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CASE STUDY ^{1/}

AN INTEGRATED COTTON SPINNING AND WEAVING
TEXTILE MILL

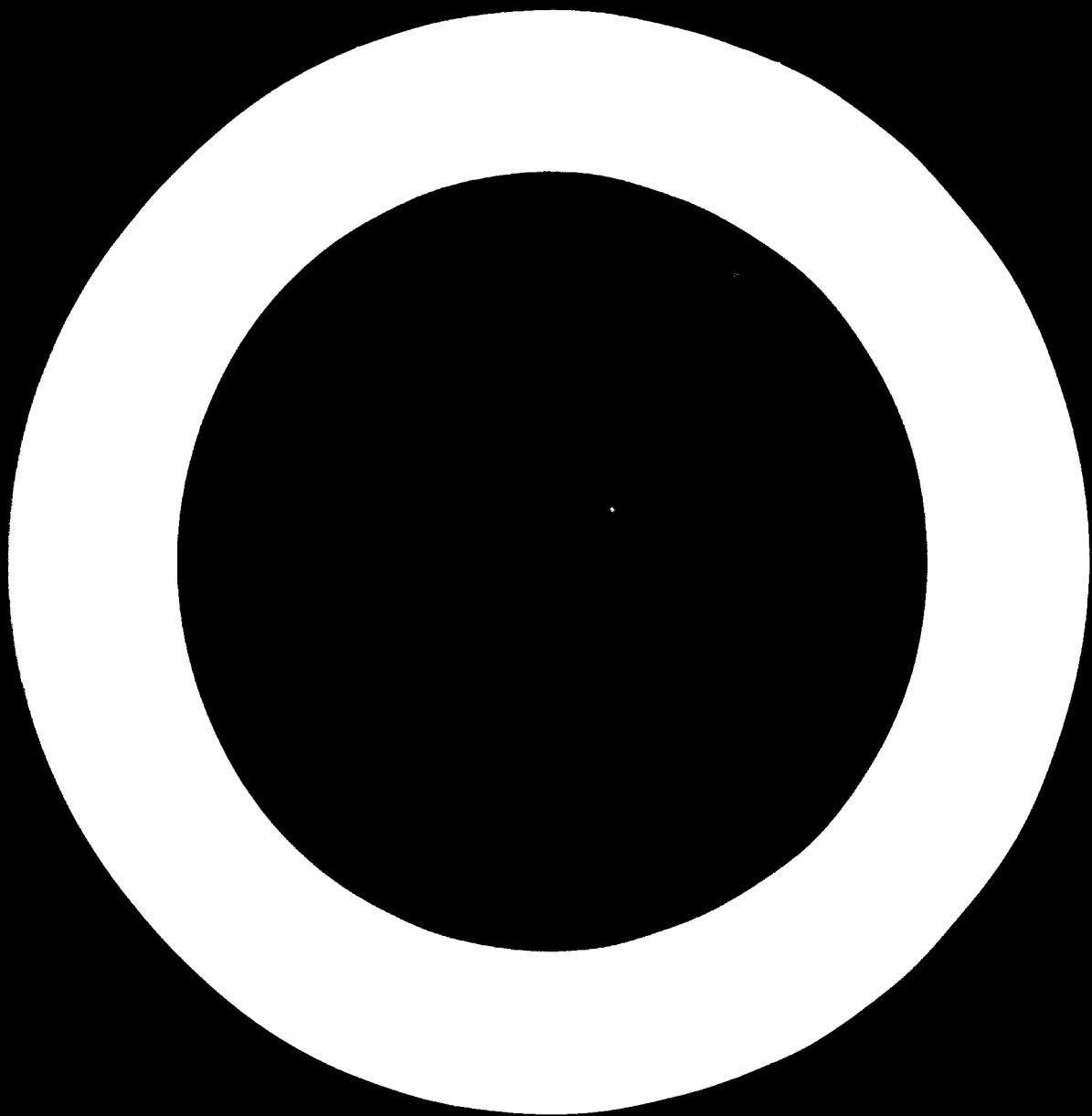
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I. PROJECT FORMULATION

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 being at the same time a significant raw cotton exporter. From its primary sector of the economy the country produces remarkable surpluses in mineral ores and liquid fuel.

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 analysed 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 any 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

and fabrics and finished clothes. 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 clothes.

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 focused on the demand and supply side of the project proposed.

A. The demand forecast has traced the present level of consumption of cotton and mixed textile yarn and fabrics as well as the changes of 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 of the country's per capita income.

The 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 1,000,000 meters of textile fabrics.

The present domestic production of cotton and mixed textile fabrics is about 900 tons, which represents only about 5 per cent of the domestic consumption.

Analysing the pattern of consumption from the past as well as for countries at the 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 1,200 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 1,100 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 of oil price on the other.

C. The selling price was estimated at 178.5 dinars per 1,000 meters.

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 among

- 3 -

different possibilities to choose the location in the capital of the province Oasis as the main cotton-producing region with labour employment problems and no significant industrial plant established until now.

4. Technical Aspects

This part of the project formulation has been undertaken by the "National Industrial Development Institute" in co-operation with two foreign experts engaged through an aid programme of an international industrial development organization.

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

The objective is production of finished poplin fabrics of medium count yarn. The capacity of the project is 2,000 tons of mixed textile fabrics, i.e. about 16,000,000 meters annually when producing at full capacity. This is the minimum economic size of a project in that type of activity.

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 2,000 tons per year.

The weaving mill includes 600 automatic looms in addition to the preparation sections of a total capacity of 16,000,000 meters per year.

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

- Programme of Implementation - It was estimated that the project will be implemented in four years, beginning in 1976 and ending in 1979, including the test run period in the year 1979. This is as well the starting year of operation of the plant.

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 would employ 2,357 men. Table 1 illustrates the estimation of manpower by type, skills and rate of pay.

6. Financial Aspects

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

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. Table 2a is a supplementary table to Table 2 giving an overall view of the investment costs by main items, years and type of currency as well. The total investment costs are estimated at 3,500,000 dinars, of which 2,750,000 are in domestic currency and 2,550,000 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 book value at the end of the project's life.

6.3. Income

The whole production of the project will be sold in the home market. It is estimated that the project will operate at 80 per cent capacity in 1979 since the construction period ends by the beginning of the year and there is a test run period during the same year. The full capacity should be reached in 1980 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 revenue of the project consisting of income, 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

Table 1. Manpower Requirements

<u>Labour Analysis</u>	<u>Manning Data</u>		<u>Total Costs</u>
	<u>No.</u>	<u>Rate/Year</u>	
<u>Direct Wages</u>			
Operators of Spinning Dept.	700	330	231,000
Operators of Weaving Dept.	600	360	216,000
Operators of Finishing Dept.	300	350	105,000
Total	1,600		552,000
<u>Indirect Wages</u>			
Indirect operators			
Service operators	300	330	99,000
Maintenance operators	280	340	95,200
Drivers	5	500	2,500
Subtotal	585		196,700
<u>Supervisory + Clerical</u>			
Plant superintendant	3	3,600	10,800
Engineers	6	3,000	18,000
Technical assistants	15	2,400	36,000
Clerks	62	600	37,200
Subtotal	86		102,000
Total	671		298,700
<u>Administrative</u>			
President	1	5,000	
Financial and Sales Manager	1	3,600	
Accountants +Clerical	64	38,400	
Servicemen	20	3,000	
Total	86		50,000
Grand Total	2,357		900,700

Table 2. Plant Investment and Schedule of Construction

	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>
	0	1	2	3
1. <u>Fixed Assets</u>	280	1,260	2,530	130
1.1 Imported equipment ^{1/}	-	-	1,825	75
1.2 Domestic equipment	-	-	200	-
1.3 Instalation cost	-	-	130	-
1.4 Land acquisition and development	260	800	375	-
- Land	30	-	-	-
- Buildings	225	800	375	-
- Other	5	-	-	-
1.5 Other fixed assets	20	460	-	55
2. <u>Preliminary Expenses</u>	60	5	115	20
3. <u>Working Capital</u>	-	-	900	-
4. <u>Initial Investment (1+2+3)</u>	340	1,265	3,545	150
5. <u>Interest During Construction</u> ^{2/}	-	-	-	-
6. <u>Total Investment (4+5)</u>	340	1,265	3,545	150

^{1/} Foreign components have been converted into local currency at the official rate of exchange (10 dinars = 1 US \$; domestic prices including transport costs, duties and taxes.

^{2/} In order to promote economic development there is no interest during the construction period (probably rate of interest takes care of that).

Table 2a. Analysis of Investment Costs

<u>Items</u>		<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>Total</u>
<u>Land</u>	Dm	30,000	-	-	-	30,000
	Fr	-	-	-	-	-
	Total	30,000	-	-	-	30,000
<u>Buildings + Construc- tion</u>	Dm	200,000	1,000,000	200,000	-	1,400,000
	Fr	-	-	-	-	-
	Total	200,000	1,000,000	200,000	-	1,400,000
<u>Machinery + Equipment</u>	Dm	100,000	150,000	150,000	-	400,000
	Fr	-	100,000	2,230,000	-	2,330,000
	Total	100,000	250,000	2,230,000	-	2,730,000
<u>Cars, Lorries + Furniture</u>	Dm	-	-	20,000	-	20,000
	Fr	-	-	20,000	-	20,000
	Total	-	-	40,000	-	40,000
<u>Preliminary Exp.</u>	Dm	10,000	15,000	25,000	150,000	200,000
	Fr	-	-	-	-	-
	Total	10,000	15,000	25,000	150,000	200,000
<u>Working Capital</u>	Dm	-	-	200,000	-	200,000
	Fr	-	-	700,000	-	700,000
	Total	-	-	900,000	-	900,000
<u>Total</u>	Dm	340,000	1,165,000	595,000	150,000	2,750,000
	Fr	-	100,000	2,950,000	-	2,550,000
	Total	340,000	1,265,000	3,545,000	150,000	5,300,000

Table 3. Depreciation, Replacement and Residual Values

Item of Assets	Costs (in 000 dinars)	Expected Lifetime from		Annual Depreciation	Years of Depreciation	Book Value in 1988
		Starting-up (Years)	Non Dep.			
1. <u>Fixed Assets</u>	4200	-		296		
1.1 Production Equipment	2230	10		223	1979-1988	-
1.2 Land	30		Non Dep.	-		30
1.3 Buildings	1400	33		42	1979-1988	990
1.4 Utilities	500	20		25	1979-1988	250
1.5 Cars	20	5		4	1979-1982	-
1.6 Furniture	20	10		2	1979-1988	-
2. <u>Preliminary Expenses</u> ^{1/}	200	5		40	1979-1982	-
3. <u>Working Capital</u> ^{2/}	900		Non Dep.	-		900
4. <u>Replacements</u>	-	-		-		-
5. <u>Residual Value</u> ^{3/}	-	-		-		2160

1/ Preliminary expenses are capitalized in our case. 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.

