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A FEASIBILITY STUDY OF «SIBLINE» CEMENT PLANT.

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O U T L I N E

ECONOMIC FEASIBILITY OF «SIBLINE» CEMENT PLANT.

I. Statement of the Hypothesis .

II. Definition of Cement Product and Production Process .

III. Economic of Cement Industry .

- A) High Transportation Cost.
- B) Labor Intensive Industry.
- C) Different Quality and Specifications.
- D) Fluctuating Prices and Elastic Demand.

IV. Demand Determinats for Cement .

- A) Demand Conditions of Cement.
- B) Components of the Local & Market Demand.
- C) The Historical trend of Demand for Cement in Lebanon.
- D) Forecasted Demand : 1986 - 2000 .
  - a. Least squares technique .
  - b. UNIDO Function-Econometric Model - Single Equation.

V. Cement Factories in Lebanon .

- A) The Lebanese Cement Company (Chekka).
- B) The National Cement Company (Chekka).
- C) Description of Sibline Cement Project.

VI. Profitability Indicators

- A) Break-Even Production Level (B.E).
- B) Nqt Present Value (NPV).

C) Internal Rate of Return (IRR).

VII. Conclusion :

Recommendation and Summary .

I. STATEMENT OF THE HYPOTHESIS

The purpose of this paper is to test the economic viability of Sibline Cement Plant. Different investment criteria used in project evaluation are applied, namely : the Net Present Value of the Project, the Internal Rate of Return and the Break-Even Level of Production.

Since the viability of the project depends heavily on the presence of sufficient demand for cement both in the domestic and in the export markets, and consequently on the most likely share of the market it will occupy, this paper has investigated the nature and magnitude of expected demand using different forecasting techniques. Moreover the impact of similar and competing cement plants in Lebanon are fully explored.

Capital costs, operating costs and financing of the project are estimated and explained. Similarly, ex-factory price of cement per ton is estimated based on the prevailing domestic price and C.I.F. of imported cement through Beirut seaport to estimate the revenue stream of the project. Finally, even though the technical process of cement is beyond the scope of this paper, a brief idea will be given about the wet and dry processes in general, and particularly the process used by Sibline.

II. DEFINITON OF CEMENT PRODUCT AND PRODUCTION PROCESS

In modern times, the term «Cement» refers to a variety of commercial products which have one important feature in common , namely, their ability to act as bonding agents. Many cohesive materials such as glues , pastes, lime and asphalts fit in the definition . However, the extensive application of cement in construction activities has lead to its general recognition as a product with calcareous (lime) base, and the term usually designates Portland cement [1].

Some writers on the cement industry have described its production process as «putting a mountain through a sieve»[2]. This is true as the finished cement would have to be so finely milled that it will pass through a sieve fine enough to hold water. Although the production process involves around eighty different steps , it could at best be described in terms of its major steps [3].

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[1] John G. Glover and Rudolph L. Laquai (eds.) The Development of American Industries : The Economic Significance (4th ed., New York : Simons-Bordman Publishing Corporation, 1959), p. 446 .

[2] Samuel M. Loesher, Imperfect Collusion in the Cement Industry (Cambridge : Harvard University Press, 1959), p. 33 .

[3] Interview with an Industrial Engineer at SIBLINE Plant

Step 1 : Raw Materials and their Preparation for Burning

The raw materials of Portland cement are chiefly a mixture of calcareous materials such as limestone, marl, or chalk, and agrillaceous materials such as clay or shale .These materials furnish the essential constituents of cement namely lime silica, alumina, and iron excide. In Lebanon, limestone provides the lime requirement while clay and sand supplement the other constituents.

In the two plants at Chekka , limestone is first quarried from adjacent quarries and transported by trucks to gyratory crushers capable of reducing the hard and rocky blocks to one inch diameter pieces. Then, the crushed materials are transported by trucks, aerial ropeway, or conveyor belts, to the plants storage bins where different materials are stored separately. The clay on the other hand is dug from its pits in nearby locations as Coura and Bischmizeen and transported by trucks to the storage bins of the plants.

