8	9	10
Quantity (in kg)					125430					125430

LT	Item		Week									
			1	2	3	4	5	6	7	8	9	10
1 week	Yarn (in kg)	Gross Requirement					125430					125430
		Schedule Receipt										
		Projected on Hand										
		Net Requirement					125430					125430
		Planned Order Receipt					125430					125430
		Planned Order Releases				125430					125430	

LT	Item		Week									
			1	2	3	4	5	6	7	8	9	10
1 week	Raw Cotton (in kg)	Gross Requirement					146113					146113
		Schedule Receipt						12637				
		Projected on Hand	25274	25274	25274	25274	25274	12637	12637	12637	12637	12637
		Net Requirement					120839					126239
		Planned Order Receipt					120839					126239
		Planned Order Releases				120839					126239	

LT	Item		Week									
			1	2	3	4	5	6	7	8	9	10
1 week	Construction materials(in tk)	Gross Requirement					865					865
		Schedule Receipt										
		Projected on Hand										
		Net Requirement					865					865
		Planned Order Receipt					865					865
		Planned Order Releases				865					865	

LT	Item		Week									
			1	2	3	4	5	6	7	8	9	10
1 week	Laboratory Appliances (in tk)	Gross Requirement					10281					10281
		Schedule Receipt										
		Projected on Hand										
		Net Requirement					10281					10281
		Planned Order Receipt					10281					10281
		Planned Order Releases				10281					10281	

LT	Item		Week									
			1	2	3	4	5	6	7	8	9	10
1 week	Packing Materials (in tk)	Gross Requirement					128920					128920
		Schedule Receipt										
		Projected on Hand										
		Net Requirement					128920					128920
		Planned Order Receipt					128920					128920
		Planned Order Releases				128920					128920	

LT	Item		Week									
			1	2	3	4	5	6	7	8	9	10
1 week	Others (in tk)	Gross Requirement					1637194					1637194
		Schedule Receipt										
		Projected on Hand										
		Net Requirement					1637194					1637194
		Planned Order Receipt					1637194					1637194
		Planned Order Releases				1637194					1637194	

Objectives Of MRP

- Ensure materials are available for production and products are available for delivery to customers.
- Maintain the lowest possible material and product levels in store
- Plan manufacturing activities, delivery schedules and purchasing activities.

Limitations

- Integrity of the data is a must for MRP calculations. If there are any errors in the inventory data, the bill of materials data, or the master production schedule, then the output data will also be incorrect
- The other major drawback of MRP is that it fails to account for capacity in its calculations. This means it will give results that are impossible to implement due to manpower, machine or supplier capacity constraints

Forecasting

Forecasting:

Forecasting is the process of making predictions of the future based on past and present data and by analysis of trends.

Data Type:

We were said to carry on demand forecasting. But sadly, we could not manage enough information related to demand of these two product. So we are conducting forecasting based on annual revenue.

Here, we have the following actual data of revenue of paint (product of Berger Paint Bangladesh) and yarn (product of Alhaj Textiles):

	Actual Revenue (TK in '000)					
Year	2015	2014	2013	2012	2011	2010
Berger Paint	12,267,996	10,881,046	8,796,778	7,611,213	6,321,274	5,483,619
Alhajj Textiles	371,931	266,645	288,528	335,366	335,775	----- -

Technique used

Forecasting can be qualitative and quantitative. Qualitative forecasting techniques are subjective, based on the opinion and judgment of consumers, experts; they are appropriate when past data are not available.

Quantitative forecasting models are used to forecast future data as a function of past data. They are appropriate to use when past data is available and when it is reasonable to assume that some of the patterns in the data are expected to continue into the future.

As we are doing a short range forecast and past data was available to us via company websites, we used quantitative forecasting for our project.

Now, among many existing quantitative methods we are going to use **exponential smoothing** technique. The reasons are following:

- The **simple moving average method** assumes that all observations are of equal importance and they are given equal weight when generating forecasts.
- **Regression method** is suitable when the data follows a specific trend or when we find a strong correlation between two parameters. But neither is applicable here.

