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AN INTEGRATED COTTON SPINNING AND WEAVING TEXTILE MILL

CASE STUDY<sup>1/</sup>

by

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<sup>1/</sup> This case study illustrates the application of the operational step-by-step methodology for project evaluation developed in the Manual for Evaluation of Industrial Projects in Arab Countries.

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## I. PROJECT FORMULATION

### 1. General Background

The country of Perovia is initiating its industrial development. It has a very strong traditional sector producing agricultural products covering most of the domestic demand in foodstuffs and is at the same time a significant raw cotton exporter. From its primary sector of the economy, the country produces remarkable surpluses in mineral ores.

The social and economic changes and development of the country have brought about changing patterns of consumption. The country is importing all of its capital equipment needs and most of the finished goods sold on the domestic market. Planners and other government specialists have analyzed such a development path and have come to the conclusion that the country could soon run into balance of payments problems. Besides, the existing pattern does not provide space for substantial increases in employment, a problem Perovia faced from the very beginning of its development as an independent country.

Perovia, therefore, has a strong desire to exploit to the utmost the resources it does possess. The government has decided to encourage the establishment of industries which depend on domestic resources of raw materials. Among the possibilities at hand the government has decided as well to begin with those industrial projects which do not need highly advanced skills and technology. The objective is to establish within the industrial sector plants producing exportables or import substituting goods. One of the main branches which the government has decided to encourage is the textile industry.

Cotton is one of the main agricultural products, constituting about 80 per cent of total exports. Practically all marketable surpluses of cotton are exported, but the export price has shown significant fluctuation in recent years. At the same time, the country imports from abroad nearly all of its needs in textile yarn, fabrics and finished clothing. There exists a traditional handloom industry which depends on imported yarn as well. This industry at the same time does not represent a significant percentage of the domestic market consumption.

A proposed new national industry has the objective of creating new employment as a means of absorbing the labour surplus created by the very fact of structural changes within the economy and population growth as well. There is, in addition, the objective of decreasing the imports of cotton yarn fabrics and finished clothing.

## 2. Market Study

The market analysis has been undertaken by a team of specialists in market research and industrial development from the government market research agency "Marko". Briefly, their analysis and results were focussed on the demand and supply side of the project proposed.

A. The demand forecast has traced the present level of consumption of cotton, mixed textile yarn and fabrics as well as the changes in this consumption over the past eight years, i.e. over the past periods for which they could find or estimate more or less reliable data. The analysis has shown that the increase in consumption is steady and elastic with respect to the increase in the country's per capita income.

Domestic demand is covered heavily by imports and there is just a minor fraction of demand which is covered by domestic production.

Annual imports of cotton and mixed textile yarn and fabrics are about 12,000 tons, or the equivalent of 70 million m<sup>2</sup> of textile fabrics.

The present domestic production of cotton and mixed textile fabrics is about 900 tons, which represents only about five per cent of the domestic consumption.

Analysing the pattern of consumption from the past as well as for countries at a similar level of development and for countries that are somewhat ahead in their economic development and for which experts from the "Marko" agency could gather the data needed, the demand projections have shown that demand will increase in future years mostly as a result of the growth of per capita income and population growth.

B. The supply forecast has been oriented to the main inputs required by the proposed project:

- Direct materials used in the production are a mixture of cotton and synthetic fibres and chemicals. The cotton needed is a domestic input that is entirely exported. The plant would need 1,860 tons per year of medium staple (grade/good). The supplies of this input will be covered upon contract with the "National Cotton Trading Agency". Synthetic fibres are estimated at 1,705 tons per year and are imported. The importer would be the "National Textiles and Foodstuffs Trading Corporation" because of its experience and reliability. The price is estimated as the average price of this input for the region. Chemicals needed include dyeing materials for finishing and starching materials for weaving. Most of them have to be imported which would be taken care of by the above mentioned Corporation, while a minor part would be supplied by the existing domestic producers.
- Other inputs consist of indirect materials mostly of domestic origin, maintenance parts that are imported from the supplier of equipment and services produced domestically.

The analysis has concluded that all the inputs needed are available and of standard quality and that their suppliers are reliable. Most of the input prices are stable with the exception of synthetic fibres which are facing an increasing world demand on the one hand, and are directly tied to the changes in oil prices on the other.

C. The selling price was estimated at 0.75 dinars/m<sup>2</sup> or 0.60 dinars per linear meter of 80 cm width.

### 3. Location

The textile mill is in general locationally independent. Therefore, the analysis of possible locations of the mill took into consideration the main objectives of the project. The government decided on a location in the capital of the province of Oasis as the main cotton-producing region with labour employment problems and no significant industrial plant until now.

#### 4. Technical Aspects

This part of project formulation has been undertaken by the "National Industrial Development Institute" in co-operation with two UNIDO experts attached to the Institute.

The task was to choose among the existing technical possibilities and equipment those that would be the most adequate for the resources available and the level of development attained by the country.

The objective is the production of finished poplin fabrics of medium count yarn. The capacity of the project is 3100 tons of mixed textile fabrics, i.e. about 28,000,000 meters annually when producing at full capacity.

The spinning mill includes 30,000 spindles. The different departments of the mill are balanced to produce yarn of average count No. 30" at a capacity of 3,100 tons per year.

The weaving mill includes 1,000 automatic looms in addition to the preparation sections of a total capacity of 28,000,000 meters per year.

The finishing plant includes departments for bleaching, dyeing and finishing.

It was estimated that the project will be implemented in three years, beginning in 1976 and ending 1978. A test run period of six months will be in the year 1979. This is also the starting year of operation of the plant, which will operate until the end of 1988.

#### 5. Labour Analysis

The estimation of the manpower needed was done by the Economic Institute and National Planning Agency. It is expected that the textile mill will employ 2,357 men. It is pointed out that foreign personnel will be engaged in the year 1979-1983. Table 1 illustrates the estimation of manpower by type, skills and rates of pay.

#### 6. Financial Aspects

The financial aspects of the project were formulated by the engineering and project planning bureau "Plan". All relevant financial and economic data are summarized in Tables 2 - 7.



Table 1. Manpower Requirements

Category of Manpower	Number of personnel			Average annual wages in dinars	Amount in '000 dinars
	Unskilled	Skilled	Total		
1. <u>Direct operating personnel</u>	200	1,400	1,600	-	1,440
1.1 Operators of spinning department	50	650	700	900	630
1.2 Operators of weaving department	100	500	600	900	540
1.3 Operators of finishing department	50	250	300	900	270
2. <u>Indirect operating personnel</u>	180	405	585	-	526
2.1 Service operators	100	200	300	900	270
2.2 Maintenance operators	80	200	280	900	252
2.3 Drivers	-	5	5	800	4
3. <u>Supervisory and clerical personnel</u>	-	86	86	-	107
3.1 Plant superintendent	-	3	3	2,650	8
3.2 Engineers	-	6	6	2,000	12
3.3 Technical assistants	-	15	15	1,250	19
3.4 Clerks	-	62	62	1,100	68
4. <u>Administrative personnel</u>	10	76	86	-	106
4.1 President	-	1	1	8,000	8
4.2 Financial and sales manager	-	1	1	6,000	6
4.3 Accountant and clerks	-	64	64	1,200	77
4.4 Servicemen	10	10	20	750	15
5. <u>Grand total</u>	390	1,967	2,357	-	2,179
5.1 Domestic personnel					Not uniform
5.2 Foreign personnel <sup>1/</sup>					Not uniform

<sup>1/</sup> Annual wage bill of foreign personnel is dinars 200,000 over the years 1979-1981 (150,000 to be repatriated) but decreases to 150,000 dinars in 1982 and 1983 (100,000 to be repatriated). Later on, no foreign personnel will be used. The rest of the annual wage bill is paid out to domestic personnel.

Table 2. Plant Investment and Schedule of Construction<sup>1/</sup>

(in 000 dinars)

I t e m s	Y e a r s								
	1976			1977			1978		
	D <sup>2/</sup>	F <sup>3/</sup>	Total	D <sup>2/</sup>	F <sup>3/</sup>	Total	D <sup>2/</sup>	F <sup>3/</sup>	Total
1. Fixed assets	2,430	-	2,430	13,020	5,010	18,030	3,000	12,040	15,040
1.1 Equipment including installation costs	-	-	-	1,000	4,000	5,000	3,000	12,000	15,000
1.2 Buildings	2,000	-	2,000	12,000	1,000	13,000	-	-	-
1.3 Land	400	-	400	-	-	-	-	-	-
1.4 Other	30	-	30	20	10	30	-	40	40
2. Preliminary expenses (training of personnel, royalties, etc.)	100	-	100	20	30	50	-	50	50
3. Working capital	-	-	-	-	-	-	1,500	1,000	2,500
4. Total initial investment (1+2+3)	2,530	-	2,530	13,040	5,040	18,080	4,500	13,090	17,590

<sup>1/</sup> Foreign components have been converted into local currency at the official rate of exchange 1 dinar = US\$ 1. Prices of imported components include c.i.f. price, import duties and internal charges such as transport, insurance, etc.

<sup>2/</sup> Domestic

<sup>3/</sup> Foreign

Table 3. Depreciation Replacement and Residual Values

Items	Costs (in 000 dinars)	Expected lifetime from starting-up (years)	Annual depreciation	Years of depreciation	Residual value in 1988 <sup>1/</sup>
1. Fixed assets	35,550	-	2,470	-	-
1.1 Production equipment	20,000	10	2,000	1979 - 1988	-
1.2 Land	400	Non Dep.	-	-	400
1.3 Buildings	15,000	33	450	1979 - 1988	10,500
1.4 Others	100	5	20	1979 - 1983	-
2. Preliminary expenses <sup>2/</sup>	200	10	20	1979 - 1988	-
3. Working capital <sup>3/</sup>	2,500	Non Dep.	-	-	2,500
4. Total	38,200	-	2,490	-	13,400

1/ The book value in 1988 has been used for residual value since it is assumed that the plant will be going on with another cycle using the same location and buildings. The equipment component will have some scrap value in 1988 because of its negligible effect, due to the distant future and the discounting. For the same reasons, it is assumed that the price of the land will remain the same, being aware however that actually the price will change in 1988 as compared to 1976.

2/ Preliminary expenses are capitalized. If they must not be capitalized, what differs from country to country then they must be written off entirely in the first year of operation.

3/ Working capital is not written off. The entire amount enters the final year of the project's lifetime as residual value.