2/ Working capital is not written off. The entire amount enters the final year of the project's life-time as residual value.

3/ The book value in 1988 has been used for residual value since it is assumed that the plant will be going on with the same production.

Table 4. Annual Revenue

I T E M S	1972		1980 - 1986	
	Quantity (000 meters)	Value (000 dinars)	Quantity (000 meters)	Value (000 dinars)
INCOME				
1. <u>Annual Sales</u>	14,400	2,569	18,000	3,213
- Product A (finished poplin fabrics of medium count yarn)	14,400	2,569	18,000	3,213
- Product B	-	-	-	-
2. <u>Subsidy</u> ^{1/}	-	200	-	...
3. <u>Residual Value</u> ^{2/}	-	-	-	...

^{1/} Subsidy is given by the Government during the first four years of operation. In 1979, 200,000 dinars; 150,000 dinars in 1980; 100,000 dinars in 1981; and 0,000 dinars in 1982.

^{2/} Residual value is 2,160,000 dinars and forms part of the income in 1988, i.e. the last year of the project.

make the domestic products competitive as compared to imported fabrics during the first and most critical years of operation of the textile mill.

6.4 Operating Costs

Operating costs consist of manufacturing cash expenses, marketing cash expenses, administrative cash expenses and depreciation. They include wages and salaries which are illustrated in Table 5a split into direct and indirect labour costs, by type of skill and divided into variable and fixed costs. Table 5 gives the annual operating costs at 80 per cent capacity and at 100 per cent capacity. The material costs have been split into domestic and imported 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. It is expected by preliminary contracts and other agreements that the financing will have the following sources: equity, which is domestic, and borrowing.

Borrowing has two sources:

- (a) Credit facilities from suppliers of machinery which is 2,230,000 dinars. Repayment of the principal will be in 6 yearly equal instalments, beginning in the year 1980 and ending in year 1985. Interest will be paid annually at 5 per cent on balance;
- (b) Bank overdraft amounting to 70,000 dinars. Repayment will be made in 1980 at an interest rate of 5 per cent for one year only.

6.5 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.

Table 3. Cash Expenses Excluding Interest

(in dinars)

	Y e a r s					1984-1989
	1979	1980	1981	1982	1983	
1. Manufacturing cash expenses	1,581,660	1,994,900	1,994,900	1,994,900	1,994,900	1,994,900
1.1. Material (t.4, p. 9)	671,360	939,200	939,200	939,200	939,200	939,200
1.1.1. imported	450,400	563,000	563,000	563,000	563,000	563,000
1.1.2. domestic	220,960	376,200	376,200	376,200	376,200	376,200
1.2. Wages (t.4, p. 10 = 1 + 2)	740,300	850,700	850,700	850,700	850,700	850,700
1.3. Others (t.6, p. 11 = 1)	170,000	205,000	205,000	205,000	205,000	205,000
2. Marketing cash expenses	24,100	28,700	28,700	28,700	28,700	28,700
2.1. Material	5,500	9,100	9,100	9,100	9,100	9,100
2.1.1. imported	-	-	-	-	-	-
2.1.2. domestic	5,500	9,100	9,100	9,100	9,100	9,100
2.2. Wages	8,600	8,600	8,600	8,600	8,600	8,600
2.3. Sales and excise taxes and others	10,000	11,000	11,000	11,000	11,000	11,000
3. Administrative	76,400	94,400	94,400	94,400	94,400	94,400
3.1. Material (domestic)	17,000	20,000	20,000	20,000	20,000	20,000
3.2. Wages	41,400	41,400	41,400	41,400	41,400	41,400
3.3. Others	18,000	23,000	23,000	23,000	23,000	23,000
4. Operating cash expenses	1,680,160	2,108,000	2,108,000	2,108,000	2,108,000	2,108,000
5. Depreciation	336,000	336,000	336,000	336,000	336,000	336,000
6. Total (4 + 5)	2,016,160	2,444,000	2,444,000	2,444,000	2,444,000	2,444,000
Equal capacity utilization of (in physical terms)	80%	100%	100%	100%	100%	100%
Cost per unit of production (000 meters) - in dinars	160.15	25.73	25.73	25.73	25.73	25.73

Table 5a. Labour Analysis

	1979		1980 - 1988	
	No. at 100% Capacity	Var. 80%	Fixed 100%	Total VI 100%
Skilled Unsk. Total				
Direct Wages	1,600	1,600	441,600	552,000
Subtotal	1,600	1,600	441,600	552,000
Indirect Wages (mgf.)				
- Service operations	300	300	99,000	99,000
- Indirect operations	285	285	97,700	97,700
- Plant Superintendent	3	3	10,800	10,800
- Engineers	6	6	18,000	18,000
- Technical Assistants	15	15	36,000	36,000
- Clerical	62	62	37,200	37,200
Subtotal	371	371	293,700	298,700
Administrative				
- President	1	1	5,000	5,000
- Financial Sales Manager	1	1	3,600	3,600
- Accountants + Clerical	64	64	38,400	38,400
- Servicemen	-	20	3,000	3,000
Subtotal	66	86	50,000	50,000
Grand Total	2,037	2,357	441,600	552,000
			790,000	900,700

Table 6. Capital Structure
(in 000 dinars)

<u>Items</u>	<u>1976</u>	<u>1977</u>	<u>1978</u>	<u>1979</u>	<u>Total</u>
1. <u>Investment</u>					
1.1 Initial Investment	340	1,265	3,545	150	5,300
1.2 Interest during Construction	340	1,265	3,545	150	5,300
<u>Total Investment</u>	340	1,265	3,545	150	5,300
2. <u>Financing</u>					
2.1 Equity	750	1,500	3,050	-	5,300
2.1.1 Local Currency	750	1,500	750	-	3,000
2.1.2 Foreign Exchange	750	1,500	750	-	-
2.2 Borrowing	-	-	-	-	-
2.2.1 Local Currency	-	-	2,300	-	2,300
2.2.2 Foreign Exchange	-	-	70	-	70
<u>Total Financing (2.1 + 2.2)</u>	750	1,500	2,980	-	5,300

Table 11. Financial Obligations
(in 000 dinars)

Financial Obligations	1979	1980		1981		1982		1983		1984		1985		1986-1989	
	P ^{1/} I ^{2/}	P	I	P	I	P	I	P	I	P	I	P	I	P	I
1. Interest	-	115	-	93	-	74	-	56	-	37	-	19	-	-	-
2. Repayment	442	-	372	-	372	-	372	-	372	-	372	-	-	-	-
3. Dividends	-	300	-	300	-	300	-	300	-	300	-	300	-	-	300
Total (1 + 2 + 3)	857	705	745	745	728	709	691	691	300	300	300	300	300	300	300

1/ P = Principal

2/ I = Interest

3/ In this table, the company capital through the period of operation.

It is estimated through the conditions formulated earlier that interest and repayment have to be covered from 1979 until 1984, while dividends have to be paid through the entire period of operation, i.e. from 1979 to 1989 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 3. It is the starting point of analysing the project in terms of liquidity analysis and commercial profitability analysis which is done in the process of project evaluation.

The net cash flows that are the result of the integrated financial analysis show negative values during the first three years which occur due to the investment during the construction period. After that, i.e. starting from 1979 the net cash flows have a positive value each year.

Table 3. Integrated Financial Analysis

(in 000 dinars)

I t e m s	Y e a r s												
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
1. Initial investment	340	1,265	3,545	150	-	-	-	-	-	-	-	-	-
1.1 Fixed capital	340	1,265	2,645	150	-	-	-	-	-	-	-	-	-
1.2 Working capital	-	-	900	-	-	-	-	-	-	-	-	-	-
2. Operating costs	-	-	-	2,133	2,537	2,518	2,710	2,481	2,419	2,400	2,400	2,400	2,400
2.1 Cash expense excluding interest	-	-	-	1,692	2,108	2,108	2,103	1,108	2,108	2,108	2,108	2,108	2,108
2.2 Depreciation	-	-	-	336	336	336	366	366	292	292	292	292	292
2.3 Interest	-	-	-	115	93	74	56	37	19	-	-	-	-
3. Income	-	-	-	2,770	3,363	3,313	3,263	3,213	3,213	3,213	3,213	3,213	3,213
3.1 Sales revenue	-	-	-	2,570	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213
3.2 Subsidies	-	-	-	200	150	100	-	-	-	-	-	-	-
3.3 Residual value	-	-	-	-	-	-	-	-	-	-	-	-	2,160
4. Net cash earnings	-	-	-	-	-	-	-	-	-	-	-	-	-
4.1 Tangible profit on equity (3-2, excluding 3.3)	-	-	-	637	826	795	763	732	794	813	813	813	813
Plus taxes on equity profits (25% of)	-	-	-	159	206	199	191	183	198	203	203	203	203
4.2 Net profit after interest and taxes on equity	-	-	-	478	620	596	572	549	596	610	610	610	610
Plus interest	-	-	-	115	93	74	56	37	19	-	-	-	-
4.3 Net profit before interest (tangible investment)	-	-	-	593	713	670	628	586	615	610	610	610	610
Plus taxes on investment profits of 4.3)	-	-	-	148	178	168	157	147	154	153	153	153	153
4.4 Net profit before interest and after taxes on investment profits	-	-	-	445	535	502	471	439	461	457	457	457	457
Plus depreciation (2.2)	-	-	-	336	336	336	336	336	292	292	292	292	292
Plus residual value (3.3)	-	-	-	-	-	-	-	-	-	-	-	-	2,160
Plus replacement (debt)	-	-	-	-	-	-	-	-	-	-	-	-	-
4.5 Total (net cash earnings)	-	-	-	781	871	838	807	775	753	749	749	749	2,909
5. Net cash flows (4.5 - 1) (NPV + IIR)	-	340	-1,265	-3,545	631	871	383	807	775	753	749	749	2,909
6. Financial sources	750	1,500	2,900	-	-	-	-	-	-	-	-	-	-
6.1 Equity	750	1,500	750	-	-	-	-	-	-	-	-	-	-
6.2 Loans	-	-	2,150	-	-	-	-	-	-	-	-	-	-
7. Financial obligations	-	-	-	857	765	746	723	709	691	300	300	300	300
7.1 Interest charges	-	-	-	115	93	74	56	37	19	-	-	-	-
7.2 Depayment installment	-	-	-	442	372	372	372	372	372	-	-	-	-
7.3 Dividends (10% on equity capital)	-	-	-	300	300	300	300	300	300	300	300	300	300
8. Net cash balance (5 + 6 - 7)	410	235	- 565	- 226	106	92	79	66	62	449	449	449	2,609
9. Cumulative net cash balance	410	645	90	- 146	- 40	52	131	197	259	708	1,157	1,606	4,215

II. PROJECT EVALUATION (Commercial Profitability)

Project evaluation has been done by the Economic Institute and National Planning Agency.