The advantage of the exponential smoothing is that by being weighted to the most recent price changes, it responds more quickly to price changes than the simple moving average does. It emphasizes the most up-to-date information. This is particularly helpful to trade swing highs and lows, since the smoothed signals trend change more rapidly than the simple moving average does. It also requires storing very little data. It is very quick and simple to compute. We have set the parameter as following:

Parameter: α (% feedback)=0.4

Detailed Calculation by Exponential Smoothing:

We know, formulae of calculation of demand forecasting by exponential smoothing is:

$$F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1})$$

Here, $\alpha=0.4$

Berger Paint:

Actual Data of revenue of 2010 has been used as base condition in these calculations.

- Forecasting of 2011 year:

Here,

$$A_{t-1}=5,483,619 \text{ TK}$$

$$F_{t-1}=5,483,619 \text{ TK}$$

$$A_t =6,321,274 \text{ TK}$$

$$\text{Therefore, } F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \underline{\hspace{1cm}}$$

$$=5,483,619 + (0.4)(5,483,619-5,483,619)$$

$$=5,483,619 \text{ TK}$$

$$\text{Error}=\text{Actual data}-\text{forecasted data}$$

$$= A_t - F_t$$

$$= (6,321,274 - 5,483,619) \text{ TK}$$

$$=837,655 \text{ TK}$$

- Forecasting of 2012 year:

Here,

$$A_{t-1}=6,321,274$$

$$F_{t-1}= 5,483,619 \text{ TK}$$

$$A_t = 7,611,213 \text{ TK}$$

$$\text{Therefore, } F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \underline{\hspace{1cm}}$$

$$=5,483,619 + (0.4)(6,321,274-5,483,619)$$

$$=5,818,681 \text{ TK}$$

$$\text{Error}=\text{Actual data}-\text{forecasted data}$$

$$= A_t - F_t$$

$$= (7,611,213 - 5,818,681) \text{ TK}$$

$$= 1,792,532 \text{ TK}$$

- Forecasting of 2013 year:

Here,

$$A_{t-1}=7,611,213 \text{ TK}$$

$$F_{t-1}=5,818,681 \text{ TK}$$

$$A_t=8,796,778 \text{ TK}$$

$$\text{Therefore, } F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1})$$

$$= 5,818,681 \text{ TK} + (0.4)(7,611,213 - 5,818,681)$$

$$= 6,535,693 \text{ TK}$$

Error=Actual data-forecasted data

$$= A_t - F_t$$

$$= (8,796,778 - 6,535,693) \text{ TK}$$

$$= 2,261,085 \text{ TK}$$

- Forecasting of 2014 year:

Here,

$$A_{t-1}=8,796,778 \text{ TK}$$

$$F_{t-1}= 6,535,693 \text{ TK}$$

$$A_t=10,881,046 \text{ TK}$$

$$\text{Therefore, } F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1})$$

$$= 6,535,693 + (0.4) (8,796,778 - 6,535,693)$$

$$= 7,440,127 \text{ TK}$$

Error=Actual data-forecasted data

$$\begin{aligned}
 &= A_t - F_t \\
 &= (10,881,046 - 7,440,127) \text{ TK} \\
 &= 3,440,919 \text{ TK}
 \end{aligned}$$

- Forecasting of 2015 year:

Here,

A_{t-1}=10, 881, 046 TK

$F_{t-1} = 7,440,127$ TK

A_t = 12, 267, 996 TK

Therefore, $F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1})$ _____

$$= 7,440,127 + (0.4)(10,881,046 - 7,440,127)$$

$$= 8,816,494 \text{ TK}$$

$$\text{Error} = \text{Actual data} - \text{forecasted data}$$

$$= A_t - F_t$$

$$= (12,267,996 - 8,816,494) \text{ TK}$$

$$= 3,451,502 \text{ TK}$$

- Forecasting of 2016 year:

Here,

A_{t-1}=12, 267, 996 TK

F_{t-1}= 8, 816, 494 TK

Therefore, $F_t = F_{t-1} + \alpha (A_{t-1} - F_{t-1})$

$$= 8,816,494 + (0.4)(12,267,996 - 8,816,494)$$

$$= 10,197,094 \text{ TK}$$

- Forecasting of 2016 year:

Here, we need the actual value of revenue of year 2016 but it is not available as the year has not yet ended.

$$A_{t-1}=12,267,996 \text{ TK}$$

$$F_{t-1}= 8,816,494 \text{ TK}$$

$$\begin{aligned} \text{Therefore, } F_t &= F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \\ &= 8,816,494 + (0.4)(12,267,996 - 8,816,494) \\ &= 10,197,094 \text{ TK} \end{aligned}$$

Alhajj Textile Mills:

Actual Data of revenue of 2011 has been used as base condition in these calculations.

- Forecasting of 2012 year:

$$A_{t-1}=335,775 \text{ TK}$$

$$F_{t-1}= 335,775 \text{ TK}$$

$$\begin{aligned} \text{Therefore, } F_t &= F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \\ &= 335,775 + (0.4)(335,775 - 335,775) \\ &= 335,775 \text{ TK} \end{aligned}$$

$$\text{Error} = \text{Actual data} - \text{forecasted data}$$

$$\begin{aligned}
 &= A_t - F_t \\
 &= (335,366 - 335,775) \text{ TK} \\
 &= (409) \text{ TK}
 \end{aligned}$$

- Forecasting of 2013 year:

$$A_{t-1} = 335,366 \text{ TK}$$

$$F_{t-1} = 335,775 \text{ TK}$$

$$\begin{aligned}
 \text{Therefore, } F_t &= F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \\
 &= 335,775 + (0.4) (335,366 - 335,775) \\
 &= 335,611 \text{ TK}
 \end{aligned}$$

$$\text{Error} = \text{Actual data} - \text{forecasted data}$$

$$\begin{aligned}
 &= A_t - F_t \\
 &= (288,528 - 335,611) \text{ TK} \\
 &= (47,083) \text{ TK}
 \end{aligned}$$

- Forecasting of 2014 year:

$$A_{t-1} = 288,528 \text{ TK}$$

$$F_{t-1} = 335,611 \text{ TK}$$

$$A_t = 266,645 \text{ TK}$$

$$\begin{aligned}
 \text{Therefore, } F_t &= F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \\
 &= 335,611 + (288,528 - 335,611)(.4) \\
 &= 316,777 \text{ TK}
 \end{aligned}$$

$$\text{Error} = \text{Actual data} - \text{forecasted data}$$

$$\begin{aligned}
 &= A_t - F_t \\
 &= (266,645 - 316,777) \text{ TK} \\
 &= (50,132) \text{ TK}
 \end{aligned}$$

- Forecasting of 2015 year:

$$A_{t-1} = 266,645 \text{ TK}$$

$$F_{t-1} = 316,777 \text{ TK}$$

$$A_t = 371,931 \text{ TK}$$

$$\begin{aligned}
 \text{Therefore, } F_t &= F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \\
 &= 316,777 + (266,645 - 316,777)(.4) \\
 &= 296,724 \text{ TK}
 \end{aligned}$$

$$\text{Error} = \text{Actual data} - \text{forecasted data}$$

$$\begin{aligned}
 &= A_t - F_t \\
 &= (371,931 - 296,724) \text{ TK} \\
 &= (75,207) \text{ TK}
 \end{aligned}$$

- Forecasting of 2016 year:

$$A_{t-1} = 371,931 \text{ TK}$$

$$F_{t-1} = 296,724 \text{ TK}$$

$$\begin{aligned}
 \text{Therefore, } F_t &= F_{t-1} + \alpha (A_{t-1} - F_{t-1}) \\
 &= 296,724 + (371,931 - 296,724)(.4) \\
 &= 402,013 \text{ TK}
 \end{aligned}$$

Limitations

- Forecasting is rarely perfect because of randomness in data
- Accuracy of forecasting decreases with time

Capital Budgeting Decision

Capital budgeting is the planning process used to determine whether an organization's long term investments are worth the funding through the companies capitalization structure

Capital Budgeting is of special importance in mutually exclusive project selection situations, where among several project at most one is selected. Capital budgeting helps us to decide the best project.