Table 4. Annual Income

	1979 - 1980		1981 - 1987		1988	
	Quantity	Value	Quantity	Value	Quantity	Value
	(000 meters)	(000 dinars)	(000 meters)	(000 dinars)	(000 meters)	(000 dinars)
<b>INCOME</b>						
1. Annual sales <sup>1/</sup>	22,000	13,200	28,000	16,800	28,000	16,800
2. Subsidy <sup>2/</sup>	-	1,320	-	-	-	-
3. Residual value <sup>3/</sup>	-	-	-	-	-	13,400

<sup>1/</sup> Annual sales are computed using a unit price of 0.60 dinars/m.

<sup>2/</sup> Subsidy is given by the government during the first two years of operation and amounts to 0.06 dinars/m.

<sup>3/</sup> Residual value includes land, buildings and working capital. See Table 3.

### 6.1. Investment

Table 2 represents plant investment and the schedule of construction. It illustrates an analysis of investment costs by years of implementation and type of currency. The total investment costs are estimated at 38,200,000 dinars, of which 20,070,000 in domestic currency and 18,130,000 dinars in foreign currency.

### 6.2. Operations

The operating life of the project is ten years beginning in the year 1979 and ending in 1988. Table 3 illustrates the annual depreciation of each type of assets and its residual value at the end of the project's life.

### 6.3. Income

The bulk of the poplin produced will be sold on the home market and 2.5 million meters will be exported. It is estimated that the project will operate at 80 per cent capacity in 1979 and 1980. Full capacity should be reached in 1981 and in each of the following years.

The income from sales is arrived at by multiplying the quantity produced by the unit price. Table 4 illustrates the annual income of the project consisting of sales, subsidy and the residual value. The subsidy is a government policy measure that has been approved by the coming five year plan so as to make the domestic products competitive as compared to imported fabrics during the first and most critical years of operation of the textile mill. It amounts to 0.06 dinars per meter and is given in 1979 and 1980.

### 6.4. Operating Costs

Operating costs consist of manufacturing cash expenses, marketing cash expenses, administrative cash expenses and depreciation. Table 5 gives the annual operating costs at 80 per cent capacity and at 100 per cent capacity. The material costs and wages have been split into domestic and foreign components.

### 6.5. Capital Structure

This part of project formulation has the purpose of giving a summary statement on total investment and its financing. Table 6 illustrates investment by years and financing. From preliminary contracts and other agreements, it is expected that the financing will have the following sources: equity and loans, both domestic and foreign:

- a. Domestic equity capital of 5,570,000 dinars and foreign equity capital of 1,040,000 dinars. Dividends are to be paid at ten per cent of the project's net profit after taxes and interest.
- b. Domestic loan amounting to 14,500,000 dinars is borrowed at 6.5 per cent interest and will be repaid over eight years starting from 1979.
- c. Foreign loan of 17,090,000 dinars is borrowed at eight per cent rate of interest and will be repaid over seven years starting from 1979.

### 6.6. Financial Obligations

The financing of the project creates certain financial obligations represented in interest, repayment and dividends. Table 7 gives those items annually throughout the period of operation. It is estimated through the conditions formulated earlier that interest and repayment have to be covered from 1979 until 1986 while the dividends have to be paid through the entire period of operation, i.e. from 1979 to 1988 in equal amounts each year.

### 6.7. Integrated Financial Analysis

Data presented until now in the process of project formulation serve as well for constructing the model of integrated financial analysis represented in Table 8. It is the starting point of analysing the project in terms of commercial profitability which is done in the process of project evaluation.

**Table 5. Annual Operating Costs**

(in 000 dinars)

I t e m	Y e a r s - A n n u a l l y					
	1979 - 1980			1981 - 1988		
	Variable	Fixed	Total cost	Variable	Fixed	Total cost
<b>1. Manufacturing cash expenses</b>	4,830	2,136	6,966	6,150	2,136	8,286
1.1 Materials	4,830	-	4,830	6,150	-	6,150
1.1.1 Imported <sup>1/</sup>	2,380	-	2,380	3,080	-	3,080
1.1.2 Domestic	2,450	-	2,450	3,070	-	3,070
1.2 Wages	-	1,966	1,966	-	1,966	1,966
1.2.1 Foreign <sup>2/</sup>	-	190	190	-	140	140
1.2.2 Domestic	-	1,776	1,776	-	1,826	1,826
1.3 Other	-	170	170	-	170	170
<b>2. Marketing cash expenses</b>	-	191	191	-	191	191
2.1 Materials	-	40	40	-	40	40
2.1.1 Imported <sup>1/</sup>	-	-	-	-	-	-
2.1.2 Domestic	-	40	40	-	40	40
2.2 Wages	-	50	50	-	50	50
2.2.1 Foreign <sup>2/</sup>	-	10	10	-	10	10
2.2.2 Domestic	-	40	40	-	40	40
2.3 Other	-	101	101	-	101	101
<b>3. Administrative cash expenses</b>	-	253	253	-	253	253
3.1 Materials (domestic)	-	50	50	-	50	50
3.2 Wages (domestic)	-	163	163	-	163	163
3.3 Other	-	40	40	-	40	40
<b>4. Operating cash expenses (1+2+3)</b>	4,830	2,580	7,410	6,150	2,580	8,730
<b>5. Depreciation</b>	-	2,490	2,490	-	2,490	2,490
<b>6. Total operating cost</b>	-	-	9,900	-	-	11,220
<b>7. Capacity utilization<sup>3/</sup> (in physical terms)</b>		80%			100%	
<b>8. Cost per unit of production</b>	-	-	0.45	-	-	0.40

<sup>1/</sup> Imported component of the materials has been valued at the official exchange rate, i.e. 1 dinar = 1 US\$.

<sup>2/</sup> Annual wage bill of foreign personnel over the years 1979-1981 is 200,000 dinars and decreases to 150,000 in 1982 and 1983. Later on, no foreign personnel will be used.

<sup>3/</sup> Utilization of capacity at 100% can hardly be achieved in practice. This assumption is made for the sake of simplicity only.

Table 6. Capital Structure

(in 000 dinars)

	Y e a r s			Total
	1976	1977	1978	
1. Investment	2,530	18,080	17,590	38,200
2. Financing	2,530	18,080	17,590	38,200
2.1 Equity	2,530	4,090	-	6,610
2.1.1 Domestic	2,530	3,040	-	5,570
2.1.2 Foreign <sup>1/</sup>	-	1,040	-	1,040
2.2 Loans	-	14,000	17,590	31,590
2.2.1 Domestic	-	10,000	4,500	14,500
2.2.2 Foreign <sup>1/</sup>	-	4,000	13,090	17,090
3. Additional financing needed	0	0	0	0

<sup>1/</sup> Foreign financing is valued at the official exchange rate of 1 dinar = US\$ 1. The imported equipment is financed through supplier's credit, the rest of the foreign component, by foreign equity.



Table 7. Financial Obligations

(in 000 dinars)

	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1979-1988
<b>1. Loans</b>											
<b>Repayment installments</b>	6,564	6,251	5,938	5,632	5,319	5,006	4,695	1,927	-	-	41,332
<b>Interest</b>	4,254	4,254	4,254	4,254	4,254	4,254	4,257	1,809	-	-	31,590
<b>1.1 Domestic loan</b>	2,310	1,997	1,684	1,378	1,065	752	438	118	-	-	9,742
<b>Repayment installments</b>	2,756	2,638	2,520	2,402	2,284	2,166	2,048	1,927	-	-	18,741
<b>Interest</b>	1,813	1,813	1,813	1,813	1,813	1,813	1,813	1,809	-	-	14,500
<b>1.2 Foreign loan</b>	943	825	707	589	471	353	235	118	-	-	4,241
<b>Repayment installments</b>	3,808	3,613	3,418	3,230	3,035	2,840	2,647	-	-	-	22,591
<b>Interest</b>	2,441	2,441	2,441	2,441	2,441	2,441	2,444	-	-	-	17,390
<b>2. Dividends</b>											
<b>Domestic</b>	1,367	1,172	977	789	594	399	203	-	-	-	5,501
<b>Foreign</b>	230	262	350	378	406	434	463	492	502	502	4,319
<b>Domestic</b>	184	210	280	304	325	347	370	394	402	402	3,218
<b>Foreign</b>	46	52	70	74	81	87	93	98	100	100	301
<b>3. Total (1+2)</b>	6,794	6,513	6,288	6,010	5,725	5,440	5,158	2,419	502	502	45,351

**Table 8. Integrated Financial Analysis**  
(in CCC dinars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1987	1988	
	0	1	2	3	4	5	6	7	8	9	10	11	12
1. Investment	2,530	19,090	17,590	-	-	-	-	-	-	-	-	-	-
1.1 Fixed capital	2,530	19,090	17,590	-	-	-	-	-	-	-	-	-	-
1.2 Working capital	-	-	2,500	-	-	-	-	-	-	-	-	-	-
2. Operating costs	-	-	-	12,210	11,897	12,504	13,559	12,295	11,972	11,553	11,238	11,220	11,220
2.1 Cash expenses excluding interest	-	-	-	7,410	7,410	8,730	8,730	8,730	8,730	8,730	8,730	8,730	8,730
2.2 Depreciation	-	-	-	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490
2.3 Interest	-	-	-	2,310	1,997	1,694	1,378	1,065	752	438	119	-	-
3. Income	-	-	-	14,520	14,520	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
3.1 Sales revenue	-	-	-	13,200	13,200	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
3.2 Subsidies	-	-	-	1,320	1,320	-	-	-	-	-	-	-	-
3.3 Residual value	-	-	-	-	-	-	-	-	-	-	-	-	-
4. Net cash earnings <sup>1/</sup>	-	-	-	2,310	2,623	3,895	4,202	4,515	4,829	5,142	5,452	5,760	5,800
4.1 Taxable profit (3-2)	-	-	-	-	-	390	420	451	483	514	542	561	561
4.2 Net profit after taxes and interest	-	-	-	2,310	2,623	3,505	3,782	4,064	4,345	4,629	4,915	5,022	5,022
4.3 Plus interest	-	-	-	2,310	1,997	1,694	1,378	1,065	752	433	119	-	-
4.4 Plus depreciation	-	-	-	4,620	4,620	5,190	5,160	5,129	5,097	5,066	5,034	5,022	5,022
4.5 Plus residual value	-	-	-	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490	2,490
4.6 Total	-	-	-	7,110	7,110	7,590	7,550	7,519	7,587	7,556	7,524	7,512	7,512
5. Net cash flows	(2,530)	(18,080)	(17,590)	7,110	7,110	7,590	7,550	7,519	7,587	7,556	7,524	7,512	20,512
6. Financial sources	2,530	18,080	17,590	-	-	-	-	-	-	-	-	-	-
6.1 Equity	2,530	4,000	-	-	-	-	-	-	-	-	-	-	-
6.2 Loans	-	14,080	17,590	-	-	-	-	-	-	-	-	-	-
7. Financial obligations	-	-	-	6,794	6,513	6,298	6,010	5,725	5,440	5,159	4,879	4,598	4,317
7.1 Interest charges	-	-	-	2,310	1,997	1,694	1,378	1,065	752	438	119	-	-
7.2 Repayment installments	-	-	-	4,254	4,254	4,254	4,254	4,254	4,254	4,257	4,257	4,257	4,257
7.3 Dividends	-	-	-	230	262	350	379	405	434	453	492	502	502
8. Net cash balance	0	0	0	316	597	1,392	1,540	1,894	2,147	2,399	2,652	2,905	3,158
9. Cumulative Net Cash Balance	0	0	0	316	913	2,305	3,845	5,339	7,486	10,185	13,137	16,442	20,100

<sup>1/</sup> The arrangement of the items under Row 4. Net cash earnings was made to fit the existing tax and other regulations in Peruvia, which seem to be rather complicated. In other countries this arrangement may differ, subject to existing regulations.