1. Investment Profitability Analysis

1.1 Simple Rate of Return

The simple rate of return is defined as a 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. As the normal year 1981 of the project was chosen 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_e)

		<u>Amount in 000 dinars</u>
1.	Initial Investment (Row 1, t. 8) (K)	5,300
2.	Equity Capital (Row 6.1, t. 8) (Q)	3,000
3.	Net Profit after Taxes and Interest (Row 4.2, t. 8) (F)	596
4.	Net Profit before Interest - after Taxes (Row 4.3, t. A) (F+I)	670

The rate is presented either as:

$$R = \frac{F+I}{K} = \frac{670}{5,300} \times 100 = 12.6\%$$

$$R_e = \frac{F}{Q} = \frac{596}{3,000} \times 100 = 19.9\%$$

where

R = simple rate of return on total investment

R_e = simple rate of return on equity capital.

Since the rates R and R_e are higher than the rate of interest prevailing in the capital market, which is 10 per cent, the project is commercially acceptable.

1.2 Pay-off 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 it by subtracting from the initial investment the annual net cash earnings.

Table 10. Pay-off Period
(in 000 dinars)

<u>I T E M</u>	<u>Nominal Amount</u>	<u>Uncovered Capital</u>
I. Initial Investment (K) (Row 1, t. 8)	5,300	-
II. Annual Net Cash Earnings (E) (Row 4.5, t. 8)		
Year 0	-	5,300
Year 1	-	5,300
Year 2	-	5,300
Year 3	781	4,519
Year 4	871	3,648
Year 5	838	2,810
Year 6	807	2,003
Year 7	775	1,228
Year 8	753	475
Year 9	749	- 274

In the case of the textile mill evaluated, the investment will be recovered between year 8 and year 9 or in approximately 9.5 years. On the basis of this indicator the project is acceptable.

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.

In Table 11 the calculation of the net present value of the project is presented. 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 10 per cent since it is the rate of interest prevailing in the capital market.

The net present value is calculated as follows:

$$NPV = \sum_{t=0}^n \frac{(CI - DC)_t}{(1+i)^t} = 372,000 \text{ dinars}$$

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

$$PVI = \frac{NPV}{\sum_{t=0}^n \frac{PI_t}{(1+i)^t}} = \frac{372,000}{4,420,000} = 0.084$$

Table 11. Net Cash Flows

(in 000 dinars)

I t e m s	Y e a r s													
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	
I. CASH INFLOWS (CI)	-	-	-	2,770	3,363	3,313	3,263	3,213	3,213	3,213	3,213	3,213	3,213	5,373
1. Income	-	-	-	2,770	3,363	3,313	3,263	3,213	3,213	3,213	3,213	3,213	3,213	5,373
1.1 Sales revenue	-	-	-	2,770	3,363	3,313	3,263	3,213	3,213	3,213	3,213	3,213	3,213	5,373
1.2 Subsidies	-	-	-	2,570	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213
1.3 Residual value	-	-	-	200	150	100	50	-	-	-	-	-	-	-
II. CASH OUTFLOWS (CO)	340	1,265	3,545	2,139	2,492	2,475	2,456	2,438	2,460	2,464	2,464	2,454	2,464	
(2 + 3 + 4)														
2. Initial investment	340	1,265	3,545	150	-	-	-	-	-	-	-	-	-	
2.1 Fixed capital	340	1,265	2,545	150	-	-	-	-	-	-	-	-	-	
2.2 Working capital	-	-	900	-	-	-	-	-	-	-	-	-	-	
3. Operating costs (depreciation and interest excluded)	-	-	-	1,682	2,103	2,103	2,103	2,103	2,103	2,103	2,103	2,103	2,103	
4. Taxes	-	-	-	307	384	57	343	330	352	356	356	356	356	
4.1 Taxes on equity profits	-	-	-	150	206	109	191	183	193	203	203	203	203	
4.2 Taxes on investment profits	-	-	-	143	178	153	157	147	154	153	153	153	153	
III. NET CASH FLOWS (ICF) (I-II)	- 340	-1,265	-3,545	631	871	838	807	775	753	749	749	749	2,900	
IV. Discount factors at 10% discount rate	1	0.9091	0.8264	0.7513	0.6830	0.6209	0.5645	0.5132	0.4665	0.4241	0.3855	0.3505	0.3186	
V. Present values of the net cash flows at 10% discount rate	- 340	-1,150	-2,930	474	595	520	455	393	351	310	289	262	1,130	

This ratio shows that a unit of total investment in the textile mill creates 0.004 units of net present value. On the basis of the net present value criterion the project is not acceptable since PVI is less than 1. It is suggested to the Government to compare this project to an alternative one.

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.

Table 12. Internal Rate of Return

<u>Discount Rate</u>	<u>Net Present Value of the Project (dinars)</u>
15 %	- 802,000
12 %	- 281,000
11 %	- 69,000
10.5 %	48,000
10.0 %	372,000

This means that $i_r = 11\%$, or by using the formula for interpolation for close enough intervals

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

$$i_r = 10.5 + \frac{48,000(11-10.5)}{48,000 + 69,000} = 10.705$$

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 10.7 per cent, which is the return of capital invested and the maximum rate of interest on loans this project can pay, which is slightly above the present prevailing market discount rate, this project should be accepted from the commercial standpoint only if no better project is at hand.

2. Financial Analysis

2.1 Liquidity Analysis

In this part of analysis the objective is to trace 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 into the liquidity analysis of the textile mill, such as financial obligations (interest charges, repayment instalment, 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.

In the net cash balance the first two years of the construction period have positive values, while in years 1978 and 1979 there is a negative value. All other years show a positive net cash balance.

The cumulative net cash balance shows that the negative balance in 1978 can be covered, while in 1979 it is reduced but therefore a relatively smaller negative balance appears in the year 1980.

Table 13. Net cash Balance

(in OOO dinars)

Y e a r s	Y e a r s												
	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Y t e m s	0	1	2	3	4	5	5	7	8	9	10	11	12
I. CASH INFLOWS (CI)	750	1,500	2,990	2,770	3,363	3,313	3,262	3,113	3,213	3,213	3,213	3,213	5,273
1. Income	-	-	-	2,770	3,363	3,313	3,263	3,213	3,213	3,213	3,213	3,213	5,273
1.1 Sales revenue	-	-	-	2,570	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213	5,273
1.2 Subsidies	-	-	-	200	150	100	50	-	-	-	-	-	-
1.3 Residual value	-	-	-	-	-	-	-	-	-	-	-	-	2,160
2. Financial sources	750	1,500	2,990	-	-	-	-	-	-	-	-	-	-
2.1 Equity	750	1,500	750	-	-	-	-	-	-	-	-	-	-
2.2 Loans	-	-	2,230	-	-	-	-	-	-	-	-	-	-
II. CASH OUTFLOWS (CO)	340	1,265	3,545	2,996	3,257	3,221	3,184	3,147	3,151	2,764	2,764	2,764	2,764
3. Initial investments	340	1,265	3,545	150	-	-	-	-	-	-	-	-	-
3.1 Fixed capital	340	1,265	2,645	150	-	-	-	-	-	-	-	-	-
3.2 Working capital	-	-	900	-	-	-	-	-	-	-	-	-	-
4. Operating costs (degrece and interest excluded)	-	-	-	1,682	2,108	2,108	2,108	2,108	2,108	2,108	2,108	2,108	2,108
5. Taxes	-	-	-	307	384	367	248	330	352	356	356	356	356
5.1 Taxes on equity profits	-	-	-	159	206	199	191	183	198	203	203	203	203
5.2 Taxes on investment profits	-	-	-	148	178	168	157	147	154	153	153	153	153
6. Financial obligations	-	-	-	-	93	74	56	37	19	-	-	-	-
6.1 Interest charges	-	-	-	442	372	372	272	372	372	-	-	-	-
6.2 Repayment installment	-	-	-	300	300	300	300	300	300	300	300	300	300
6.3 Dividends (10% on equity capital)	-	-	-	-	-	-	-	-	-	-	-	-	-
III. NET CASH BALANCE (NCB) (I-II)	410	235	- 565	- 226	106	92	79	61	62	449	449	449	2,409
IV. CUMULATIVE NET CASH BALANCE	410	645	80	- 126	- 40	52	131	192	259	708	1,157	1,606	4,215

The first two positive years in the net cash balance show that equity capital will be sufficient to cover the investment outlays in the first two years of the construction period. In year 1978 a loan of 2,230,000 dinars is needed in addition to the 750,000 dinars of equity capital. However, a deficit arises of 565,000 dinars and at the 80 per cent capacity utilization a deficit of 226,000 dinars is obvious. Here a subsidy is given by the Government but the interest, repayments and dividends seem to be too heavy a burden for the project and outweigh the effect of the subsidy. It has to be stated that the loans and equity are given under favourable criteria so that there is no space for changing it.

The evaluation came to the conclusion that the project is just on the border of acceptability when analysed in isolation and to improve its liquidity two possibilities exist: To secure a short-term bank credit of 186,000 dinars to cover the deficits occurring in year 1978 and year 1979. This will, however, improve the liquidity but at the same time reduce the already narrow commercial profitability of the project. The best solution is to increase the capacity to an optimal scale since the part of production that could not be sold domestically could be exported. The project evaluation team of experts suggests as well to re-examine the technology applied in the sense of finding ways to reduce the capital intensity ratio of the project.

All aspects of the commercial profitability analysis and the liquidity analysis have demonstrated that this project should be compared with a similar project proposed and other competing projects that are submitted to the Government agencies for approval and financing.

III. PROJECT EVALUATION (National Profitability)

Having assessed the acceptability of the project from the private investor's point of view, one has to proceed on to judge whether it is nationally profitable. Or its contribution to the goals of the social and economic development has to be appraised. Since the Five-Year Development Plan of Peruvia states building up the development and growth potential as the main target, the essential attention has to be paid to the project's contribution to the formation of value added in Peruvia, and more precisely to the national value added due to the capital and foreign exchange scarcities. But, other development goals, such as increasing employment, improving the balance of payments situation, mobilizing the idle capacities, improving the material position of wage earners, should not be neglected either, as they appear to be obstacles for faster social and economic development of the country.