Therefore,a further process is applied before the materials are finally ready for the burning step. Depending on the water content of the raw materials , one of two techniques may be used : The dry, or the wet process . For raw materials with a low moisture content the dry method is used, while if the water content is usually high the wet method is used. At

Sibline Cement Plant the dry method was adopted.

In the dry process, the raw materials are usually crushed separately, stored, and mixed dry before grinding.Clay and other material with high moistrue contents are passed into rotary dryers to expel moisture before mixing with limestone. The raw materials are then carefully mixed through a proportioning equipment to have the required components of calcium carbonate, silica, alumina and iron oxide. The mixture is then passed into a grinding unit that may consist of preliminary grinders and vibrating screen. The screen permits the well ground materials , which are less than one sixteenth of an inch in size, to pass to the final grinding in the tube mills. These mills contain steel balls of one inch in diameter which by rotating , girnd the mix further , the mix is their subjected to air separation where the fine materials are removed and stored as kiln feed while the coarse grains are returned to the tube mill for regrinding.

In the wet process a great facility is obtained by mixing the raw materials . Clay is first cleaned from stones in a wash mill . Then, it is dumped with water in a basin with rotary rakes that would turn the slumps of clay into a mobile paste . Clay slurry is next mixed with other raw materials in the correct proportion and fed into grinding mills

as in the dry process . The ground slurry is further pumped into tanks that are equipped with air and mechanical agitators to further mix the slurry. Contents of every, tank are continously checked in laboratories before they are released for burning . If the composition is defficient in some elements, it may be corrected by stirring in a new slurry of compensatory composition or by blending the slurry with other tanks.[4]»

Step 2 : Burning and Clinkor Cooling

The prepared mix or slurry is fed into the upper and of huge rotary kilns with dimensions that very approximately between 120 and 150 meters in lenght and 3 and 5 meters in diameter . These kilns are internally lined with firebrick set at an inclination of half to five-eighth an inch per foot of length, supported with a motor drive, and geared to rotate from 20 to 90 revolutions per hour. Usually the wet process kilns are larger than those used in the dry process to provide an additional zone at the upper and for drying the slurry with the escaping gases.

Heat is supplied from the lower end of the kiln by combustibles as fuel oil or coal. As the slurry loses its

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[4]Samuel M. Loesher, Imperfect Collusion in the Cement Industry (Cambridge : Harvard University Press,1959),p.53 .

moisture it progresses slowly through the entire lenght of the kiln by the latter inclination and rotary motion. In the lower third of the kiln where the temperature is about 2700 Fahrenheit , the raw materials are transformed physically and chemically into marble sized balls called clinker . The heat which the clinker emanates is then passed back into the kiln resulting into a substantial savings in fuels. After the clinker balls drop from the kiln they are cooled to room temperature by a partially lined rotating clyinder or a series of moving gates through which cooling air is blown.

Step 3 : Clinker Grinding Into Finished Cement

The cooled clinker is placed in storage to take care of the fluctuations in output of the kilns and the final grinding mills . Before grinding, 3 to 5 percent of gypsum is added to retard the setting time when mixed with water. The grinding process is practically the same as in the final grinding of raw materials , i.e. the clinker has to pass in preliminary and final grinding . The ground mixture of clinker and gypsum would be so fine that 88 to 96 percent would pass through a sieve with 40,000 openings per square inch depending on the type of cement desired . Periodical complete chemical and physical tests are made of the end product, in addition to the tests of raw material in process, to determine

the quality and conformance to specifications. Finished cement is then transferred by belt conveyors to concrete dampproof silos where it is held until required for packing and shipment .

The two operating plants at Chekka employ the wet process, while SIBLINE plant will employ the dry process as mentioned earlier. This is due to the fact that at Sibline the limestone has a low moisture content and that this process consumes less fuel than the wet process.