II. PROJECT EVALUATION  
(Commercial Profitability)

Project evaluation was done by the H.E.L.E.N.A. Research Institute in close co-operation with the National Planning Agency.

1. Investment Profitability Analysis

1.1 Simple Rate of Return

The simple rate of return is defined as the ratio of net profit in a normal year to the initial investment. The rate is computed on total capital and on equity capital invested so as to assess the profitability of total investment including equity and loans and profitability of only equity capital invested.

The items needed for calculating the simple rate of return are presented in Table 9. Nineteen-eighty-two was chosen as the normal year of the project since it is the year in which the project has reached its attainable capacity and the loan repayment is still going on.

Table 9. Simple Rate of Return (R+R<sub>e</sub>)

		<u>Amount in 000 dinars</u>
1. Initial investment (Row 1, t.8)	(I)	38,200
2. Equity capital (Row 6.1, t.8)	(Q)	6,610
3. Net profit after taxes and interest (Row 4.2, t.8)	(F)	3,782
4. Net profit before interest - after taxes (Row 4.3, t.8c)	(F+Y)	5,160

The rate is presented either as:

$$R = \frac{F+Y}{I} \frac{5,160}{38,200} \times 100 = 13.5\%$$

$$R_e = \frac{F}{Q} \frac{3,782}{6,610} \times 100 = 57.2\%$$

where: R = simple rate of return on total investment.

R<sub>e</sub> = simple rate of return on equity capital.

Since the rates R and R<sub>e</sub> are higher than the rate of interest prevailing in the capital market, which is 6.5% at local and 8% at foreign, on the basis of this criterion the project is commercially acceptable.

### 1.2 Pay-back Period

With the help of this method, the time needed for the project to recover its total investment was evaluated.

Table 10 presents the way of calculating by subtracting from the initial investment the annual net cash earnings.

The investment will be recovered between year 7 and year 8 or in somewhat more than eight years, and on the basis of net profit (Table 8, Row 4.2), in 11 years. On the basis of this indicator, the project is acceptable since the past experience in this sector has shown that other projects take longer to recover the investments.

### 1.3 Net Present Value

The net present value is the difference between the present value of the project's future cash inflows and the present value of its future cash outflows. It measures the magnitude of the net cash flows.

Table 11 presents the calculation of the net present value of the project. With this method the whole life of the project has been taken into account. The second interesting point to be made is that at this stage of project evaluation we are concerned with assessing its investment profitability, so only real resource flows have been taken into consideration. Therefore, any flows connected with financial transactions, such as loans on the cash inflow side and financial obligations on the cash outflow side are omitted from the analysis. In addition to this, the cash outflows do not comprise depreciation in order not to account twice for the investment as cash outflows, i.e., to avoid double counting of the investment outlays.

The discount rate used is 7.5 per cent since it is the rate of interest prevailing in the capital market.

The net present value is calculated as follows:

$$NPV = \sum_{t=1}^n \frac{(CI - DC)_t}{(1 + i)^t} = 15,413,000$$

Table 10. Pay-Back Period

(in 000 dinars)

	Nominal amount	Uncovered capital at the end of the year
I. Initial investment (I) (row 1, t.8)	38,200	-
Year 0	2,530	-
Year 1	18,080	-
Year 2	17,590	-
II. Annual net cash earnings (E) (row 4, t.8)		
Year 0	-	2,530
Year 1	-	20,610
Year 2	-	38,200
Year 3	7,110	31,090
Year 4	7,110	23,980
Year 5	7,680	16,300
Year 6	7,650	8,650
Year 7	7,619	1,031
Year 8	7,587	- 6,556

Table 11. Net Cash Flows  
(in 000 dollars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
	0	1	2	3	4	5	6	7	8	9	10	11	12
<b>I. CASH INFLOWS (CI)</b>													
1. Income (row 3, T. 8)	-	-	-	14,520	14,520	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
1.1 Sales revenue	-	-	-	13,200	13,200	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
1.2 Subsidies	-	-	-	1,320	1,320	-	-	-	-	-	-	-	-
1.3 Residual value	-	-	-	-	-	-	-	-	-	-	-	-	13,400
<b>II. CASH OUTFLOWS (CO)</b>													
1. Initial investment (row 1, T. 8)	2,530	18,080	17,590	7,410	7,410	9,120	9,150	9,131	9,213	9,244	9,276	9,288	9,318
1.1 Fixed capital	2,530	18,080	15,090	-	-	-	-	-	-	-	-	-	-
1.2 Working capital	-	-	2,500	-	-	-	-	-	-	-	-	-	-
2. Cash expenses excluding interest (row 2.1, T. 5)	-	-	-	7,410	7,410	8,730	8,730	8,730	8,730	8,730	8,730	8,730	8,730
3. Taxes (row following 4.1, T. 8)	-	-	-	-	-	390	420	451	483	514	546	558	528
<b>III. NET CASH FLOWS (row 5, T. 8)</b>													
	(2,530)	(18,080)	(17,590)	7,110	7,110	7,680	7,650	7,619	7,587	7,556	7,524	7,512	20,512
IV. Discount factors at 7.5% discount rate	1	0.930	0.865	0.805	0.749	0.697	0.648	0.603	0.561	0.522	0.485	0.451	0.420
<b>V. Present value of the net cash flows (row 6, T. 8)</b>													
	(2,530)	(16,814)	(15,215)	5,723	5,385	5,353	4,957	4,594	4,256	3,944	3,649	3,388	8,733

Since the net present value is positive, the project is acceptable.

Relating the net present value to the present value of total investment, we have:

$$NPVR = \frac{NPV}{\sum_{t=0}^n \frac{TI_t}{(1+i)^t}} = \frac{15,413,000}{34,559,000} = 0.45$$

This ratio shows that a discounted unit of total investment in the textile mill creates 0.45 units of net present value. On the basis of this criterion, the project is also acceptable since the present value ratio is relatively high.

#### 1.4 Internal Rate of Return

By definition, the internal rate of return is the rate of discount which reduces the net present value of a project to zero. In other words, it is the rate at which the capital invested will be compounded over the lifetime of the project. Table 12 illustrates the computation of the internal rate of return. The net present values at different discount rates are as follows:

Discount Rate	Net Present Value of the Project (dinars)
7.5	15,413,000
9	11,141,000
14	768,000
15	- 1,385,000

This means that the internal rate of return is between 14% and 15%. Using the formula for interpolation for close enough intervals, we arrive at the internal rate of return as follows:

$$i_x = i_1 + \frac{PV(i_2 - i_1)}{PV + NV}$$

$$i_x = 14 + \frac{768,000 (15-14)}{768,000 + 1,385,000} = 14 + 0.36 = 14.36$$

Table 12. Calculation of Internal Rate of Return

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
III. Net Cash Flows (Row III, T.11)	(2,530)	(19,030)	(17,590)	7,110	7,110	7,680	7,650	7,619	7,597	7,555	7,524	7,512	20,512
Discount factors at 9%	1	0.917	0.842	0.772	0.709	0.650	0.596	0.547	0.502	0.460	0.422	0.388	0.355
NPV = 11,141	(2,530)	(16,579)	(14,811)	5,489	5,034	4,992	4,559	4,167	3,909	3,475	3,175	2,915	7,445
Discount factors at 10%	1	0.870	0.756	0.658	0.572	0.497	0.432	0.367	0.327	0.284	0.247	0.215	0.187
NPV = -1,385	(2,530)	(15,730)	(13,223)	4,673	4,067	3,817	3,305	2,796	2,481	2,145	1,859	1,615	3,910
Discount factors at 10%	1	0.877	0.769	0.675	0.592	0.519	0.456	0.400	0.351	0.308	0.270	0.237	0.203
NPV = 768	(2,530)	(15,856)	(13,527)	4,799	4,209	3,986	3,488	3,048	2,663	2,327	2,031	1,730	4,350



- where  $i_r$  = internal rate of return of the project.  
PV = positive value of NPV at the lower discount rate.  
NV = negative value of NPV at the higher discount rate in absolute terms, i.e. the minus sign neglected.  
 $i_1$  = the lower discount rate at which NPV is still positive but close to zero.  
 $i_2$  = the higher rate of discount at which NPV is already negative, but close to zero.

Since the internal rate of return is 14.36 per cent, which is the expected return of capital invested, and is considerably higher than the rate of interest on loans for this project, it should be accepted from the commercial standpoint if no better project is at hand.

## 2. Financial Analysis

### 2.1 Liquidity Analysis

In this part of the analysis, the objective is to trace the project's cash balance in each year. Therefore, in the financial analysis all outlays and all receipts which affect the project's cash balance are included, which means that additional cash items concerned with financial transactions have been included in the liquidity analysis of the textile mill, such as financial obligations (interest charges, repayment installments, dividends) and financial sources (equity, loans).

A liquidity analysis is done with the help of the net cash balance model presented in Table 13. Liquidity is evaluated on a year-to-year basis and therefore the annual cash positions are taken into consideration in their nominal values.

The net cash balance over the years 1976-1978, i.e. during the implementation period, is zero. This indicates that the timing of financial sources is well matched to that of the investment outlays and there will be no financial problem to carry on the implementation of the project.

In the years after 1979 until 1988, or during its running in and operating period, the project shows positive net cash balance. There it is liquid and is able to meet all the cash outflows leaving the surplus which amounts to 316,000 dinars in 1979 and increases over the later years.