There are more projects competing for the capital allocated to investments in the 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 two stages: testing the project's absolute efficiency or the project screening and measuring the project's relative efficiency or the project ranking.

1. Testing the Absolute Efficiency of the Project (Contribution to National Value Added at Domestic Market Prices)

When testing the absolute efficiency of the cotton textile project, it is necessary first to determine the value added generated

by this project and then to relate this value added to the resources used for its implementation and operation. The value added generated by the cotton textile mill will be found as a difference between the value of its output and the value of the inputs used, the latter including current inputs, capital inputs and foreign exchange current obligations. All these elements have to be determined first, using domestic market prices for their valuation.

1.1 Determination of the Project's Value Added (Domestic Market Prices)

In order to have the necessary data for computing the value added of the project, the values of output, current inputs, capital inputs and foreign exchange obligations have to be found separately.

1.1.1 Value of Output

The annual values of output of the mill are stated in Table 14. All domestic items are valued at their domestic market prices while the foreign components were converted into dinars at the official rate of exchange, i.e. 10 dinars for US \$1. The items are broken down in such a way as to enable further analysis

Table 14 shows that the output of the cotton textile mill will not be exported, but used to substitute former imports of the cotton textile. Also the Peruvian Government will support the project during the first four years of operation by giving the subsidy in order to promote development. The largest amount of subsidies is given in 1979, which is the first year of operation, but after the subsidies are getting smaller and finally they are absent in 1982 and in the later years, which reflects Government policy concerning the establishment of the infant industries. It has to be pointed out that the output of the project will be sold partly as the intermediate goods to domestic clothing industry and partly to the final consumers for their further use. While at the beginning the share of the intermediate goods is of about one-fourth of the total output, in 1983 and later it increases indicating the growing demand on the part of the domestic clothing industry.

Table 14. Value of Output
(in CCC Dinars)

Items	Years				Annually	
	1979	1980	1981	1982	1982 - 1983	1983 - 1988
	3	4	5	6	7	8
	F. E.	L. C.	Total	F. E.	L. C.	Total
1. Exports	-	-	-	-	-	-
2. Import substitutes	2,015	555	2,570	2,519	694	3,213
2.1 Essential consumer goods	1,568	432	2,000	1,960	540	2,500
- c.i.f. price	1,568	-	1,568	1,960	-	1,960
- duty and other	-	432	432	-	540	540
2.2 Luxury consumer goods	447	123	570	559	154	713
2.3 Intermediate goods	447	-	447	559	-	559
- c.i.f. price	-	123	123	-	154	154
- duty and other	-	-	-	-	-	-
3. Other	-	-	-	-	-	-
4. Subsidy	-	200	200	-	150	100
4.1 Domestic	-	-	-	-	-	-
4.2 Export	-	200	200	-	150	100
5. Total value of output (1 + 2 + 3 + 4)	2,015	755	2,770	2,519	844	3,363
					794	3,313
					744	3,263
					2,519	2,519
					694	3,213

1/ F. E. = Foreign exchange

2/ L. C. = Local currency

A brief comparison with the project's income previously determined in Table 4, while doing the commercial profitability, shows that the value of output as stated in Table 14 is the same except for the residual value which does not constitute the part of value added of the project.

1.1.2 Value of Current Inputs

Again, starting from Table 5, the current inputs are broken down as needed for further analysis and given in Table 15. Domestic current inputs, exportable and non-exportable, are valued at their domestic market prices. Imported current inputs are expressed at their domestic market price, which means including c.i.f. price, converted into domestic currency at the official rate of exchange, and import duty or tax.

Therefore, it can be seen that the only adjustment in current inputs, for the purpose of testing the absolute efficiency of the project in relation to the commercial profitability analysis, is the proper breakdown as shown in Table 15.

1.1.3 Value of Capital Inputs

The capital inputs from Table 2 have to be broken down analogously. All imported items are stated at the domestic prices, i.e. including c.i.f. price converted at the official rate of exchange into dinars, import duty and other expenses. Duty on imported equipment is 4 per cent of its c.i.f. price. It can be seen that, under the item of imported equipment, the transport costs to site are stated separately, since this is rather demanding an operation, which is going to be carried out by the foreign transport firm. Consequently, the cost of transporting the imported equipment to the site will be paid in foreign currency. Both domestic capital inputs, exportable and non-exportable, are valued at the domestic market prices.

On the basis of the data presented by the investor, it is evident that the preliminary expenses include imported as well as domestic items. Licenses together with the planning and

Table 15. Value of Current Inputs
(in 000 dinars)

	<u>Annually 1980 - 1988</u>			
	<u>1979</u>		<u>Years 4 - 12</u>	
	<u>Foreign Exchange</u>	<u>Local Currency</u>	<u>Foreign Exchange</u>	<u>Local Currency</u>
		<u>Total</u>	<u>Total</u>	<u>Total</u>
<u>1. Direct Production Materials</u>		650	411	912
1.1 Cotton	329	321		401
- Domestic exportable	-	275	-	343
- Synthetic fibres (imported)	-	275	-	343
1.2 Synthetic fibres (imported)	190	12	238	15
- c.i.f. price	190	-	238	-
- Duty and other	-	12	-	15
1.3 Chemicals	139	34	173	43
- Domestic non-exportable	-	26	-	33
- Imported	139	8	173	10
- c.i.f. price	139	-	173	-
- Duty and other	-	8	-	10
<u>2. Indirect Production Materials</u>		102		127
- Domestic exportable	-	12	-	15
- Domestic non-exportable	-	90	-	112
<u>3. Maintenance Parts and Services</u>		46	169	88
- Domestic non-exportable	84	40	-	80
- Imported	84	6	169	8
- c.i.f. price	84	-	169	-
- Duty and other	-	6	-	8
<u>4. Internal Service Cost</u>		10		11
- Domestic non-exportable	-	10	-	11
<u>5. Total Value of Current Inputs (1+2+3+4)</u>	413	479	892	627
			580	1,207

Table 16. Value of capital inputs

(in 000 dinars)

I t e m s	1 9 7 6			1 9 7 7			1 9 7 8			1 9 7 9		
	F. E.	L. C.	Total	F. E.	L. C.	Total	F. E.	L. C.	Total	F. E.	L. C.	Total
1. Fixed assets	17	263	280	198	1,062	1,260	1,762	768	2,530	52	58	130
1.1 Imported equipment	-	-	-	-	-	-	1,762	63	1,825	72	3	75
- c.i.f. price	-	-	-	-	-	-	1,575	-	1,575	72	-	72
- duty (4% of c.i.f.)	-	-	-	-	-	-	-	63	63	-	3	3
- transport cost to site	-	-	-	-	-	-	187	-	187	-	-	-
1.2 Domestic equipment	-	-	-	-	-	-	-	200	200	-	-	-
- exportable	-	-	-	-	-	-	-	50	50	-	-	-
- non-exportable	-	-	-	-	-	-	-	150	150	-	-	-
1.3 Installation cost	-	-	-	-	-	-	-	130	130	-	-	-
- domestic non-exportable	-	-	-	-	-	-	-	130	130	-	-	-
1.4 Land acquisition and development (domestic non-exportable)	-	260	260	-	800	800	-	375	375	-	-	-
- Land	-	30	30	-	-	-	-	-	-	-	-	-
- Buildings	-	225	225	-	800	800	-	375	375	-	-	-
- Other	-	5	5	-	-	-	-	-	-	-	-	-
1.5 Other fixed assets	17	3	20	198	262	460	-	-	-	-	55	55
- Domestic non-exportable	-	-	-	-	230	230	-	-	-	-	55	55
- imported	17	3	20	198	32	230	-	-	-	-	-	-
- c.i.f. price	17	-	17	198	-	198	-	-	-	-	-	-
- duty and other	-	3	3	-	32	32	-	-	-	-	-	-
2. Preliminary expenses	20	40	60	5	-	5	105	10	115	-	20	20
2.1 Licenses	-	-	-	-	-	-	100	-	100	-	-	-
2.2 Planning and consultancy	20	-	20	5	-	5	5	10	10	-	6	6
2.3 Initial advertising	-	-	-	-	-	-	-	-	-	-	4	4
2.4 Start-up expenses	-	-	-	-	-	-	-	-	-	-	-	-
2.5 Training of personnel	-	40	40	-	-	-	-	-	-	-	-	-
2.6 Other preliminary expenses	-	-	-	-	-	-	-	-	-	-	10	10
3. Working capital	-	-	-	-	-	-	600	300	900	-	-	-
3.1 Domestic non-exportable	-	-	-	-	-	-	-	200	200	-	-	-
3.2 Imported	-	-	-	-	-	-	600	100	700	-	-	-
- c.i.f. price	-	-	-	-	-	-	600	-	600	-	-	-
- duty and other	-	-	-	-	-	-	-	100	100	-	-	-
4. Initial investment (1+2+3)	37	303	340	203	1,062	1,265	2,467	1,078	3,545	72	78	150
5. Interest during construction	-	-	-	-	-	-	-	-	-	-	-	-
6. Total investment (4+5)	37	303	340	203	1,062	1,265	2,467	1,078	3,545	72	78	150

consultancy going to be done by the foreign experts, constitute the imported component. All other preliminary expenses, i.e. expenses of initial advertising, start-up expenses, training of personnel expenses and others, will occur in domestic currency and thus represent the domestic non-exportable component.

1.1.4 Value of Foreign Exchange Current Obligations

In order to find out the national value added generated by the cotton textile project, the foreign exchange current obligations have to be deducted as well. Taking into consideration the conditions under which the equipment was purchased abroad and those of foreign financing, stated by the investor and presented in the project formulation, the foreign exchange current obligations were identified and are given in Table 17. The foreign exchange amounts were converted into dinars at the official rate of exchange.

Table 17. Value of Foreign Exchange Current Obligations
(in 000 dinars)

<u>Items</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1984</u>	<u>Annually</u> <u>1985-1988</u>
	<u>3</u>	<u>4</u>	<u>5</u>	<u>6</u>	<u>7</u>	<u>8</u>	<u>9-12</u>
1. Wages	-	-	-	-	-	-	-
2. Royalties	-	-	-	-	-	-	-
3. Interest	111	93	74	56	37	19	-
4. Dividends	-	-	-	-	-	-	-
5. Total (1+2+3+4)	111	93	74	56	37	19	-

Table 17 shows that no wages will be paid to abroad, as the foreign personnel will not be employed in the mill. Furthermore, no royalties will be paid apart from the licenses, which was taken into consideration previously in the value of capital inputs. Also no dividends are paid to foreign investors. Thus the only foreign exchange current obligation appears to be the interest paid on the loan to the foreign machinery supplier.