III. ECONOMIC OF CEMENT INDUSTRY

The Portland cement industry stands among few other industries that have a large influence on the population's standard of living. As an industrial good and a key building material, it has practically contributed to many phases of life, such as housing , transportation, irrigation, and a multitude of non-residential construction undertakings throughout all countries of the world. The following elements are related directly to the processing of cement:

A. High Transportation Cost

Since cement is a heavy product of low value, transportation costs would soon eat up its value if it had to be

shipped far [5]. This is why the proximity of a local market within an economical freight distance is the most urgent factor determining the choice of a particular location. The two local plants hold virtually the same advantages of being located at Chekka with easy access to Beirut and its satelites where the bulk of the construction activities take place. The transportation media are available for furnishing the local markets with lebanese cement, namely,by trucks is relatively cheaper in view of the fact that cememt shipped through the railway will have to be reloaded on trucks for final delivery to the site. Therefore it is important to note that the Sibline plant, will have a cheaper access to nearly locations in South Lebanon, such as Sidon, Than Chekka's plants. Approximately,freight charges per ton of cement transported will be one to four from Sibline to Sidon versus from Chekka to Sidon[6].As far as Sibline's exports,its location at 18 km. from the coast is rather less suitable for export purposes, although more than 50 percent of its production will be designated for export later [7]. Wadi El-Zein harbor may be rented by Sibline as a

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[5]Simon N. Whitney, Antitrust,Policies: American Experience in Twenty Industries,Vol.II,(New YorK: The Twentieh Century fund,1958).p.2.

[6]As estimated by the Finance Manegers of Sibline Plant.

[7]Chamber of Commerce and Industry : Report on Lebanese Cement, 1982,p.13 .

warehouse near the sea, for export purposes.

B. Labor Intensive Industry

The relatively simple production process and its low technical know how requirement, explain the fast growth of the cement industry among the developing countries in general. Approximately 75 percent of the employed labor force in plants constructed, in the developing countries are unskilled. The high proportion is likely to drop once the plant in expanding and modernizing its physical facilities, substitutes labor by capital intensive equipment. This is particularly true at the quarrying stage where the mechanization of the materials handling process might result with a tremendous labor cost saving at a relatively low incremental fixed investment cost.

As far as Sibline project is concerned, 250 staff will start the operation. The 250 staff will be divided among different proportions and specialties as follows :

1) Administrative Staff 38 .

2) Specialty Engineering Staff 12 .

3) Technical Staff 200 .

Some of the engineering and technicql staff are taking training courses in Paris and Rumania in order to master the know how of the industry. According to a responsible manager at Sibline[8]

[8]Interview with personnel manager at Sibline.

plant, the productivity of the cement worker in Lebanon (expressed in man hours per ton of cement) is rqther closer to the developed countries that to the developing countries. This is particularly due to the fact that the Lebanese Cement Industry comprises two plants each producing at a relatively high level of installed capacity in addition to a third plant that will start operation early September 1985 . The capital invested per worker in (thousands L.L.) turned out to be 1520. This figure is equal to the total capital investment till 1986 which is 380 Million over the number of workers in the plant. The high productivity of the Lebanese worker is justified by the relatively higher values of capital invested per worker and the gross output, per plant.

C. Different Quality and Specifications

In order to meet consumer demands that have become more and more varied and exacting,Societs des Ciments Libanais[9] has included in its production programme a whole range of special cements :

1) Rapid Hardening or high Early Strength Portland Cement (ASTM type 111, BS ,12): Concrete made with this special cement rapidly reaches a high compressive strenght permitting an early

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[9]General Report on Specifications of Cement, Chamber of Commerce and Industry , January 85 .

removal of the shuttering. The use of this quality is recommended especially during the cold season and when it is required to speed up construction work. This special type of cement is expensive in general and is used in most developed countries.

2) Moderate Sulphate Resisting Portland Cement (ASTM type 11): The use of this cement is highly recommended for all maritime work , as well as for the foundation of buildings situated near the sea. This type of cement is bought at a fair price and is used in developing countries especially the one's on the Meditteranean coast. Sibline plant will be using (Portland ASTM land 2).

3) High Sulphate Resisting Portland Cement (ASTM type V,BS 4027): This special quality, complying with very strict specifications, protects concrete against attacks by aggressive waters and soils . This type of cement is expensive and is used in cold weather climate countries.

4) Low Heat Portland Cement (ASTM type IV,BS 1370): This type is recommended when concrete is cast in large quantities,such as for dams, where low heat of hydration prevents formation of fissures and cracks. This type of cement is not high in price and isued in both developed and developing countries for huge projects in general such as dams, highways.