Table 13. Net Cash Balances

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
	C	1	2	3	4	5	6	7	8	9	10	11	12
<b>I. CASH INFLOWS (CI)</b>													
1. Income (row 3, T. 8)	-	-	-	14,520	14,520	16,800	16,800	16,800	16,800	16,900	16,900	16,900	16,900
1.1 Sales Revenue	-	-	-	13,200	13,200	16,800	16,800	16,800	16,800	16,800	16,800	16,800	16,800
1.2 Subsidies	-	-	-	1,320	1,320	-	-	-	-	-	-	-	-
1.3 Residual value	-	-	-	-	-	-	-	-	-	-	-	-	13,400
2. Financial resources (Row 6, T. 8)	2,530	19,080	17,590	-	-	-	-	-	-	-	-	-	-
2.1 Equity	2,530	4,090	-	-	-	-	-	-	-	-	-	-	-
2.2 Loans	-	14,000	17,590	-	-	-	-	-	-	-	-	-	-
<b>II. CASH OUTFLAWS (CO)</b>													
1. Investment (row 1, T. 8)	2,530	18,080	17,590	-	-	-	-	-	-	-	-	-	-
1.1 Fixed capital	2,530	18,080	15,090	-	-	-	-	-	-	-	-	-	-
1.2 Working capital	-	-	2,500	-	-	-	-	-	-	-	-	-	-
2. Cash expenses excluding interest (row 2.1, T. 8)	-	-	-	7,410	7,410	8,730	8,730	8,730	8,730	8,730	8,730	8,730	8,730
3. Taxes (Sub-row to Row 4.1, Table 8)	-	-	-	-	-	390	420	451	493	514	545	558	539
4. Financial obligations (row 7, T. 8)	-	-	-	6,794	6,513	6,288	6,010	7,425	5,440	5,158	2,419	502	502
4.1 Interest charges	-	-	-	2,310	1,997	1,684	1,378	1,065	752	438	113	-	-
4.2 Repayment installments	-	-	-	4,254	4,254	4,254	4,254	4,254	4,254	4,257	1,509	-	-
4.3 Dividends	-	-	-	230	262	350	378	405	434	453	492	502	502
<b>III. NET CASH BALANCE (row 8, T. 8)</b>													
	0	0	0	316	597	1,392	1,640	1,894	2,147	2,359	5,105	7,010	20,470
<b>IV. Cumulative net cash balance (row 9, T. 8)</b>													
	0	0	0	316	513	2,305	3,945	5,839	7,986	10,384	15,489	22,499	42,909

However, it has to be pointed out that the subsidies of 0.06 dinars per meter were given by the government in 1979 and 1980. In the absence of subsidies, the net cash balance in these two years would turn out to be negative and the project would not be liquid, showing a considerable surplus of financial assets as one gets closer to the end of the project's life. Hence, the financial management has a good opportunity to invest this surplus of financial assets outside the project but under the condition that the repayment period does not exceed 1988 since in 1989 the second cycle of the project will probably start.

Therefore, the project is liquid over its entire life and able to meet all its obligations, but the investor should pay special attention to the years 1979 and 1980 not to lower its production or to increase the operating costs of the project.

## 2.2. Capital structure analysis

In order to analyze the project's capital structure, the debt equity ratio is determined as follows:

$$R_{de} = \frac{L}{Q} = \frac{31,590,000}{6,610,000} = 4.78$$

where  $R_{de}$  = debt-equity ratio.

L = the amount of loans taken by the project (row 6.2 T.8).

Q = the amount of the equity capital engaged by the project (row 6.1, T.8).

The project's debt-equity ratio shows that the capital obtained through the loans is more than four times larger than that received from the shareholders. In spite of this, the capital structure is considered to be adequate, as neither interest charges nor repayment installments provoke short-term borrowing in any years of the project's life.

### III. PROJECT EVALUATION (National Profitability)

Having assessed the acceptability of the project from the private investor's point of view, the expert group from H.E.L.E.N.A. Research Institute has proceeded to judge whether it was nationally profitable. The contribution of the project to the objectives of the social and economic development of the country has to be appraised. Since the Five Year Development Plan of Perovia considers building up the development and growth potential as the main national objective, special attention has to be paid to the project's contribution to the formation of value added in Perovia, and more precisely to the national value added due to the capital and foreign exchange scarcities. But other development objectives, such as increasing employment, improving the balance of payments situation, mobilizing idle capacities, improving the material position of wage earners, improving the international competitiveness of poplin exports, should not be neglected either as they appear to be obstacles for faster social and economic development of the country. Hence, the assessment of the cotton textile mill's national profitability will encounter its contribution to the net national value added, but also to other goals of social and economic development.

#### 1. Project's contribution to the national value added

There are more projects competing for the capital allocated to investments in textile industry, and the choice of the most acceptable among them has to be made. Therefore, we shall test first the absolute efficiency of the cotton textile mill to see whether it is acceptable, if it were the only project competing for disposable resources. Then we have to go on and measure its relative efficiency or acceptability in comparison with all other projects in competition. In accordance with this, our evaluation procedure will be divided into three steps: determining the project's net national value, testing its absolute efficiency and finally measuring the relative efficiency or the project ranking.

1.1. Determination of the project's net national value added

Before testing the absolute and relative efficiency of the cotton textile mill, it is necessary first to determine the net national value added generated over its lifetime. The value added generated will be found out as the difference between the value of its output and the value of the material inputs used, the latter including capital inputs and current material inputs. Then the amount of the repatriated payments has to be deducted in order to arrive at the national value added.

The computation of the net national value added generated by the textile mill is made first at actual market prices and official rate of foreign exchange (Table 14). This provides an opportunity to compare:

- a. the net benefits from the commercial point of view (Table 11) with the net benefits from the national point of view (Table 14) under the same prices and exchange rates. The difference is due to the difference between "commercial benefit" and "national benefit". The net cash flow (row III, Table 11) comprises net profit after taxes and interest, plus depreciation, plus residual value (if any). The net national value added comprises wages and social surplus. Social surplus includes interest, taxes, dividends, undistributed profit in possession of the firm, which remains within the boundaries of the country.
- b. the net benefits from the national point of view computed with actual prices and official rate of exchange (Table 14) and the same net benefits computed under adjusted prices for inputs and outputs and adjusted rate of foreign exchange (Table 17).

Project formulation has offered the proper breakdown of the output and inputs into domestic and foreign components and the value of foreign components is easily corrected by applying the adjusted rate of foreign exchange.

**Table 14. Integrated Value Added Analysis**  
(at market prices)

Item	1976	1977	1978	1979	1970	1991	1982	1983	1984	1985	1985	1987	1988
	0	1	2	3	4	5	5	7	8	9	10	11	12
<b>I. Value of Output</b>													
1. Exports	-	-	-	14,520	14,520	15,800	16,900	16,900	16,900	16,300	16,300	16,200	27,700
2. Import substitution	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
3. Subsidies	-	-	-	11,700	11,700	15,300	15,300	15,300	15,300	15,300	15,300	15,300	15,300
4. Residual value	-	-	-	1,320	1,320	-	-	-	-	-	-	-	10,200
<b>II. Value of Material Inputs</b>	2,530	18,080	17,590	5,090	5,090	6,410	6,410	6,410	6,410	6,410	6,410	6,410	6,410
1. Investment	2,530	18,080	17,590	-	-	-	-	-	-	-	-	-	-
1.1 Imported	-	5,040	13,090	-	-	-	-	-	-	-	-	-	-
1.2 Domestically procured	2,530	13,040	4,500	-	-	-	-	-	-	-	-	-	-
2. Current material inputs	-	-	-	5,090	5,090	6,410	6,410	6,410	6,410	6,410	6,410	6,410	6,410
2.1 Imported	-	-	-	2,330	2,330	3,030	3,030	3,030	3,030	3,030	3,030	3,030	3,030
2.2 Domestically procured	-	-	-	2,540	2,540	3,160	3,160	3,160	3,160	3,160	3,160	3,160	3,160
2.3 Infrastructural services	-	-	-	170	170	170	170	170	170	170	170	170	170
<b>III. Net Domestic Value Added (I-II)</b>	(2,530)	(18,080)	(17,590)	9,430	9,430	10,390	10,390	10,390	10,390	10,390	10,390	10,350	21,250
<b>IV. Repatriated Payments</b>	-	30	50	1,563	1,374	1,197	963	775	486	296	93	100	100
1. Wages	-	-	-	150	150	150	100	100	-	-	-	-	-
2. Profits (dividends)	-	-	-	46	52	70	74	81	87	93	93	100	100
3. Interest	-	-	-	1,367	1,172	577	789	594	359	203	-	-	-
4. Others (royalties, etc.)	-	30	50	-	-	-	-	-	-	-	-	-	-
<b>V. Net National Value Added (III-IV)</b>	(2,530)	(18,110)	(17,640)	7,867	8,056	9,193	9,427	9,615	9,904	10,094	10,292	10,250	21,150
1. Wages	-	-	-	2,029	2,029	2,029	2,079	2,079	2,179	2,179	2,179	2,179	2,179
2. Social surplus	-	-	-	5,338	6,027	7,164	7,348	7,536	7,725	7,915	8,113	8,111	15,011

It needs to be pointed out that at an earlier stage the investor anticipated to sell all the production on the domestic market since domestic demand for poplin exceeds by far the quantities available on the market. But the experts from H.E.L.E.N.A. Research Institute, being well informed about the shortage of foreign exchange in Perovia, suggested that a portion of production be exported which was readily accepted by the National Planning Agency. Furthermore, the National Planning Agency proposes to the investor to sign a long-term contract for exporting 2,500,000 meters of poplin at the F.O.B. price of US\$ 0.60 over the period 1979-1988. Therefore, the sales of the cotton textile mill will be as stated in Table 15:

Table 15. Annual Sales

I t e m	1979 - 1980			1981 - 1988		
	Quantity in 000 meters	Price dinars/m	Sales in 000 dinars	Quantity in 000 meters	Price dinars/m	Sales in 000 dinars
1. Exports <sup>1/</sup>	2,500	0.6	1,500	2,500	0.6	1,500
2. Domestically marketed	19,500	0.6	11,700	25,500	0.6	15,300
Total (1 + 2)	22,000	-	13,200	28,000	-	16,800

<sup>1/</sup> The value of exports has been converted into domestic currency at the official rate of exchange of 1 dinar = US\$ 1.