1.1.5 Value Added of the Project (At the Market Prices)

At this stage of the evaluation all the data needed for the computation of both domestic and national value added are prepared. In order to arrive at the value added of the project, the data from Tables 14, 15, 16 and 17 have to be compiled into a single table and the necessary calculations to be carried out. In doing this, the data from the above-mentioned tables have to be re-arranged to give the appropriate breakdown of all items for the adequate pricing later on. All this is done in Table 18.

Thus Table 18 contains the domestic value added (Row III) and the national value added (Row V) of the project. For our further analysis the national value added of the cotton yarn mill is relevant since the capital and foreign exchange scarcities are pronounced in Perovia, and therefore it is important to find out not only the amount of the value added generated by this project, but also the part of its value added which stays in Perovia after covering all the obligations toward the foreign entities, i.e. the national value added of the project.^{1/}

In our further analysis, which encounters testing of the absolute efficiency of the project, we shall rely on the national value added generated by the cotton textile mill as stated in Table 18 (Row V).

1.2 Absolute Efficiency Test of the Project

Testing the absolute efficiency of the project comprises the comparison of the project's national value added with the resources used by the project, both priced at the domestic market prices. More precisely the project has to pass this test in order to continue with the evaluation, i.e. it has to satisfy the following condition:

^{1/} Of course, the evaluator may in addition to the analysis based on the national value added of the project carry on the evaluation relying on the project's domestic value added. But, if one of the two analyses is going to be done, keeping in mind the achieved stage of development in Perovia, it is recommendable to use the national value added of the cotton textile mill for the national profitability evaluation.

Table 18. Integrated Value Added Analysis
(Project Screening)

(in 000 dinars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
I t e m s	0	1	2	3	4	5	6	7	8	9	10	11	12
I. VALUE OF OUTPUT (1 + 2)													
1. Import substitutes													
1.1 Essential consumer goods				2,570	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213	3,213
1.2 Intermediate goods				2,000	2,500	2,500	1,950	1,950	1,950	1,950	1,950	1,950	1,950
2. Domestic subsidy				570	713	713	713	1,263	1,263	1,263	1,263	1,263	1,263
				200	150	100	50	-	-	-	-	-	-
II. VALUE OF INPUTS (3 + 4)	340	1,265	3,545	1,042	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207
3. Current inputs													
3.1 Imported				892	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207	1,207
3.2 Locally produced				439	613	613	613	613	613	613	613	613	613
3.2.1 Exportable				443	583	583	583	583	583	583	583	583	583
3.2.2 Non-exportable				287	358	358	358	358	358	358	358	358	358
3.3 Internal service cost				156	225	225	225	225	225	225	225	225	225
- domestic non-exportable				10	11	11	11	11	11	11	11	11	11
- domestic non-exportable				10	11	11	11	11	11	11	11	11	11
4. Capital inputs	340	1,265	3,545	150	-	-	-	-	-	-	-	-	-
4.1 Imported	20	230	2,525	75	-	-	-	-	-	-	-	-	-
4.2 Locally produced	260	1,030	905	55	-	-	-	-	-	-	-	-	-
4.2.1 Exportable			50	-	-	-	-	-	-	-	-	-	-
4.2.2 Non-exportable	260	1,030	855	55	-	-	-	-	-	-	-	-	-
4.3 Preliminary expenses	60	5	115	20	-	-	-	-	-	-	-	-	-
4.3.1 Imported	20	5	105	-	-	-	-	-	-	-	-	-	-
4.3.2 Domestic non-exportable	40	-	10	20	-	-	-	-	-	-	-	-	-
III. DOMESTIC VALUE ADDED (I - II)	- 340	- 1,265	- 3,545	1,728	2,156	2,106	2,056	2,006	2,006	2,006	2,006	2,006	2,006
IV. FOREIGN EXCHANGE CURRENT OBLIGATIONS													
5. Interest				111	93	74	56	37	19	-	-	-	-
				111	93	74	56	37	19	-	-	-	-
V. NATIONAL VALUE ADDED (III-IV)	- 340	- 1,265	- 3,545	1,617	2,063	2,032	2,000	1,969	1,987	2,006	2,006	2,006	2,006

$$VAC = \frac{\sum_{t=0}^n (VA)_t a_t}{\sum_{t=0}^n W_t a_t + \sum_{t=0}^n I_t a_t} \geq 1$$

where

- VAC = the absolute efficiency co-efficient
- VA_t = value added of the project in the t^{th} year of its life
- W_t = the amount of wages in the t^{th} year
- I_t = the amount of investment in the t^{th} year
- a_t = discounting factor of the social rate of discount
- n = number of years in the project's life.

Therefore, the expression in the nominator stands for the present value of the project's value added over its life, while in the denominator there is the sum of the present value of wages and the present value of investment outlays. The value added generated by the project during its lifetime has to be at least equal to the value of labour and capital used by the project, or possibly larger, if the project is going to pass the absolute efficiency test.

Data necessary for the above computation are stated in Table 19 containing the nominal annual values of the wages, investment and the value added but also the discounted ones.

Table 19 also contains the discounting factors at the social discount rate of 9 per cent. Therefore, it is judged that this rate reflects the social time preferences in Perovia.

Unfortunately, the Central Planning Bureau of Perovia nor the Perovian Economic Institute did any research related directly to establishing the social rate of discount as a national parameter.

Table 19. Elements for the Absolute Efficiency Test

(in 000 dinars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1976-1988
Time	0	1	2	3	4	5	6	7	8	9	10	11	12	0-12
1. Nominal values of wages	-	-	-	790	901	901	901	901	901	901	901	901	901	-
2. Nominal values of investment	340	1,265	3,545	150	-	-	-	-	-	-	-	-	-	-
3. Nominal values of national value added (at market prices)	-340	-1,265	-3,545	1,617	2,063	2,032	2,000	1,969	1,987	2,006	2,006	2,006	2,006	-
4. Discount factors at the social rate of discount q_t^s	1	0.91743	0.84168	0.77218	0.70843	0.64993	0.59627	0.54703	0.50187	0.46043	0.42241	0.38753	0.35553	-
5. Discounted values of wages (1 x 4)	-	-	-	610	638	585	537	493	452	415	380	349	320	4,779
6. Discounted values of investments	340	1,160	2,984	116	-	-	-	-	-	-	-	-	-	4,600
7. Discounted values of national value added (3 x 4) (at market prices)	-340	-1,160	-2,984	1,249	1,606	1,320	1,193	1,011	991	923	841	777	713	6,140

However, some research was done concerning the internal and external political and economic present and future situation. On the basis of these information the evaluator 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 in the world market at a lower 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 point out the need to improve the country's growth potential, but also asking for an effort to reach as much as possible the economic independence, 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 exports of the 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 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 evaluator has, due to the pronounced prospective domestic and foreign inflation, relative

political instability and strong desire for development of import substituting industries, concluded that the appropriate premium for a domestic project should be rather high. In such a way the 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.

Then the social rate of discount was 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 project.

Having introduced the appropriate values 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 9 per cent and all nominal values of national value added, wages and investment are discounted at 9 per cent and presented in Table 19.

The Summation of the discounted values stated in the last column of Table 19 shows that:

$$\sum_{t=0}^{12} (VA)_t a_t = 6,140,000 \text{ dinars}$$

$$\sum_{t=0}^{12} W_t a_t = 4,779,000 \text{ dinars}$$

$$\sum_{t=0}^{12} I_t a_t = 4,600,000 \text{ dinars}$$

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

$$VAC = \frac{6,140,000}{4,779,000 + 4,600,000} = 0.65.$$

Thus the absolute efficiency co-efficient of the cotton textile project is 0.65, i.e. it is smaller than one. This means that the cotton textile project generates 0.65 units of the national value added per unit of labour and capital used, or uses more resources than the value added generates. Consequently, this project does not pass the absolute efficiency test and has to be rejected, meaning that no further evaluation is needed.

In spite of this rather straightforward conclusion, we shall proceed with the analysis to see whether the introduction of the corrected prices in value added computation and especially the contribution of the cotton textile mill to other development goals will change our first judgement.^{1/}

2. Testing the Relative Efficiency of the Project (Contribution to National Value Added at Corrected Prices)

Like in testing the absolute efficiency of the cotton textile mill, we shall again determine national value added of the project and then relate it to the resources used. However, there are some very important new elements in measuring the relative efficiency of the project as opposed to its absolute efficiency. First, when testing the absolute efficiency the national value added was determined at the domestic market prices, while in measuring the relative efficiency the national value added is valued at the corrected prices.

Second, when comparing the national value added generated by the project over its lifetime, we shall not relate it to the labour and capital used by the project, like in testing the absolute efficiency,

^{1/} Additional argument for continuing the analysis may also be the wish to illustrate the complete process of the national profitability evaluation.

but only to the most pronounced scarce factor. As the capital and foreign exchange scarcity situations were identified in Perovic, the relative efficiency test in the capital scarcity and the foreign exchange scarcity will be performed.

2.1 Determining the Project's Value Added (Corrected Prices)

All the items necessary for the computation of the value added are already mentioned in Table 16, but there they were valued at the domestic market prices. Now we have to apply the corrected prices to these items. Thus import substitutes are priced at their c.i.f. prices converted into dinars at the shadow rate of exchange, the imported current and capital inputs at their c.i.f. prices converted into dinars at the shadow rate of exchange, domestic exportable current and capital inputs at their f.o.b. prices converted into dinars at the shadow rate of exchange, while domestic non-exportable current and capital inputs are valued at the domestic market prices. Also the foreign exchange current obligations are expressed at the contracted value in foreign exchange and then converted into dinars at the shadow rate of foreign exchange. However, we shall proceed in two steps, when introducing the corrected prices. First, the foreign components will be converted into dinars at the official rate of exchange and later at the shadow rate.

2.1.1 Integrated Value Added Analysis (Project Ranking - Initial Phase)

Starting from Table 16 the items were valued at the above-mentioned prices and all foreign components converted into local currency at the official rate of exchange, i.e. 10 dinars to one US dollar. This is presented in Table 20.^{1/}

Table 20 was worked out partly on the basis of the information already submitted by the investor in the project formulation, and partly using the information given at the later request of the evaluator. Thus, in spite of risking to mention the obvious, it is pointed out that:

^{1/} Table 20 is introduced mostly for practical reasons of checking the results and is by nature nothing more than a transitory table.