D. FLUCTUATING PRICES AND ELASTIC DEMAND

In general, the prices of cement vary widely from one country to another. Many economic factors contribute to these variations such as the G.N.P, the fiscal policy of the governments and various others. This fact makes the comparison of cement prices among different countries somehow misleading.In Lebanon the situation is even worse when considering the acute devaluation of the Lebanese pound during the last two years.In 1983, when 1 U.S $ equalled 4.5 L.L. the prices of one Ton of cement was L.L. 370 in Beirut, L.L. 335 in Toronto . L.L.715 in Stocholm while Japanese and Romania cements were sold in Beirut at L.L. 180 and L.L. 203 respectively. At present, when U.S. $ equal 45 the price of one Ton of cement is L.L. 2000. c.e. in dollar teem the price is 45% cheaper.Naturally, it should not be expected that prices of commodities to catch up with the fluctuation in currency rates without a time - lag, yet a drop of 45 % in dollar price at a time when the dollar itself is passing through difficulties cannot be justified by the time-Lag factor alone.

A discussion of the factors contributing to this drop in the real price is beyond the scope of this paper. In the study, the indication is strong that the demand for cements Lags well behind supply. In fact during the three years period

1983-1985 production of cement was always more than the quantity demanded [10].

In a study conducted by UNIDO it was demonstrated that cement increases at a higher rate than G.N.P. per head up to an income per head approximately # 390, increasing thenafter at a lower rate. It would appear therefore, that the demand for cement in Lebanon is inelastic, since the per capita income is estimated to be 1300[11]. However the political situation and other factors are seriously affecting demand. These factors are discussed in briefin Part IV which follows ,

IV. DEMAND DETERMINANTS FOR CEMENT.

A. Demand Conditions of Cement.

Cement is a key building material, which , in association with other materials, has extensive applications. The demand for cement is derived from the demand of construction activities. Two basic characteristics are inherent in the cement demand : First, since the bulk of cement is used in outdoor construction projects, the demand for cement is seasonal in view of the influence which climatic variations have on construction activities. Second, construction activities are deter-

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[10] L'économie Libanaise Et Arabe - No 369, Juillet 1986, page,9.

[11] Statistical year Book,U.N. 1979/80 Dept of International Economic and social Affairs, statistical office, index 4- p.11.

mined largely by the general business conditions i.e. rising to great heights in periods of prosperity and sinking to very low levels in periods of depression. Consequently, the demand for cement is also volatile due to cyclical fluctuations there two aspects of demand may explain the likelihood of cement producers to operate under excess capacity conictions.

B. Components of the Local Market Demand

Although cement is genrally demandeal by construction activity, there major classifications of demanders may be drawn. These are the private building construction industrys the public works and the cement based industries.

a) The private building construction industry

By for private building construction constitutes the buth of construction activity in Lebanon. Approximately 80 percent of total local sales of cement have been chanelled to the private building construction industry during the last four years [12]. However, the housing market in Lebanon has been, to some extent, characterized by a serious imbalance in its faces. This leads to the existence of substantial shortage between the supply and demand of housing due to the imposition of rent ceilings on non luxury aportments. The crux of the problem is

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[12] Genral Report on specifications of cement, chambre of commerce and Industry, Jan 83.

that the greater part of the construction has represented,since the early seventies, luxury apartment houses (with modern facilities such as lifts, central heating, telephone etc...), which due to their high levels of rent, are beyond the means of limited and low income groups. Furthermore,while an our expansion in Luxury buildings category of housing have prevailed, the supply of ordinary and popular housing has been inadequate to lodge the greatest portion of the population. Second, insufficient return on building investments, high permit charges, and complicated administrative and municipalities procedures and political instability situation have distracted local and wealthy Arab investors from real estate investments in Lebanon . It was also reported that the government charges on building construction have continously grown, and adversely influenced the return, (excluding the years of war where the government was not present). Consequently, the return on new building projects, at present, is likely to approximate 10 to 15 % when equal or higher rates are paid in the local and international money markets.