After the separation of the quantities to be exported from those to be sold on the domestic market, all information for applying pricing rules appropriately is available. But in doing the evaluation, the team was confronted with the problem of finding the adjusted rate of exchange as all foreign components have to be converted into dinars not at the official but at an adjusted rate of exchange. The team found that the National Planning Agency of Perovia did not set up the adjusted rate of exchange as a national parameter. Therefore, first it must be decided whether to use the adjusted rate of exchange or not at all. In the publication "Economic Survey of Perovia", issued annually by the National Planning Agency among other information of an economic nature, the balance of payments situation over the last ten years,

Table 16. Peruvia's Balance of Payments 1972-1976 (current accounts)

(in million dinars)

Years	E X P O R T S		I M P O R T S		Shadow Rate of Exchange
	Goods	Invisible	Goods	Invisible	
1972	8,020	310	9,653	510	1.220
1973	8,690	350	10,323	525	1.200
1974	9,480	380	11,230	582	1.198
1975	10,030	400	11,895	611	1.199
1976	10,660	450	12,712	598	1.199
1972-1976	46,880	1,890	55,813	2,826	1.202
			Total	Total	
			48,770	58,639	
			10,430	12,506	
			11,110	13,310	
			9,040	10,848	
			8,330	10,163	



together with the projected one for 1976 was shown. The aggregated information concerning the exports and imports are reproduced in Table 16.

It is obvious from Table 16 that there is a chronic balance of payments deficit in Peruvia in the period 1972-1976, and it is estimated that the situation will not change substantially in the years to come. For this reason the demand for foreign exchange exceeds its supply and the official rate of exchange is less than the true value of the foreign exchange from the national point of view. The balance of payments deficit will continue in the foreseeable future, and therefore the adjusted rate of foreign exchange should be used in the national profitability evaluation of the cotton textile mill.

On the basis of available information, the adjusted rate of exchange premium will be estimated as

$$P^F = R^F \left( 1 + \frac{M-B}{B} \right),$$

where  $P^F$  - the adjusted rate of foreign exchange

$R^F$  - official rate of foreign exchange

$M$  - the value of imports in the current accounts

$B$  - the value of exports in the current accounts.

In doing so, we shall confine ourselves to the last five years; for 1972 the adjusted rate of exchange is

$$P^F = 1 \left( 1 + \frac{10,163 - 8,330}{8,330} \right) = 1.22$$

when the imports, exports and deficit are converted into dinars at the official rate of exchange and expressed in millions of dinars.

Table 16 shows that the adjusted rate of foreign exchange varies from year to year and this is a reason to find an average one for the whole period 1972-1976. If it is estimated on the basis of a five-year period, it amounts to 1.202. This means that the adjusted rate of foreign exchange is 20.2 per cent higher than the official rate. For further analysis we shall adopt the rate 1.2 dinars = US\$ 1.

Having determined the adjusted rate of exchange, we can proceed to the proper evaluation of outputs and inputs, which is presented in Table 17. The value of outputs consists of exports at F.O.B. price converted into dinars at the adjusted rate of exchange, 1.2 dinars = US\$ 1. The poplin sold on domestic market is actually import substituting and is priced at the price which includes the C.I.F. price of poplin, its import duties, transportation and insurance cost. Of course, its C.I.F. price was converted into dinars at the adjusted rate of foreign exchange. Subsidies are introduced at their nominal values. Residual value includes only the value of buildings and land at the end of 1988, which will probably be used for a new cycle of production as from 1989. During discussions with the investor, it was found that a relatively short life of the project is taken, which is equal to the duration of equipment. This was done on purpose to follow comparatively rapid technological progress in the textile industry. Hence, the investor will not undertake any major replacement, but will start the second cycle with the existing buildings and new equipment at the present location. The fact that the time horizon of the investor's development policy is longer than the life span of the project shows that the project will be operated by reliable and competent people, so this fact was brought to the attention of the Peruvian government.

Data concerning the material inputs were readily introduced in Table 17: all imported components valued at the prices including their C.I.F. price, import duties as well as transport and insurance cost, and converted into domestic currency at the adjusted rate of foreign exchange. Among the investments the adjusted rate of exchange was applied only to the imported component of fixed capital.

Repatriated payments were given as it was formulated by the investor and converted in dinars at the adjusted rate of exchange.

Net national value added stated in Table 17, row V, is broken down into wages and social surplus for further analysis.

**Table 17. Integrated Value Added Analysis**  
(at corrected prices)

(in 000 dinars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
	0	1	2	3	4	5	6	7	8	9	10	11	12
<b>I. VALUE OF OUTPUT<sup>1/</sup></b>													
1. Exports	-	-	-	17,150	17,160	20,150	20,150	20,150	20,150	20,150	20,150	20,150	31,000
2. Import substitution	-	-	-	1,800	1,300	1,300	1,800	1,800	1,800	1,800	1,800	1,800	1,800
3. Subsidies	-	-	-	14,000	14,010	18,350	18,350	18,350	18,350	18,350	18,350	18,350	18,350
4. Residual value	-	-	-	1,320	1,320	-	-	-	-	-	-	-	10,900
<b>II. VALUE OF MATERIAL INPUTS<sup>1/</sup></b>	2,530	19,088	17,508	5,566	5,566	7,026	7,026	7,026	7,026	7,026	7,026	7,026	7,026
1. Investment	2,530	19,088	17,508	-	-	-	-	-	-	-	-	-	-
1.1 Imported	-	5,048	14,508	-	-	-	-	-	-	-	-	-	-
1.2 Domestically produced	2,530	13,040	3,000	-	-	-	-	-	-	-	-	-	-
2. Current material inputs	-	-	-	5,566	5,566	7,026	7,026	7,026	7,026	7,026	7,026	7,026	7,026
2.1 Imported	-	-	-	2,956	2,956	3,696	3,696	3,696	3,696	3,696	3,696	3,696	3,696
2.2 Domestically produced	-	-	-	2,540	2,540	3,160	3,160	3,160	3,160	3,160	3,160	3,160	3,160
2.3 Infrastructural services	-	-	-	170	170	170	170	170	170	170	170	170	170
<b>III. NET DOMESTIC VALUE ADDED</b>	(2,530)	(19,088)	(17,508)	11,594	13,134	13,134	13,134	13,134	13,134	13,134	13,134	13,134	24,034
<b>IV. REPATRIATED PAYMENTS<sup>1/</sup></b>	-	36	60	1,375	1,648	1,435	1,158	930	583	355	118	120	120
1. Wages	-	-	-	180	180	180	120	120	-	-	-	-	-
2. Profits (dividends)	-	-	-	55	62	84	91	97	104	111	113	120	120
3. Interest	-	-	-	1,640	1,405	1,172	947	713	479	244	-	-	-
4. Others (royalties, etc.)	-	36	60	-	-	-	-	-	-	-	-	-	-
<b>V. NET NATIONAL VALUE ADDED</b>	(2,530)	(19,088)	(17,508)	9,719	9,946	11,698	11,976	12,204	12,551	12,779	13,015	13,014	23,514
1. Wages	-	-	-	2,029	2,029	2,029	2,079	2,079	2,179	2,179	2,179	2,179	2,179
2. Social surplus	-	-	-	7,690	7,917	9,669	9,897	10,125	10,372	10,600	10,837	10,835	21,335

<sup>1/</sup> Import substitution and exported output, imported investment and current material inputs as well as repatriated payments are valued at the adjusted rate of foreign exchange 1.2 dinars = USC 1.

One notices the difference between the annual magnitudes of the value added computed using the official rate of exchange (Table 14) on one hand and the value added computed with the adjusted rate of exchange (Table 17) on the other. This is so because the adjusted rate of exchange was applied to all imported materials and investment, exports of output, import substitution as well as repatriated payments. Through exports and import substitution the adjusted rate of exchange increases the value added while through imported materials, investment and repatriated payments the application of the adjusted rate of exchange brings down the net value added. In this way we obtain a more realistic picture of the true social value of the net national value added generated by the textile mill project.

Having determined the nominal values of net national value added throughout the project's life, we proceed to the absolute efficiency test.

#### 1.2 Absolute efficiency test of the project

Testing the absolute efficiency of the textile mill project comprises the comparison of the project's net benefits with the resources used by the project. More precisely, the project's net national value added has to cover wages and provide some social surplus in order to continue with the evaluation. This comparison will be done for the normal year and for the whole economic life of the textile mill.

If the absolute efficiency test is based on a normal year data, the project has to satisfy the following condition:

$$E_s = O - (M1 + D) > W,$$

- where  $E_s$  = absolute efficiency test for a single normal year;  
 $O$  = value of output in a normal year;  
 $M1$  = value of current material inputs in a normal year;  
 $D$  = amount of depreciation in a normal year;  
 $W$  = total wages paid in a normal year to local and expatriate labour.

Since 1982 has been chosen as the normal year of the textile cotton mill, the above condition turns out to be:<sup>1/</sup>

$$E_n = 20,160,000 - (7,026,000 + 2,490,000) > 2,179,000$$

or 
$$E_n = 10,644,000 > 2,179,000.$$

Therefore, the project passes the absolute efficiency test since its net national value added covers fully the wages in this year and generates 8,465,000 dinars of social surplus in terms of interest, dividends, taxes, rents and undistributed profit. But in order to be quite positive, the expert group has carried out the absolute efficiency test on the basis of the whole economic life of the textile mill.

If the absolute efficiency test is performed on the basis of the whole-life of the project, the condition a project has to meet is given by the expression

$$E_n = \sum_{t=0}^n (VA)_t a_t \geq \sum_{t=0}^n W_t a_t$$

- where  $E_n$  = absolute efficiency test indicator;  
 $(VA)_t$  = net national value added expected to be generated in the year  $t$  of the project's life;  
 $W_t$  = expected wages in year  $t$  (domestic and those of foreigners which are not repatriated). Repatriated wages are excluded.  
 $a_t$  = discounting factor in the year  $t$  derived from the social rate of discount.

Therefore, if the project is to pass the absolute efficiency test, its net national value added generated over its whole life has to be at least equal to the wages paid out over the same period of time, or possibly larger.

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<sup>1/</sup> All figures are stated in dinars.

Data necessary for the above computation are given in Table 17 containing the nominal annual values of the wages and the net national value added. For the absolute efficiency test the above nominal annual values have to be discounted to their present values, applying a social rate of discount. Such a discount rate was not readily available to the team of project evaluators.

Unfortunately, neither the National Planning Agency of Perovia nor the Perovian Economic Institute did any research related directly to establishing the social rate of discount as a national parameter.