- The f.o.b. price of cotton is 10 per cent lower than its domestic market price;
- The f.o.b. price of the domestic exportable capital inputs is 20 per cent lower than the domestic market price;
- The value of imported components of the preliminary expenses was stipulated in the contract with the foreign suppliers, and due to their nature no import duty is paid, and they all are considered as valued at the c.i.f. prices;
- The transport cost of the imported equipment to the site is contracted too and has to be paid to the foreign transporter. Again, no duty is charged on these imported services, meaning that they are valued at c.i.f. prices.

Taking all this into consideration, the national value added of the cotton textile mill was determined, but since the foreign components are converted to local currency at the official rate of exchange, we may consider this to be the initial phase of determining the value added at the corrected prices. A further step involves converting the foreign exchange components from Table 20 into dinars at the shadow rate of exchange. Consequently, we have to find out the shadow rate of exchange first.

2.1.2 Shadow Rate of Foreign Exchange

It is known that the Central Planning Bureau of Peruvia did not set up the shadow rate of exchange as a national parameter. Therefore, first it has to be decided whether to use the shadow rate of exchange or not at all. In the publication "Economic Survey of Peruvia", issued annually by the Central Planning Bureau among other information of an economic nature, the balance of payments situation over the last ten years, together with the projected one for 1975 was shown. The aggregated information concerning the exports and imports were reproduced in Table 21.

As shown in Table 21 there is a chronic balance of payments deficit in Peruvia in the period 1971-1975, and it is estimated

Table 21. Peruvia's Balance of Payments 1971-1975
(in million dinars)

<u>Years</u>	<u>Exports</u>		<u>Goods</u>	<u>Imports</u>		<u>Total</u>	<u>Freemur</u>
	<u>Goods</u>	<u>Invisible</u>		<u>Invisible</u>	<u>Total</u>		
1971	8,020	310	12,530	510	12,540	0.505	
1972	8,690	350	13,425	525	13,950	0.543	
1973	9,480	300	13,338	580	14,420	0.462	
1974	10,030	400	15,299	611	15,910	0.525	
1975	10,660	450	15,332	598	16,430	0.479	
1971-1975	46,880	1,890	70,424	2,826	73,250	0.502	

that the situation will not change substantially in the years to come. This is why the demand for the 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 shadow rate of foreign exchange should be used in the national profitability evaluation of the cotton textile mills.

On the basis of the disposable information, the shadow rate of foreign exchange premium will be estimated as:

$$SRF_p = \frac{M - D}{E} ,$$

where

- SRF_p = the shadow rate of foreign exchange premium
- M = the value of imports
- D = the value of the balance of payments deficit, i.e. imports minus exports
- E = the value of exports.

In doing so, we shall confine ourselves only to the last five years, and for 1971 the premium is:

$$SRF_p = \frac{12,540 - 1,210}{8,330} = 0.505,$$

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

Table 21 shows that the premium varies from year to year and this is a reason to find an average premium for the whole period 1971-1975. If the premium is estimated on the basis of a five-year period, it amounts to 0.502. This means that the shadow rate of foreign exchange is 50.2 per cent higher than the official rate, or it is 15.2 dinars to a dollar.

Having estimated the shadow rate of foreign exchange on the basis of the balance of payments situation, due to the

importance of this rate, we shall check our results by trying to estimate the shadow rate of exchange starting from the import pattern of Peruvia. We shall do this relying on the projected future import pattern of Peruvia, which is derived from the import pattern over the last few years and the estimates concerning the future import pattern arrived at through a discussion with the representatives of the Central Planning Bureau.

It has been observed that the increased availability of foreign exchange in Peruvia stimulates the growth of imports, and does not reduce the exports. In this situation we shall estimate the shadow rate of foreign exchange using the expression:

$$SRF = \sum_{i=1}^n f_i \frac{P_i^d}{P_i^{cif}}$$

where

- SRF = the shadow rate of foreign exchange
- P_i^d = the domestic market price of the i^{th} import
- P_i^{cif} = the c.i.f. price of the i^{th} import expressed in foreign currency
- f_i = the fraction of the additional foreign exchange available to be allocated to the i^{th} import.

For this purpose two groups of commodities were singled out, the intermediate goods A and D, as well as the consumer goods B and C. The computations are carried out under the assumption that:

$$f_A + f_B + f_C + f_D = 1.$$

The relevant information is given in Table 22.

Having included the relevant numbers in the expression for SRF, we obtain:

$$\text{SRF} = 250 \frac{0.25}{200} + 10 \frac{0.35}{5} + 30 \frac{0.15}{30} + 200 \frac{0.25}{150} = 1.496$$

which turns out to be the shadow rate of a unit of foreign exchange in dinars. In other words, the shadow rate of exchange is 14.96 dinars to a dollar.

Now we have two estimates. The estimated shadow rate on the basis of the balance of payments is 15.2 dinars to a dollar, while the import pattern estimates suggest this rate to be 14.96 dinars to a dollar. Since we are concerned with the estimates, and not the exact numbers, we shall for all practical purposes adopt the shadow rate of foreign exchange of 15 dinars to a dollar. This is the rate going to be used in further evaluation of the cotton textile project.

Table 22. Peruvia's Future Import Pattern

<u>Commodities to be Imported</u>	<u>f</u>	<u>P^d in dinars</u>	<u>P^{cif} in dollars</u>
A	0.25	250	200
B	0.35	10	5
C	0.15	30	30
D	0.25	200	150
-	1.00	-	-

2.1.3 Integrated Value Added Analysis (Project Ranking - Final Phase)

As stated earlier, in Table 20, all the foreign components were converted into local currency at the official rate of exchange. The shadow rate of foreign exchange having now been estimated, we may convert these items from Table 20. into dinars at the shadow rate of exchange, meaning at the rate of 15 dinars to a dollar. This applies to the import substitutes,

imported current and capital inputs, domestic exportable current and capital inputs, domestic exportable current and capital inputs, as well as to the foreign exchange current obligations. Of course, domestic non-exportable current and capital inputs are valued at the domestic market prices and remain the same as in Table 20. The results of applying the shadow rate of exchange in computing the value added of a project are presented in Table 23.

The annual amounts of the national value added of the cotton textile mill at the corrected prices, given in Table 23, are different from those in Table 18, which are at the market prices. More precisely, the negative value added during the construction period is higher than earlier, due to the imported capital inputs, which are valued now at the shadow rate of exchange, being higher than the official one. Equally, the positive value added in the years of the operation period are higher, which is definitely in favour of this project, due to the application of foreign exchange shadow prices, which led to the increased value of the project's output.

At this stage of analysis it is impossible to state whether the increased negative amounts of value added in the implementation period are counter-balanced by the larger amounts of the value added in the operation period, i.e. to see whether the cotton textile mill during its lifetime generates more value added if priced at the corrected rather than at the market prices. In order to reach this conclusion, the annual amounts of value added from Table 23 have to be discounted to their present value and then compared to the present value of the project's value added computed at the market prices, the latter being given in Table 19.

The national value added at the corrected prices having been found, we may go on to testing the relative efficiency of the project. This is going to be done in the capital scarcity, but also in the foreign exchange scarcity situation, both being relevant for Peruvia.

Table 23. Integrated Value Added Analysis
(Project Ranking - Final Phase)

(in OOC dinars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
I t e m s	0	1	2	3	4	5	6	7	8	9	10	11	12
I. VALUE OF OUTPUT (1 + 2)													
1. Import substitute	-	-	-	3,222	3,928	3,878	3,828	3,778	3,778	3,778	3,778	3,778	3,778
1.1 Essential consumer goods	-	-	-	3,022	3,778	3,778	3,778	3,778	3,778	3,778	3,778	3,778	3,778
1.2 Intermediate goods	-	-	-	2,352	2,940	2,940	2,940	2,293	2,293	2,293	2,293	2,293	2,293
2. Domestic subsidy	-	-	-	670	670	670	670	1,185	1,485	1,485	1,485	1,485	1,485
	-	-	-	200	150	100	50	-	-	-	-	-	-
II. VALUE OF INPUTS (3 + 4)													
3. Current inputs	355	1,334	4,501	1,355	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
3.1 Imported	-	-	-	1,172	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600	1,600
3.2 Locally produced	-	-	-	619	870	870	870	870	870	870	870	870	870
3.2.1 Exportable	-	-	-	543	719	719	719	719	719	719	719	719	719
3.2.2 Non-exportable	-	-	-	387	483	483	483	483	483	483	483	483	483
3.3 Internal service cost	-	-	-	156	236	236	236	236	236	236	236	236	236
- domestic non-exportable	-	-	-	10	11	11	11	11	11	11	11	11	11
4. Capital inputs	355	1,334	4,501	183	-	-	-	-	-	-	-	-	-
4.1 Imported	25	297	3,262	108	-	-	-	-	-	-	-	-	-
4.2 Locally produced	260	1,030	915	55	-	-	-	-	-	-	-	-	-
4.2.1 Exportable	-	-	60	-	-	-	-	-	-	-	-	-	-
4.2.2 Non-exportable	260	1,030	355	55	-	-	-	-	-	-	-	-	-
4.3 Preliminary expenses	70	7	167	20	-	-	-	-	-	-	-	-	-
4.3.1 Imported	30	7	157	-	-	-	-	-	-	-	-	-	-
4.3.2 Domestic non-exportable	40	-	10	20	-	-	-	-	-	-	-	-	-
III. DOMESTIC VALUE ADDED (I - II)													
	- 355	- 1,334	- 4,501	1,867	2,328	2,278	2,228	2,178	2,178	2,178	2,178	2,178	2,178
IV. FOREIGN EXCHANGE CURRENT OBLIGATIONS													
5. Interest	-	-	-	166	139	111	84	55	28	-	-	-	-
	-	-	-	166	139	111	84	55	28	-	-	-	-
V. NATIONAL VALUE ADDED (III - IV)													
	- 355	- 1,334	- 4,501	1,701	2,189	2,167	2,144	2,123	2,150	2,178	2,178	2,178	2,178

2.2 Relative Efficiency Test of the Project in the Capital Scarcity Situation

This stage of the evaluation involves the comparison of the value added of the project at the corrected prices with the capital invested. The relative efficiency co-efficient in the capital scarcity situation is given as:

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

where

- VAC_c = the relative efficiency co-efficient
- VA_t = value added of the project at the corrected prices in the t^{th} year of its life
- I_t = amount of investment at the corrected prices in the t^{th} year
- a_t = discounting factor of the social rate of discount
- n = number of years in the project's life.

All the relevant data for this computation are given in Table 24, which contains the nominal and discounted values of the investments and value added.