b) Public works

It is important to note that the public sector has been utilizing cement chiefly in infrastructure and defense projects, such as roads , harbors, dams, airports, and government agencies

buildings. However, cement may apply extensively in road constructions to replace asphalt which has been traditionally used, although the substitution effect is usually slow. The importance of the choice between cement and asphalt becomes more significant at the present time is view of the gouvernment awarness to provide an up-to-date highways system that will connect major lebanese cities . Part of the system was executed and the other is under implementations.

c) The Cement Based Industries

Cement is utilized indirectly in construction activities in the form of Eternit (asbestos-Cement) and cement products such as tiles, mosaics, concrete blocks. The asbestos cement has been manufactured in Lebanon since 1952. Although Eternit plants have been established in Iraq, kuwait and Syria during the seventies, the exports of the Lebanese plant have not been influenced inview of their high standard of quality and specifications.

C. THE HISCTORICAL TREND OF DEMAND FOR CEMENT IN LEBANON.

The demand for cement in Lebanon may be divided into distinct periods , each of which has its own characteristics, that justifies an independant study . However, a brief interpretation of the above mentioned periods is described below.

The first period which lasted six years form 1960 to

1966 was characterized by the advance and expansion in the construction industry due to the increase in the number of inhabitants, the development of tourism power, trade and social activities. At that time, the production of cement was for behind the required demand, as a matter of fact imports were necessary to satisfy the market: The following table shows the the factin figures . There is a ratio of 0.90 local consumption over Production.

TABLE - 1

Break down of consumption by source (In 1000 tons)

	1962	1963	1964	1965	1966
Local consumption	806	837	876	924	1098
% increase in cons.	-	+0.4%	0.5%	0.6%	+19%
Imports	6	30	78	101	115
Production	861	897	900	970	1095
Consumption/production	94%	94%	98%	95%	100%

SOURCE : DATA given from annual report of Finance Department Sibline Co., Feb. 80 .

Therefore, we can perceive and examine all there effects in the following table :

From table II we can determened the effect of the

1967 war and the Intra Bank crives the same year on the construction Power . Therefore , there was a decline of 50 % in the number of lisences offred for construction in 1968 compared to that of 1966 and a decline of 15% in the total consumption of cement . The political stability 1972-1973 reflected an overflow of foreign currency and excessive credit facilities from the banking systems. Thus there facts led to an increase of 35% in the construction power which caused a considerable decline in exports of cement. (Table III refers).

The fourth period from 1975 to 1982 covered the Lebanese civil war which hit the construction sector down from a report by the Association of Lebanese Industries on the cement industry in Lebanon, the records of the Cimenterie Libanaise Plante showed a decline in local sales from a figure of 968,000 tons in 1974 to 331,000 tons in 1976, where as the records of the Cimenteries Nationale Plant showed a decline in local sales from a figure of 361,000 tons in the same year to 139,000 tons. The progress of the construction sector was delayed if not totally hindered, as direct consequence of the war . Investors lost confidence in the lebanese market and the working power emigrated in great percentages. No statisties are available for this period .

The fifth period from 1983 onwards, markes a recovery

from the war period. Hence it is clear that the local consumption of cement is again at its peak levels of 1974, and even increasing slightly every year. The production however still lags behind due to the inability to export the product. For the last three years there was no export of cement at all. Therefore in 1985 the quantity produced was only 1539 thousand tons while in 1979 it was 1944 thousands tons,(Table IV refers).

TABLE II , III , IV

BREAKDOWN OF CONSUMPTIN BY SOURCE (IN 1000 Tons)

	967	968	969	970	971	972	973	974	983	984	985
Local consumption	933	932	962	913	959	1205	1275	1329	1397	1432	1445
%increase consumption	-15%	-	+0.3%	-0.5%	+0.5%	2.5%	+0.65	+0.4%	+5%	2.5%	0.9%
Exports	40	33	293	402	584	418	304	508	Nill	Nill	0.5
Productions	1016	906	1253	1339	1499	1626	1659	1744	1672	1452	1539
Consumption/ Production	92%	103%	77%	68%	64%	74%	77%	76%	84%	98%	93%

1- Source : L'ECONOMIE LIBANAISE ET ARABE N° 39 July, 1986 .

2- Source : DATA given from annual report from finance Dept. Sibline Co. Feb. 80 .