However, some research was done concerning the internal and external political and economic present and future situation. On the basis of this information the evaluators made the following conclusions:

- The annual rate of inflation in Perovia has been running over the last five years between 15 per cent and 20 per cent. At the same time, the prices have been increasing on the world market at a rate of 10 per cent to 15 per cent.
- The long-term loans formerly taken by Perovian investors abroad were given usually at the rate of interest of 12 per cent, which appears to be the most frequent interest rate charged on these loans in the capital market with which Perovia deals. Furthermore, there is no sign that this rate will change substantially in the foreseeable future;
- The observed rates of return on the long-term investments in Perovia have been about 10 per cent and are expected to stay more or less the same;
- The Five-Year Development Plan of Perovia, which was accepted by the Federal Parliament six months ago, has put much emphasis on social and economic development; especially points out the need to improve the country's growth potential but also asks for an effort to reach economic independence as much as possible, i.e. to start or to develop further the import substituting industries. Also, it has been decided to discontinue the exports of Perovian raw materials and intermediate goods and using them in domestic industries to promote the export of final products;

- The future political situation in this part of the world seems to be relatively risky since some of the developed countries are interested very much in Perovian and neighbouring countries' natural resources. In addition to this, the Perovian Government intends to nationalize some large firms belonging to the foreigners and this may bring some troubles, too.

Starting with this general information, the evaluators have concluded that the appropriate premium for a domestic project should be rather high. The team came to this conclusion taking into account the pronounced prospective domestic and foreign inflation, the relative political instability and the strong desire for development of import substituting industries. In such a way the social discount rate would be lower and more projects would be feasible. The premium for domestic projects in accordance with this was set up at 0.25.

The social rate of discount was then determined using the rate of interest in the relevant world capital market and the premium for domestic projects as follows:

$$SRD = r_w - P_d r_w$$

where SRD = social rate of discount

$r_w$  = rate of interest in the relevant world capital market

$P_d$  = premium for domestic projects

Having introduced the appropriate value in the above expression, the social rate of discount was determined as:

$$SRD = 12 - 0.25 \times 12 = 9\%$$

Therefore, the social rate of discount to be applied is nine per cent and all nominal values of national value added, wages and investment are discounted at nine per cent and presented in Table 18.

The summation of the discounted values stated in the last column of Table 18 shows that:

Table 19. Elements for Absolute and Relative Efficiency Test

(in 000 dinars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1976-1983
	0	1	2	3	4	5	6	7	8	9	10	11	12	C-12
1. Terminal values of wages (row V.1, Table 17)	-	-	-	2,029	2,029	2,029	2,079	2,079	2,179	2,179	2,179	2,179	2,179	-
2. Terminal values of investment (row II.1, Table 17)	2,530	19,039	17,503	-	-	-	-	-	-	-	-	-	-	-
3. Terminal values of net national value added (row V, Table 17)	(2,530)	(19,039)	(17,503)	9,719	9,946	11,698	11,976	12,204	12,551	12,779	13,016	13,016	23,914	-
4. Discounting factors at the social rate of discount 9%	1	0.917	0.842	0.772	0.703	0.650	0.596	0.547	0.502	0.460	0.422	0.388	0.361	-
5. Discounted values of wages (1 x 4)	-	-	-	1,566	1,436	1,319	1,239	1,137	1,094	1,002	919	845	775	11,333
6. Discounted values of investments (2 x 4)	2,530	17,504	14,742	-	-	-	-	-	-	-	-	-	-	34,775
7. Discounted values of the net national values added (3 x 4)	(2,530)	(17,504)	(14,742)	7,503	7,042	7,604	7,138	6,676	6,301	5,879	5,493	5,019	8,513	32,421



$$\sum_{t=0}^{12} (VA)_t a_t = 32,421,000$$

$$\sum_{t=0}^{12} W_t a_t = 11,333,000$$

Having introduced the above amounts in the absolute efficiency formula, we obtain

$$E = 32,421,000 \geq 11,333,000.$$

Thus, the absolute efficiency test of the cotton textile mill shows that the net national value added generated over its lifetime exceeds the wages during this period by 21,088,000 dinars, which is the social surplus. It is to say that the same conclusion, but more founded, has been reached as before when testing the absolute efficiency on the normal year basis. Since this project has passed the absolute efficiency test, the analysis is continued, carrying out the relative efficiency test in order to compare it to other competing projects in the textile industry.

### 1.3 Relative efficiency test of the project

The objective of the relative efficiency test is to find an indicator for judging which project generates maximum net national value added relative to the investments used, which are the most scarce factors in Peruvia. On this basis, all projects competing for the limited capital resources may be ranked and a decision taken with regard to their acceptance for implementation or rejection. The relative efficiency test indicator may be arrived at by dividing the discounted net national value added generated by the textile mill project by the discounted investments in fixed capital, indicated as follows:

$$E_o = \frac{\sum_{t=0}^n (VA)_t a_t}{\sum_{t=0}^n I_t a_t}$$

- where  $E_o$  - relative efficiency test indicator;  
 $(VA)_t$  - net national value added generated in the year  $t$  of the project's life;  
 $I_t$  - investments in fixed capital in the year  $t$  of the project's life;  
 $a_t$  - discounting factor in the year  $t$  derived from the present value tables.

Introducing the data from Table 18 into the above expression gives the following result:

$$E_o = \frac{32,421,000}{34,776,000} = 0.93$$

Therefore, a unit of investments in fixed capital, when discounted to the present value, generates 0.93 units of discounted net national value added. This ratio in itself is relatively high. It is also higher than the ratios of two other alternative textile projects being examined by the Peruvian authorities. Therefore, the textile cotton mill passes the relative efficiency test.

In spite of the fact that the project contributes considerably to the national income in terms of net national value generated, the evaluation team felt that its impact on other national economic and social objectives should also be examined. This was readily supported and accepted by the Ministry of Industry and the National Planning Agency of Peruvia.

## 2. Evaluation of the Project in the Light of Other Development Objectives

### 2.1 Introduction

Up to now the evaluation has been oriented toward appraising the project's contribution to the national value added of Perovia. However, it remains to be seen whether this project is justified when the other development objectives are considered.

The present stage of social and economic development of Perovia suggests, and this was clearly stated by the Five Year Development Plan of Perovia, that the project's impact on employment, distribution among social groups, balance of payments position, better usage of idle capacity in the country and international competitiveness of poplin exports should be viewed as very important, too. Consequently, the evaluation was oriented toward the estimation of the project's employment effect, distribution effect, net foreign exchange effect, idle capacity effect and international competitiveness as well.

### 2.2 Employment Effect of the Project

Measuring the employment effect of the cotton textile mill will, in addition to the project itself, involve the sectors directly linked either at the input or at the output side. In such a way, the total number of workers additionally employed will be assessed. These new jobs will be created only if the corresponding investment outlays take place. Keeping this in mind, the employment effect will be estimated as:

$$Z_e = \frac{W_u + W_s}{TI}$$

- where  $Z_e$  = employment effect of the project;  
 $W_u$  = total number of unskilled workers additionally employed;  
 $W_s$  = total number of skilled workers additionally employed;  
 $TI$  = total investment outlays needed to open these new job opportunities.

Partly from the formulation of the cotton textile mill project and partly after making a special inquiry, the evaluator gathered the necessary information for computing the employment effect, which is presented in Table 19.

Table 19. Elements for the Employment Effect Estimation

Location of Effect	Number of Workers Employed			Capital invested (in 000 dinars)
	Unskilled workers	Skilled workers	Total	
1. Cotton yarn mill	390	1,967	2,357	38,200
2. Production of inputs	34	-	34	55
- Chemicals	11	-	11	50
- Services	23	-	23	5
3. Clothing industry	97	15	112	202
4. Total (1 + 2 + 3)	521	1,982	2,503	38,457

The cotton textile mill will, therefore, directly and indirectly create 2,503 new job opportunities, but for this 38,457,000 dinars need to be invested. By introducing this information in the expression for the employment effect we get:

$$Z_e = \frac{521 + 1,982}{38,457,000} = 0.0664$$

showing that a million of investments will open 66 job opportunities. After comparison with the employment effect from other alternative projects, this one was found to be acceptable since it creates more job opportunities per unit of capital invested.

### 2.3 Distribution Effect of the Project

In evaluating the distribution effect of the cotton textile mill, we are interested in the distribution of the value added between the wage earners, the profit earners and the government. This means that the distribution effect will be computed according to the followings:

$$DB^W = \frac{VA^W}{VA}$$

$$DB^P = \frac{VA^P}{VA}$$

$$DB^G = \frac{VA^G}{VA}$$

- where  $DB^W$  - distribution index of the wage earners;  
 $DB^P$  - distribution index of the profit earners;  
 $DB^G$  - distribution index of the government;  
 $VA^W$  - net national value added distributed to the wage earners in the normal year, i.e. 1982;  
 $VA^P$  - net national value added distributed to the profit earners in the normal year, i.e. 1982;  
 $VA^G$  - net national value added distributed to the government in the normal year, i.e. 1982.

It may be pointed out that the share distributed to the wage earners encounters only wages, the profit earners get dividends, interest and rent while the government gets taxes and the total interest on domestic loans since these are loans granted by the Peruvian National Bank. Therefore, the first step in assessing the distribution effect is to determine the net national value added generated by the project in the normal year (which is 1982), as well as the share going to the wage earners, profit earners and government. This is done using market prices and is presented in Table 20.

Using the data from Table 20 in the above expressions, we obtain:

$$DB^W = \frac{2,079,000}{6,937,000} \times 100 = 29.97\%$$

$$DB^P = \frac{304,000}{6,937,000} \times 100 = 4.38\%$$

$$DB^G = \frac{1,009,000}{6,937,000} \times 100 = 14.55\%$$

It can be seen that the main beneficiaries from the distribution of net national value added are the wage earners and the government, who get 29.97% and 14.55% respectively. However, it should be pointed out that the government has direct control of the undistributed share of the net

Table 20

Distribution of the Net National Value Added in 1982  
(in 000 dinars)

I. VALUE OF OUTPUT	16,800
1. Sales revenue	16,800
II. VALUE OF INPUTS	8,900
1. Investment (depreciation)	2,490
2. Current material inputs	6,410
2.1 Domestic	3,160
2.2 Imported <sup>1/</sup>	3,080
2.3 Infrastructural services	170
III. DOMESTIC NET VALUE ADDED (I-II)	7,900
IV. REPATRIATED PAYMENTS	963
1. Wages	100
2. Dividends	74
3. Interest	789
IV. NATIONAL NET VALUE ADDED	6,937
1. Wages	2,079
2. Dividends (private)	304
3. Government revenue (profit, taxes and interest on domestic loans)	1,009
4. Undistributed profits <sup>2/</sup>	3,545

<sup>1/</sup> Value of imported current material inputs is converted into dinars at the official rate of exchange 1 dinar = US\$ 1.