The last column in Table 24 states, apart from the other information, the present value of the investments and the present value of the project's value added, both at the corrected prices. Introducing these magnitudes to the above expression, we obtain the relative efficiency co-efficient in the capital scarcity situation as:

$$VAC_c = \frac{5,963,000}{5,508,000} = 1.083.$$

Thus the relative efficiency co-efficient indicates that in the cotton textile project a unit of the investment outlays generates 1.083 units

Table 24. Elements for the Relative Efficiency Test

(in 000 dinars)

Y e a r s	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1976- 1988
I t e m s	0	1	2	3	4	5	6	7	8	9	10	11	12	0-12
1. Nominal values of investment	355	1,334	4,501	183	-	-	-	-	-	-	-	-	-	-
2. Nominal values of net foreign exchange earnings	- 55	-304	-3,479	1,742	2,286	2,314	1,341	2,370	2,397	2,425	2,425	2,425	2,425	-
3. Nominal values of national value added (at corrected prices)	-355	-1,334	-4,501	1,701	2,189	2,167	2,144	2,123	2,150	2,178	2,178	2,178	2,178	-
4. Discount factors at the social rate of discount 9%	1	0.91743	0.84163	0.77218	0.70943	0.64993	0.59627	0.54703	0.50187	0.46043	0.42241	0.38753	0.35553	-
5. Discounted values of investment (1 x 4)	355	1,224	3,788	141	-	-	-	-	-	-	-	-	-	5,508
6. Discounted values of net foreign exchange savings	- 55	-279	-2,928	1,345	1,619	1,504	1,396	1,296	1,203	1,116	1,024	940	862	9,043
7. Discounted values of national value added (at corrected prices) (3 x 4)	-355	-1,224	-3,788	1,313	1,551	1,408	1,278	1,161	1,079	1,002	920	844	764	5,963

of the national value added when the whole life of the project is taken into consideration.

This relative efficiency co-efficient of the cotton textile mill has to be further compared with the corresponding co-efficients of other projects competing for the same capital. All the project having this co-efficient larger than 1.083 will be considered, other things being equal, as more acceptable than the cotton yarn mill. Those with the lower co-efficient will be inferior to the cotton yarn mill.

2.3 Relative Efficiency Test of the Project in the Foreign Exchange Scarcity Situation

Following the same logic, the value added generated by this project has to be related now to the net foreign exchange used by the project over its lifetime. The relative efficiency co-efficient in the foreign exchange scarcity situation will be the indicator in this respect. This co-efficient is defined as:

$$VAC_f = \frac{\sum_{t=0}^n (VA)_t \cdot e_t}{\sum_{t=0}^n F_t \cdot r_t}$$

where the previously mentioned symbols have the same meaning as before and F_t stands for the amount of foreign exchange used by the project in the t^{th} year. This amount is determined in each year as:

$$F_t = f_d - (f_c + f_m + f_l + f_o) - f_{c_0}$$

where

- f_d = project's foreign exchange earnings or savings
- f_c = foreign exchange component in the capital inputs
- f_m = foreign exchange component in the material inputs
- f_l = foreign exchange component in labour
- f_o = other foreign exchange commitments of the project (e.g. royalties, etc.)

f_c = foreign exchange losses due to the use of domestic exportable current and capital inputs, which were previously exported.

The data involved in computing the annual amounts of the foreign exchange used by the cotton textile project are given in Table 25.

As can be seen from Table 25 the contribution of the mill to the national reserves of foreign exchange consists of saving the foreign exchange due to the production of formerly imported cotton textile. But at the same time this project leads to the losses of foreign exchange due to the imported current and capital inputs, wages to the foreign personnel, royalties and interest to foreign loans. Furthermore, it uses some current and capital inputs previously exported and thus additionally reduces Peruvia's foreign exchange reserves. The difference between the savings and losses was worked out in each year to see the net annual foreign exchange savings.

All the items in Table 25, which are in real life expressed in foreign currency, were converted into dinars at both the official and the shadow rate of exchange. For the relative efficiency test of the project in the foreign exchange scarcity situation, only the values converted at the shadow rate of exchange are relevant. They were reproduced in their nominal values and then discounted at the social rate of discount in Table 24.

Table 24 in its last column offers the necessary elements for computing the relative efficiency co-efficient in the foreign exchange scarcity situation. Thus we obtain:

$$VAC_f = \frac{5,963,000}{9,043,000} = 0.659 .$$

This means that the cotton textile mill will generate 0.659 units of the national value added per unit of foreign exchange used when all its savings and needs of the foreign exchange over the whole lifetime are taken into consideration. Of course, any project having this co-efficient higher than 0.659 will be preferable, other things remaining equal, to the cotton textile mill, and those with the lower one will be less attractive.

3. Evaluation of the Project in the Light of Other Development Goals

3.1 Introduction

Up to now the evaluation has been oriented toward appraising the project's contribution to the national value added of Peruvia. The absolute efficiency test of the cotton textile mill has already shown that it is not acceptable on the grounds of its value added formation. However, it remains to be seen whether this project is justified when the other development goals are considered.

The present stage of social and economic development of Peruvia suggests, and this was clearly pronounced by the Five-Year Development Plan of Peruvia, that the project's impact on employment, distribution among social groups, balance of payments position and better usage of idle capacity in the country should be viewed as very important too. Consequently, the evaluation will be oriented toward the estimation of the project's employment effect, distribution effect, balance of payments effect and idle capacity effect.

3.2 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 a total number of workers additionally employed will be assessed. But 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:

$$E_e = \frac{TI}{W_u + W_s} ,$$

where

E_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 project formulation of the cotton textile mill, and partly after making a special inquiry, the evaluator gathered the necessary information for computing the employment effect, which is presented in Table 26.

Table 26. Elements for the Employment Effect Estimation

<u>Location of Effect</u>	<u>Number of Workers Employed</u>			<u>Capital Invested</u> (in 000 dinars)
	<u>Unskilled Workers</u>	<u>Skilled Workers</u>	<u>Total</u>	
1. Cotton yarn mill	370	2,037	2,357	5,300
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)	501	2,052	2,553	5,557

The cotton textile mill will, therefore, directly and indirectly create 2,553 new job opportunities, but for this 5,557,000 dinars need to be invested.

By introducing this information in the expression for the employment effect, we get:

$$E_o = \frac{5,557,000}{501 + 2,052} = 2,176,655$$

showing that it is necessary to invest 2,176,655 dinars to open a single new job.

3.3 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 and the profit earners. This means that the distribution effect will be computed according to the following expressions:

$$E_d = \frac{\sum_{t=0}^n (VA_w)_t a_t}{\sum_{t=0}^n (VA)_t a_t} ,$$

where

- E_d = distribution effect
- $(VA_w)_t$ = value added distributed to the wage earners in the t^{th} year
- $(VA)_t$ = value added generated by the project in the t^{th} year
- a_t = discounting factor reflecting the social rate of discount.

In the absence of fringe benefits, as it is the case, we may adopt that the part of value added distributed each year to the wage earners is equal to the amount of their wages. In our notation this means that $(VA_w)_t$ is equal to the amount of wages in the t^{th} year. Both wages and value added of the project are expressed at the market prices.

The information needed for the computation is already available in Table 19, and the employment effect of this project is:

$$E_d = \frac{4,779,000}{6,140,000} = 0.778 .$$

Hence, out of every unit of the national value added generated by the cotton textile project, the wage earners will get 0.778 units. Or, three-fourths of the project's value added will be distributed to the wage earners in terms of wages.

3.4 Balance of Payments Effect

The implementation and operation of the cotton textile mill will require the foreign exchange, but on the other hand, this project will save Peruvia some foreign exchange since it produces the cotton textile

which is currently being imported. In order to assess the impact of the project on the balance of payments, the balance of payments effect will be estimated. This effect is expressed as:

$$E_f = \sum_{t=0}^n \frac{1}{(1+r)^t} (FI - FO)_t$$

where

- E_f = balance of payments effect
- FI_t = foreign exchange inflows in the t^{th} year
- FO = foreign exchange outflows in the t^{th} year
- r_t = discount factors of the social rate of discount
- n = number of years in the project's life.

The information needed for estimating the balance of payments effect of the cotton textile mill is given in Table 27.

Even though it might seem obvious, we point out that Table 27 includes information basically derived from Table 25, but in addition to the latter it contains the foreign loan as the foreign exchange inflow and its repayment as the foreign exchange outflow. Furthermore, the items in Table 25 were expressed in dinars applying the shadow rate of exchange, while Table 27 states the foreign exchange inflows and outflows in foreign currency.

The analysis of the balance of payment could be carried out taking into consideration the whole life of the project, but also on the annual basis. Table 27 indicates that the cotton textiles mill will have, over its implementation period, negative net foreign exchange inflows, which means that the foreign loan given by the machinery supplier is not sufficient to provide it with the necessary foreign exchange. However, starting in 1979 and later the project has positive annual net foreign exchange inflows, stating that in spite of repaying the foreign loan, importing current inputs and using the domestic exportable current inputs,

Table 27. Elements for the Balance of Payments Effect Estimation

(in 000 dollars)

	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1976-1988
	C	1	2	3	4	5	6	7	8	9	10	11	12	C-12
I. FOREIGN EXCHANGE INFLOWS (1+2)	-	-	223.0	201.5	251.9	251.9	251.9	251.9	251.9	251.9	251.9	251.9	251.9	-
1. Savings by import substitution	-	-	-	201.5	251.9	251.9	251.9	251.9	251.9	251.9	251.9	251.9	251.9	-
1.1 Essential consumer goods	-	-	-	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	156.0	-
1.2 Intermediate goods	-	-	-	44.7	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	55.9	-
2. Foreign loan	-	-	223.0	-	-	-	-	-	-	-	-	-	-	-
II. FOREIGN EXCHANGE OUTFLOWS (3+4+5+6+7+8)	3.7	20.3	232.0	122.6	136.7	134.8	123.0	131.1	129.3	90.2	90.2	90.2	90.2	-
3. Current inputs imported	-	-	-	41.3	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	58.0	-
4. Capital inputs imported	1.7	19.8	217.5	7.2	-	-	-	-	-	-	-	-	-	-
5. Wages to foreign personnel	2.0	0.5	0.5	-	-	-	-	-	-	-	-	-	-	-
6. Foreign loan repayment	-	-	-	48.3	46.5	44.6	42.8	40.9	39.1	-	-	-	-	-
6.1 Principal	-	-	-	37.2	37.2	37.2	37.2	37.2	37.2	-	-	-	-	-
6.2 Interest	-	-	-	11.1	9.3	7.4	5.6	3.7	1.9	-	-	-	-	-
7. Licenses	-	-	10.0	-	-	-	-	-	-	-	-	-	-	-
8. Domestic exportable inputs used	-	-	4.0	25.8	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	-
8.1 Current inputs	-	-	-	25.8	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	32.2	-
8.2 Capital inputs	-	-	4.0	-	-	-	-	-	-	-	-	-	-	-
III. NET FOREIGN EXCHANGE INFLOWS (I - II)	- 3.7	-20.3	-9.0	78.9	115.2	117.1	118.9	120.8	122.6	161.7	161.7	161.7	161.7	-
IV. Discount factors at the social rate of discount 9%	1	0.91743	0.84168	0.77218	0.70843	0.64993	0.59627	0.54703	0.50187	0.46043	0.42241	0.38753	0.35553	-
V. Discounted values of the net foreign exchange inflows	- 3.7	-18.6	-7.6	60.9	81.6	76.1	70.9	66.1	61.5	74.4	68.3	62.6	57.5	650.0

it saves still more foreign exchange for Peruvia by producing the cotton yarn which is now being imported.