Technique Used

Many formal methods are used in capital budgeting. Some of them are-

- Internal Rate Of Return
- Net Present value
- Payback Period
- Benefit Cost Ratio

Here, we are have calculated NPV of current bank balance. The reasons for this is given below-

- **Internal Rate of Return (IRR)** is defined as the discount rate that forces the project' s NPV to equal zero. IRR is used to find out at what minimum acceptable profit rate Total Revenue equals Total Expenditure. But here, the total expenditure is not known to us. So we couldn' t use this method.
- **Payback Period** is defined as the number of years required to recover a project' s cost from operating cash flows. But both the projects we picked were established quite a long ago, and the documents of their initial project cost at that time was not found. So we could not apply conventional or discounted payback period method here.
- **Benefit Cost Ratio (B-C Ratio)** is calculated for non-profitable public projects, where benefit from the project is converted to monetary value, and if benefit is greater than project cost the project is acceptable. But we are dealing with private project here, so this method is not applicable either.

Berger Bangladesh

Unit= BDT in '000

Opening cash and cash equivalent, 2012= (52,061)

	2012	2013	2014	2015	2016
Cash flow from	1,077,803	989,577	1,152,181	2,132,935	1,591,512

Operating activities					
Cash flow from Investing activities	(278,157)	(364,901)	(589,412)	(854,381)	(686.024)
Cash flow from Financing activities	(416,716)	(417,197)	(509,676)	(741,698)	(625,842)
Net Cash Flow for the year	382,930	207,479	53,093	536,856	279,646

Now, $NPV = \sum_{t=0}^N \frac{CF_t}{(1+r)^t}$

Let,

Cash inflation rate, $r = 6\%$

So, Here,

$$NPV = CF_0 + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} + \frac{CF_5}{(1+r)^5}$$

$CF_0 = -52,061$

$CF_1 = 382,930$

$CF_2 = 207,479$

$CF_3 = 52,093$

$CF_4 = 536,856$

$CF_5 = 279,646$

So, $NPV \text{ (for 2012)} = 1,171,795$

So, the project looks pretty profitable from the NPV. And if we look at actual data, we can see from the company's annual report that the Cash and Cash Equivalents at end of the year 2016 is 1414,848. So, the project is worth investing.

Alhaj Textiles

Unit= BDT in '000

Opening cash and cash equivalents, 2012=6,178.223

	2012	2013	2014	2015	2016
Cash flow from Operating activities	21,251.088	37,064.786	122,706.598	(28,725.976)	102,309.216
Cash flow from Investing activities	(3,498.261)	(51,974.245)	(125,299,788)	51,553.722	(72,833.685)
Cash flow from Financing activities	–	–	–	–	(7,113.644)
Net Cash Flow for the year	17,752.826	(14,909.458)	(2,593.190)	22,827.746	22,361.887

Now, $NPV = \sum_{t=0}^N \frac{CF_t}{(1+r)^t}$

Let,

Cash inflation rate, $r = 6\%$

So, Here,

$$NPV = CF_0 + \frac{CF_1}{(1+r)^1} + \frac{CF_2}{(1+r)^2} + \frac{CF_3}{(1+r)^3} + \frac{CF_4}{(1+r)^4} + \frac{CF_5}{(1+r)^5}$$

$$CF_0 = 6,178.223$$

$$CF_1 = 17,752.826$$

$$CF_2 = 14,909.458$$

$$CF_3 = -2,593.190$$

$$CF_4 = 22,827.746$$

$$CF_5 = 22,361.887$$

So, $NPV \text{ (for 2012)} = 42,271.33$

So, the project looks pretty profitable from the NPV. And if we look at actual data, we can see from the company's annual report that the Cash and Cash Equivalents at end of the year 2016 is 51,618,034. So, the project is worth investing.

So, from NPV calculation, we can see that both the projects are profitable. But the NPV for Berger Bangladesh is much greater than NPV for Alhaj Textiles. So, the Berger Bangladesh is the better project and we should go for it.