<sup>2/</sup> To be used for financing future expansion of the firm reserve funds, social welfare funds, etc.

national value added amounting to 3,545,000 dinars, which will be used for expansion of the firm, reserve funds, social welfare funds, etc. The wage earners will get a considerable amount of fringe benefits (kindergarden, hospital, theatre, recreational facilities, low priced food in the cafeteria, etc.) financed from the project's social welfare fund to which part of the undistributed value added will be allocated. It is estimated on the basis of past experience and comparison with other competing projects that the cotton textile mill provides considerable direct and indirect benefits to the wage earners as well as secure funds for further development of the firm.

#### 2.4 Net foreign Exchange Effect of the Project

The implementation and operation of the cotton textile mill will require foreign exchange, but on the other hand, this project will save Perovia some foreign exchange, since it earns foreign exchange through exports and saves it through import substitution.

In order to assess the impact of the project on the balance of payments, the net foreign exchange effect will be estimated. This effect is expressed as:

$$P(FE)E_t = \sum_{t=0}^n (FI - FO)_t a_t$$

where  $P(FE)E_t$  - present value of the net foreign exchange effect;

$FI_t$  - foreign exchange inflows in the  $t^{\text{th}}$  year;

$FO_t$  - foreign exchange outflows in the  $t^{\text{th}}$  year;

$a_t$  - discount factors at selected social rate of discount;

$n$  - number of years in the project's economic life.

The information needed for estimating the net foreign exchange effect of the cotton textile mill is given in Table 21. The items in this table were expressed in dinars applying the official rate of exchange.

The analysis of the net foreign exchange could be carried out taking into consideration the whole life of the project, but also on the annual basis. Table 21 indicates that the cotton textile mill

**Table 21. Elements for Net Foreign Exchange Effect Estimation**

(000 dollars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1985	1987	1988
	0	1	2	3	4	5	6	7	8	9	0	11	12
<b>I. FOREIGN EXCHANGE INFLOW</b>	-	6,050	12,040	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
1. Foreign equity capital	-	1,040	-	-	-	-	-	-	-	-	-	-	-
2. Equipment on credit	-	5,010	12,040	-	-	-	-	-	-	-	-	-	-
3. Exports	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
<b>II. FOREIGN EXCHANGE OUTFLOW</b>	-	30	50	6,384	6,155	6,713	6,484	6,296	6,007	5,820	3,178	3,130	3,190
1. Royalties	-	30	50	-	-	-	-	-	-	-	-	-	-
2. Imported materials	-	-	-	2,390	2,330	3,030	3,030	3,030	3,030	3,090	3,030	3,030	3,030
3. Repayment of the foreign loans	-	-	-	2,441	2,441	2,441	2,441	2,441	2,441	2,444	-	-	-
4. Repatriated wages by foreign personnel	-	-	-	150	150	150	100	100	-	-	-	-	-
5. Dividends to foreign shareholders	-	-	-	46	52	70	74	81	87	93	93	100	100
6. Interest on foreign loans	-	-	-	1,367	1,172	977	789	594	399	203	-	-	-
<b>III. NET FOREIGN EXCHANGE FLOW (I-II)</b>	-	6,020	11,990	(4,884)	(4,695)	(5,218)	(4,984)	(4,796)	(4,507)	(4,320)	(1,678)	(1,680)	(1,690)
<b>IV. DEFICIT SUBSTITUTION EFFECT</b>	-	-	-	11,700	11,700	15,300	15,300	15,300	15,300	15,300	15,300	15,300	15,300
<b>V. NET FOREIGN EXCHANGE EFFECT (III+IV)</b>	-	6,020	11,990	6,816	7,005	10,082	10,316	10,504	10,793	10,980	13,622	13,620	13,610
<b>VI. DISCOUNT FACTORS AT SOCIAL DISCOUNT RATE 9%</b>	1	0.917	0.842	0.772	0.709	0.650	0.596	0.547	0.502	0.450	0.422	0.339	0.355
<b>VII. DISCOUNTED VALUES OF THE NET FOREIGN EXCHANGE EFFECT</b>	-	5,500	10,095	5,262	4,959	6,553	6,148	5,746	5,419	5,051	5,743	5,235	4,945



will have over its implementation period positive net foreign exchange flows, which means that the foreign loan given by the machinery supplier and the foreign equity capital are sufficient to finance the foreign components of investments. However, starting in 1979 and later, the project will have negative annual net foreign exchange flows due to repaying foreign loan (principal and interest), importing current material inputs and repatriation of wages and dividends. Situation changes radically when the foreign exchange saved due to import substitution is taken into consideration. In this case the net foreign exchange effect is positive throughout the project's lifetime. By discounting the annual net foreign exchange effects at the social rate of discount, we arrive at the present value of the net foreign exchange effect amounting to 55,019,000 dinars. Hence, the amount of foreign exchange earned and saved for Perovia by implementation of this project would be such that in spite of repaying the foreign loan, using imported material, foreign equity capital and personnel, there is still a surplus which in terms of present value amounts to 55,019,000 dinars.

### 2.5 Idle Capacity Effect

It has been noted that there is an idle capacity in the factory producing chemicals, which are not competitive and therefore not exported abroad, as well as in the domestic production of the indirect production materials due to the lack of demand for their products. The implementation of the textile mill will increase this demand and use up the existing idle capacities generating an additional value added in these sectors without any additional investments. Therefore, the team of evaluators decided to account for this part of the value added by computing the idle capacity effect of the cotton textile mill in the capital scarcity situation as follows:

$$Z_1 = \frac{\sum_{t=0}^n (VA)_t a_t + \sum_{t=0}^n (VA_1)_t a_t}{\sum_{t=0}^n I_t a_t}$$

where  $Z_1$  = idle capacity effect;

$(VA)_t$  = net national value added generated by the project being evaluated in the  $t$ th year;

$(VA_1)_t$  = net national value added generated in the linked up sectors presently having idle capacity;

$I_t$  = investment outlays of the project being evaluated in the  $t$ th year;

$a_t$  = discount factors at the selected social rate of discount;

$n$  = number of years in the project's life.

Part of the information necessary to estimate the idle capacity effect was already prepared. Present value of the net national value added generated by the cotton textile mill and the present value of investment were computed in Table 18 and amounted to 32,421,000 dinars and 34,776,000 dinars respectively. However, the information regarding the value added generated in the linked-up sector is still missing.

After analyzing the production capacities of the inputs, it was found that there is an idle capacity in the production of chemicals and indirect production materials which is due to the lack of demand for these products. The cotton textile mill will create an additional demand for them, and as a result of the usage of the idle capacity, the value added in these sectors will be higher for the amounts as stated in Table 22.

Table 22. Net National Value Added in the Linked-up Sectors  
(in 000 dinars)

	1979	1980	1981	1982	1983	1979/83
	3	4	5	6	7	3-7
1. Production of chemicals	95	60	25	-	-	-
2. Production of indirect production materials	180	155	110	60	20	-
3. Nominal net national value added (1 + 2)	275	215	135	60	20	-
4. Discount factors at 0.772 social rate of discount 9%	0.772	0.708	0.649	0.596	0.547	-
5. Discounted net national value added (3 x 5)	212	152	88	36	11	499

As shown, the value added on the basis of better usage of the idle capacity in the production of chemicals will appear only in 1979, 1980 and 1981, and the one in the production of the indirect production materials in the period 1979-1983. Or, in the other years of the cotton textile project's life there will be no idle capacities in these sectors. This is due to the growing demand for chemicals and indirect production materials in Perovia.

Having introduced the relevant figures in the expression for the idle capacity effect, we obtain:

$$Z_1 = \frac{32,421,000 + 499,000}{34,776,000} = 0.95$$

Thus, the implementation of the cotton textile mill will generate over the whole of its life 0.95 units of value added per unit of investment after including the value added in the sectors presently with idle capacities.

It is of some interest to compare this figure to the outcome of the relative efficiency test in the capital scarcity situation. There it was estimated that one unit of the investment outlays would generate 0.93 units of value added when the whole life of the project is considered.<sup>1/</sup> This co-efficient is somewhat higher now as the nominator is larger due to the inclusion of the value added to be generated by present idle capacities.

## 2.6 International competitiveness

The group of experts evaluating this project decided to estimate the international competitiveness of the cotton textile mill since a part of its production will be exported. In order to do this, the international competitiveness indicator was worked out according to the expression:

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<sup>1/</sup> See Section 1.3 of National Profitability Evaluation.

$$IC = \frac{\sum_{t=0}^n (FI-FO)_t a_t}{\sum_{t=0}^n IR_t a_t} \geq 1$$

- where IC - international competitiveness indicator;
- $FI_t$  - foreign exchange inflow of the project in the year t of its life;
- $FO_t$  - foreign exchange outflow of the project in the year t of its life;
- $IR_t$  - domestic resource costs (domestic component of investments, current material inputs and wages) of the project's output in the year t of its life;
- $a_t$  - discounting factor at the selected social rate of discount in the year t.

Foreign exchange inflows and outflows as well as the domestic resource cost have already been computed in Table 21, but there they were stated for the total annual production. Now, since the international competitiveness is analyzed only for exports, we have to account for the foreign exchange inflows and outflows and domestic resource cost related only to the quantity of exported poplin.

Exports of poplin amount to 8.93% of the total annual production, which leads us to take into consideration only 8.93% of each foreign exchange component and domestic component (investments, current material inputs and wages) when computing the elements for estimation of the international competitiveness.<sup>1/</sup> This is to say that we account only for the effect which reflects the production of poplin for export amounting to 2,500,000 meters.

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<sup>1/</sup> In order to be quite precise, it should be noted that this percentage is somewhat higher in 1979 and 1980, but it was accepted that the exports make 8.93% of the annual production in every year of the project's life.

Foreign exchange inflows and outflows valid for the export of 2,500,000 meters of poplin are computed in Table 23. They are converted in dinars at the adjusted rate of exchange, and then discounted at the social rate of discount. The present value of the net foreign exchange earnings turns out to be 6,783,000 dinars.

Annual domestic resource cost also based on the quantity of 2,500,000 meters of exported poplin is worked out in Table 24. Its present value amounts to 4,055,000 dinars.