By discounting the annual net foreign exchange inflows at the social rate of discount, we arrive at the balance of payments effect over the entire project's life. From the last column of Table 24 it is evident that the cotton textile mill will generate, or more precisely, save over its lifetime 650,000 dollars in terms of present value. Hence, the amount of the foreign exchange saved for Peruvia by implementation of this project would be such that in spite of repaying the foreign loan, using the imported and domestic exportable inputs, there is still a surplus which in terms of present value amounts to 650,000 dollars.

3.5 Idle Capacity Effect

It has been noted that there is an idle capacity for the domestic non-exportable chemicals producers, as well as in the domestic production of the indirect production materials, both 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, we have 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:

$$E_1 = \frac{\sum_{t=0}^n (VA)_t a_t + \sum_{t=0}^n (VA_1)_t a_t}{\sum_{t=0}^n I_t a_t}$$

where

E_1 = idle capacity effect

$(VA)_t$ = value added generated by the project being evaluated in the t^{th} year

$(VA_1)_t$ = 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 of the social rate of return
- n = number of years in the project's life.

Some of the necessary information to estimate the idle capacity effect was already prepared. Present value of the value added generated by the cotton textile mill and the present value of its investment could be found in Table 24, amounting to 5,963,000 dinars and 5,508,000 dinars respectively. However, the information regarding the value added generated in the linked-up sector is still missing.

After analysing 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 28.

Table 28. Value Added in the Linked-up Sectors
(in 000 dinars)

<u>Items</u>	<u>1979</u>	<u>1980</u>	<u>1981</u>	<u>1982</u>	<u>1983</u>	<u>1979-1983</u>
	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 Value Added (1+2)	275	215	135	60	20	-
4. Discount Factors at the Social Rate of Discount 9%	0.77218	0.70843	0.64993	0.59627	0.54703	-
5. Discounted 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 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 Peruvia.

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

$$E_1 = \frac{5,263,000 + 499,000}{5,508,000} = 1.173 \quad .$$

Thus, the implementation of the cotton textile mill will generate, after including the value added in the sectors presently with the idle capacities, over the whole of its life 1.173 units of value added per unit of investment.

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 1.083 units of value added when the whole life of the project is considered.^{1/} 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.

^{1/} See Section 2.2 in the National Profitability Evaluation.

IV. EVALUATION SUMMARY OF THE COTTON TEXTILE MILL

Having finished the commercial and national profitability evaluation of the cotton textile mill, it is practical to state explicitly the results. This is done for better understanding of those who are going to deal with the project, but it is even more important as the aggregated information for the policy maker. The basic results of the evaluation and main conclusions are presented in Table 29.

The evaluation summary presented in Table 29 refers only to the cotton textile mill. The table of the same nature has to be worked out after the proper evaluation for each project in the competition. Then the evaluator is in a position to establish the ranking of the projects and through the evaluation summary tables offer the appropriate information to the policy makers, who will on the basis of this make the choice of the projects to be implemented.

Table 29. Evaluation Summary

Criteria	Evaluation Results
<u>I. Commercial Profitability</u>	
1. R - simple rate of return on total investment	R = 12.6%, i.e. this is the maximum rate of interest on the loans. Since the prevailing market interest rate is 10%, the project is commercially satisfactory.
2. R _o - simple rate of return on equity capital	R _o = 19.9%, the project is acceptable unless there exist better possibilities for the private sector to invest.
3. Pay-off period	9.5 years. The project is satisfactory.
4. Net present value (NPV)	is 372,000 dinars which is not sufficient.
5. Ratio of NPV to the present value of total investment (PVI)	PVI = 0.084, since it is lower than unity, the project is not acceptable.
6. Internal rate of return (i _r)	i _r = 10.705, almost indifferent, since market interest rate is 10%. Acceptable only if no better projects at disposal.
7. Net cash balance (NCB)	Shows high deficits in years 1978 and 1979 and relatively small positive NCB values in each of the years thereafter. Acceptable since total cumulative net cash balance is positive (4,215,000 dinars) but only if modified.
<u>General Conclusions on Commercial Profitability:</u>	
Project is acceptable only if modified as follows:	
- Increase of capacity to optimum scale;	
- Reduction of the capital intensity of the project.	

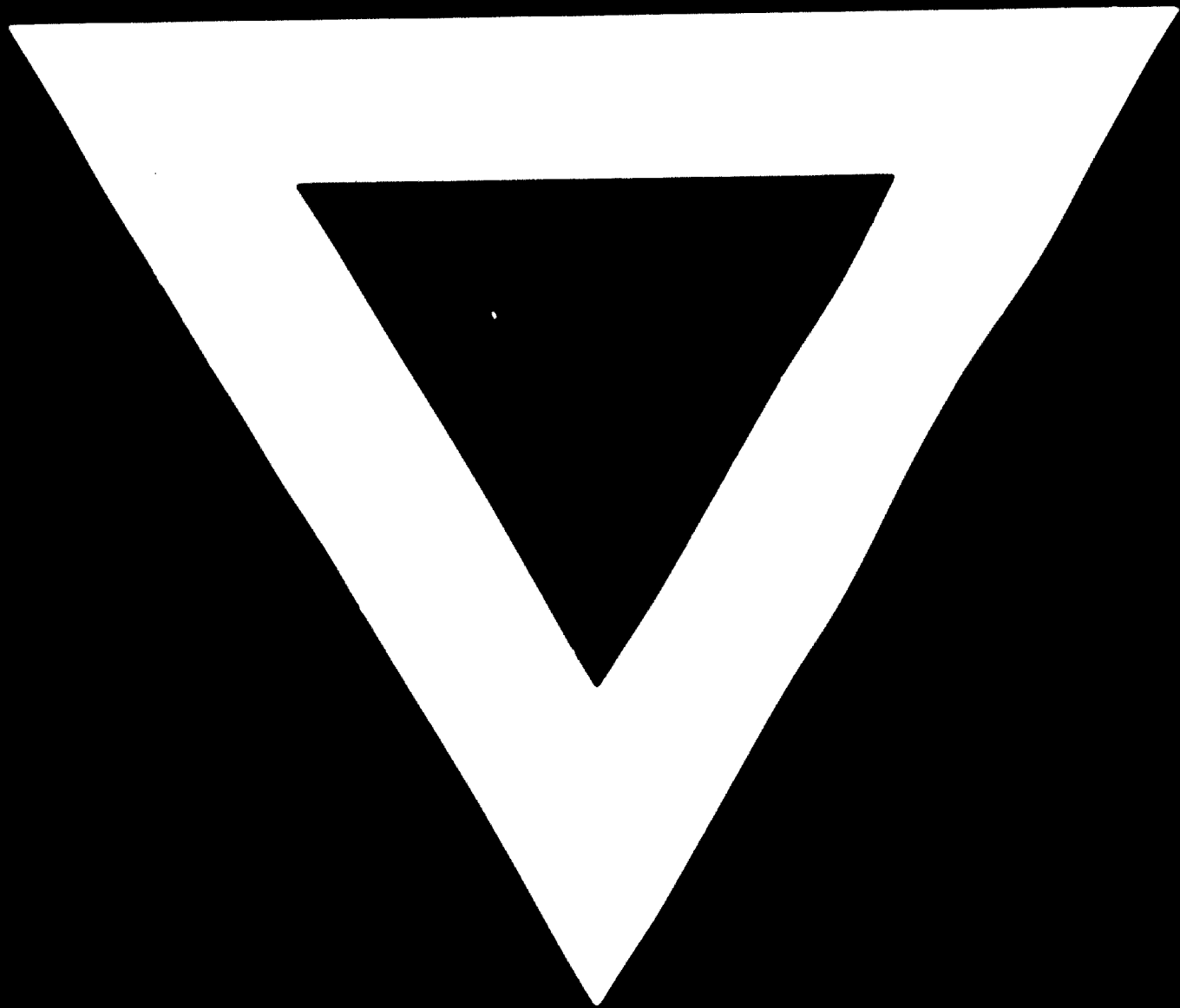
Criteria	Evaluation Results
II. National Profitability Analysis	
1. National value added formation	
1.1 Absolute efficiency (VAC)	VAC = 0.69, i.e. less than unity, project uses more labour and capital than it contributes to national value added; not acceptable.
1.2 Relative efficiency in capital scarcity (VAC _c)	VAC _c = 1.033. Dinar of investment generates 1.033 dinars of national value added. To be compared with other projects.
1.3 Relative efficiency in foreign exchange scarcity (VAC _f)	VAC _f = 0.699. Unit of foreign exchange generates 0.699 units of national value added. To be compared with other projects.
2. Other development goals	
2.1 Employment effect (E _e)	E _e = 2,176,650 dinars of investment for newly employed. To be compared with other projects.
2.2 Distribution effect (E _d)	E _d = 0.778. Wage earners get 77.8% of the project's national value added. To be compared with other projects.
2.3 Balance of payments effect (E _p)	E _p = US \$650,000. This is the present value of foreign exchange saved in the balance of payments by import substitution after satisfying all foreign exchange obligations of the project.
2.4 Idle capacity effect (E _i)	E _i = 1.173. Dinar of investment in the mill generates 1.173 dinars of national value added within this project and directly linked sectors. To be compared with other projects.

Criteria	Evaluation Results
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General Conclusions on National Profitability:

- National value added not sufficient and project to be rejected on these grounds;
- Contribution to employment, balance of payments, distribution and idle capacity usage is positive. On these grounds the project is acceptable;
- Definite decision to be taken after comparison with other projects, or to be modified as suggested in commercial profitability analysis.





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