Therefore, after introducing the above figures in the expression for the international competitiveness, we get:

$$IC = \frac{6,783,000}{4,055,000} = 1.67$$

Since the international competitiveness indicator is larger than one, it is evident that the exports are justified irrespective of prices expressed in monetary terms based on controlled exchange rate. One unit of domestic resource cost occurring in the textile cotton mill will generate 1.67 units of net foreign exchange earnings in terms of their present value. Therefore, in addition to the recovery of domestic resources used in the project, there will be a considerable surplus of foreign exchange over and above the domestic resource cost.

**Table 23. Net Foreign Exchange Reserves**  
**(For Calculation of International Comparability)**

(in 000 dollars)

Items	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1976-1988
	0	1	2	3	4	5	6	7	8	9	10	11	12	C-12
<b>I. FOREIGN EXCHANGE INFLOW</b>	-	500	1,075	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
1. Foreign equity capital	-	93	-	-	-	-	-	-	-	-	-	-	-	-
2. Equipment on credit	-	477	1,075	-	-	-	-	-	-	-	-	-	-	-
3. Exports	-	-	-	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500	1,500
<b>II. FOREIGN EXCHANGE OUTFLOWS</b>	-	3	4	569	553	599	579	562	537	519	284	284	234	-
1. Royalties	-	3	4	-	-	-	-	-	-	-	-	-	-	-
2. Imported materials	-	-	-	212	212	275	275	275	275	275	275	275	275	-
3. Repayment of foreign loans	-	-	-	219	215	215	216	218	218	218	-	-	-	-
4. Repatriated wages by foreign personnel	-	-	-	13	13	13	9	9	-	-	-	-	-	-
5. Dividends to foreign shareholders	-	-	-	4	5	6	7	7	8	8	9	9	9	-
6. Interest on foreign loans	-	-	-	122	105	87	70	53	36	18	-	-	-	-
<b>III. NET FOREIGN EXCHANGE FLOW (I-II)</b>	-	537	1,071	931	947	901	921	938	963	981	1,216	1,216	1,216	-
<b>IV. Accounting surplus at the central bank of discount <math>\frac{1}{2}</math></b>	1	0.917	0.842	0.772	0.703	0.650	0.596	0.547	0.502	0.450	0.422	0.389	0.356	-
<b>V. Present value of the Net Foreign Exchange Reserves (III x IV)</b>	-	482	902	719	670	646	540	513	483	451	513	472	433	6,783

**Table 24. Domestic Resource Cost**  
**(Per Calculation of International Competitiveness)**

(in CCC dinars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989-1993
	0	1	2	3	4	5	6	7	8	9	10	11	12	C-12
1. Investments domestically procured	206	1,164	268	-	-	-	-	-	-	-	-	-	-	-
2. Current material inputs domestically procured	-	-	-	227	227	232	232	232	232	232	232	232	232	-
3. Infrastructure services	-	-	-	15	15	15	15	15	15	15	15	15	15	-
4. Domestic wages	-	-	-	181	181	181	186	186	195	195	195	195	195	-
5. Domestic resources cost (1 + 2 + 3 + 4)	206	1,164	268	423	423	478	493	493	492	492	492	492	492	-
6. Discounting factors at the social discount rate 9%	1	0.917	0.842	0.772	0.708	0.650	0.596	0.547	0.502	0.450	0.422	0.399	0.356	-
7. Present values of the domestic resources cost	206	1,067	226	327	299	311	298	264	247	226	208	191	175	4,655

IV. Evaluation Summary

Criteria	Evaluation Results
<b>I. Commercial Profitability</b>	
1. Simple rate of return on total investment	The simple rate of return of the project is expected to be 13.5%. Since the prevailing market interest rate is 6.5% for domestic loans and 8% for foreign loans, the project is commercially satisfactory.
2. Simple rate of return on equity capital	The simple rate of return on equity capital is 57.2%. This is a very high rate. The project is acceptable unless there exist better possibilities for the private sector to invest.
3. Pay-back period	The pay-back period is eight years. The project is satisfactory in view of the past experience of the investor. There is no competing project with shorter pay-back period.
4. Net present value (NPV)	The NPV is 15,413,000 dinars. Since the NPV is positive, the project is acceptable.
5. Ratio of NPV to the present value of total investment (NPVR)	NPVR = 0.45. A discounted unit of total investment creates 0.45 units of net present value. The project is acceptable since the present value ratio is relatively high, and there is no better project.
6. Internal rate of return	The internal rate of return is 14.36. The internal rate of return is considerably higher than the rate of interest on loans for this project - 6.5% for domestic loans and 8% on foreign loans. Therefore, the project is acceptable.
7. Net cash balance (NCB)	Shows deficits in years 1979 and 1980 but covered by government subsidy. Has considerable surpluses from 1981 onwards.



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Criteria	Evaluation Results
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General Conclusions on Commercial Profitability:

The project is acceptable on commercial profitability grounds. It needs government subsidy only during the initial operation stage, 1979-1980.

II. National Profitability Analysis

1. National net value added criterion

1.1 Absolute efficiency test

The project is expected to generate 32,421,000 dinars net national value added comprising 11,333,000 dinars wages. Therefore, it generates considerable social surplus and is acceptable. The project passes the absolute efficiency test.

1.2 Relative efficiency test in capital scarcity situation

One dinar of investment in fixed capital generates 0.93 dinars of net national value added. This ratio in itself is relatively high. It is also higher than the ratios of other alternative projects. Therefore, the project passes the relative efficiency test.

2. Contribution to other development objectives

2.1 Employment effect

One million of investments will open 66 job opportunities. This project is acceptable since it creates more job opportunities per unit of capital invested than other alternative projects.

2.2 Distribution effect

The main beneficiaries of this project will be wage earners and the government, who get directly 30% and 14.5% of the distribution of the value added. In addition, the government has direct control of the undistributed share of the value added, which will

Criteria

Evaluation Results

**2.3 Net foreign exchange effect**

be used for further expansion reserve funds and social welfare funds for the benefit of wage earners.

The project has negative annual net foreign exchange flows. The situation changes radically however when the foreign exchange saved due to import substitution is taken into consideration. In this case the net foreign exchange effect is positive throughout the project's lifetime. The present value of the net foreign exchange effect is 55,019,000 dinars. Hence the project is acceptable.

**2.4 Idle capacity effect**

One dinar of investment in the mill generates 0.95 dinars of national value added within this project and directly linked sectors. The implementation of the project will help to utilize idle capacities in the production of chemicals as well as of indirect production materials.

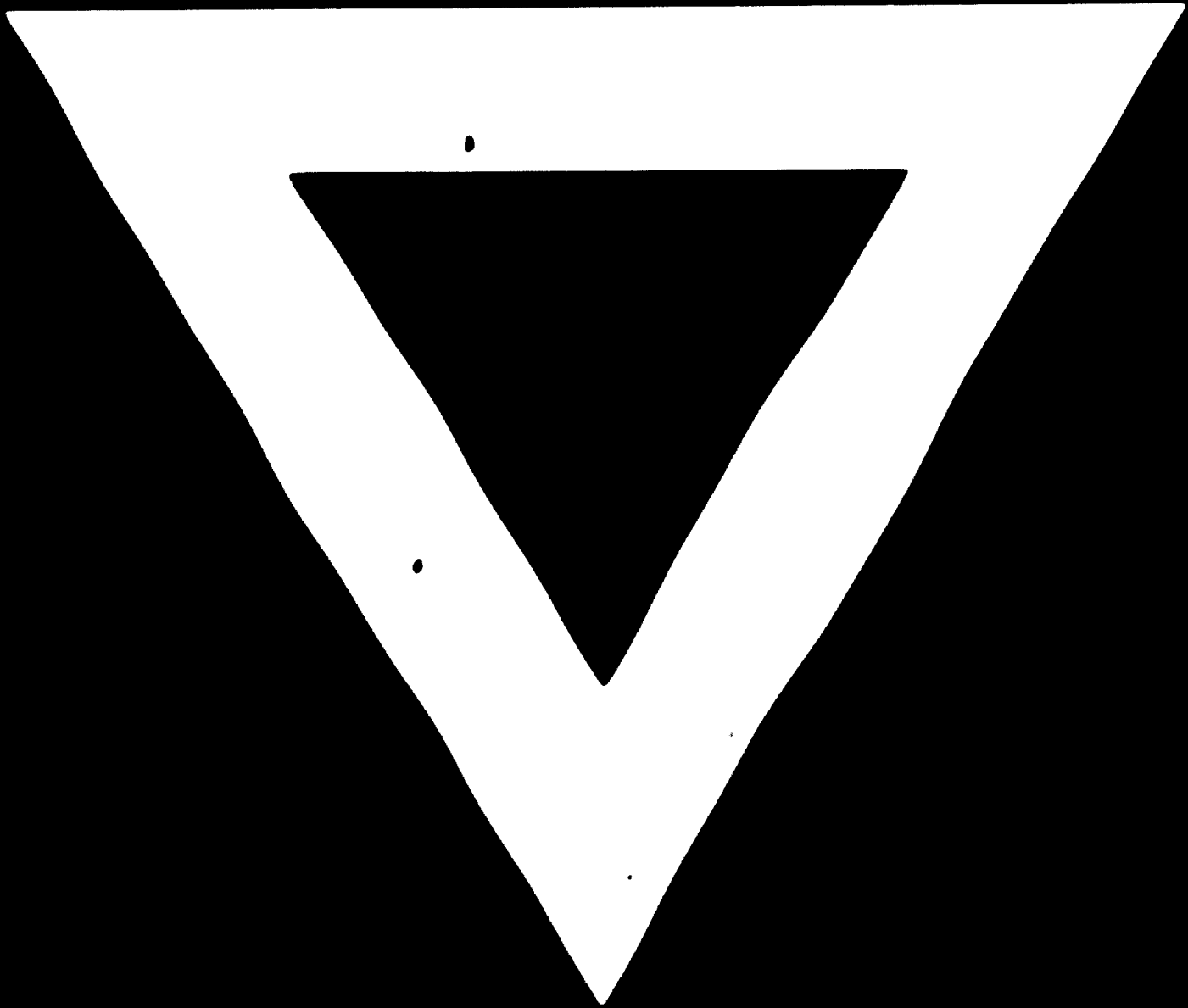
**2.5 International competitiveness**

One unit of domestic resource cost occurring in the textile mill will generate 1.67 units of net foreign exchange earnings. Therefore, in addition to the recovery of domestic resources used in the project, there will be a considerable surplus of foreign exchange. The export of poplin is justified.

General Conclusions on National Profitability

The project is acceptable on national profitability grounds as well. It passes the value added test as well as shows very positive results in contributing to other development objectives of Peruvia.

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