D. FORECASTED DEMAND 1986 - 2000

The study excluded the eight years of 1975-1982 because these years were affected by the war in the country and the Israeli invasion . Many fluctuations occured and the satistics obtained about them were not accurate. The trend was, therefor, extra polated from 1974 immediatly to 1982 .

a) The least - squares technique.

The demand for cement can be estimated by using the least - square method where by consumption is represented by deviations in time intervals . A Linear equation is used for fitting the curue .

$$Y_c = a + bX$$

Where Y_c = trend values (y - variable fitted to the time series)

$a = \frac{\varepsilon Y}{N}$ the trend value at the origin, x = 0

$b = \frac{\varepsilon XY}{\varepsilon X^2}$

X= deviation in time intervals from the origin, x=0 .

Table V shows how the values of (a) and (b) were calculated, while table VI lists the forcasted demand over the period 1986 - 2000 .

TABLE V

Least - squares Trend computation of the Local demand for cement in Lebanon during The period 1963-1985 excluding the years 75 - 82

Year	(Y) Tons	X	X^2	XY
1963	837	-7	49	-5859
1964	876	-6	36	-5256
1965	924	-5	25	-4620
1966	1098	-4	16	-4392
1967	933	-3	9	-2799
1968	932	-2	4	-1864
1969	962	-1	1	- 962
1970	913	0	0	0
1971	959	1	1	959
1972	1205	2	4	2410
1973	1275	3	9	3825
1974	1329	4	16	5316
1983	1397	5	25	6985
1984	1432	6	36	8592
1985	1445	7	49	10115
	16517		280	12450

$$Yc = a + bx = 1101.1333 + 44.46428\ x$$

$$a = \frac{\varepsilon x}{n} = \frac{16517}{15} = 1101.1333$$

$$b = \frac{\varepsilon xy}{\varepsilon x^2} = \frac{12450}{280} = 44.46428$$

TABLE VI

Forcasted Demand for cement from

1986 - 2000

Year	x	F.D
1986	8	1457 *
1987	9	1501
1988	10	1546
1989	11	1590
1990	12	1634
1991	13	1679
1992	14	1723
1993	15	1768
1994	16	1812
1995	17	1857
1996	18	1901
1997	19	1946
1998	20	1990
1999	21	2035
2000	22	2079

* $Y_c = a + bx$,

where $a = 1101.1333$

$b = 44.46428$

$x = 8$

$\therefore Y_c = 1101.133 + 44.46428 \times 8$

$= 1457$

b) UNIDO function : Econometric Model -Single Equation

The above analysis is of great help to forecast the future demand of cement in Lebanon or at least the historical trend of consumption over years. The study conducted by UNIDO related the per capita x consumption of cement in Kilo grams and the GNP per capita in U.S. Dollars for 100 different countries in the world both developed and developing countrie, therefore, the folloin regression aquation resulted.

$$\text{Log } y = -3.27 + 3.22 \text{ Log } x - 0.34 (\log x)^2$$

Where :

Y = per capita consumption of cement .

X = per capita income = $ 1300 (estimated)[13]

r^2 = coefficient of determination therefore.

Log y = 3.46 y = 2884 Kgs

The demand for cement in Lebanon would be :

$$= \frac{2884 \times 3000000}{1000} = 8.652.000 \text{ tons}$$

Total population of Lebanon is estimated to be 3 million persons.

From the resulth shown above , it is deducated that the

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[13] Statistical year book, united Nations,1979/80,Dept.of international Economic and social affairs,statistical office, index 4, p. 11 .

UNIDO function dees not fit the Lebanese demand for cement because :

Y = 8652000 tons VS 1445000 tons (Max actual demand in 1985).

V- CEMENT FACTORIS IN LEBANON .

The two main competing firms for Sibline are the«Lebanese Cement Company»and«the National Cement Company».

a) The Lebanese Cement Company (Chekka)

The Lebanese cement company was established in year 1929 Licen se by N°4469. It is tocaled in Chekka at 60 Km from Beirut. It was the first plant of its kind in Lebanon, Syria and Jordan. It started operation with a capacity of 160 ton per day. Some expansions have taken place in the following years : 1935,1945, 1957,1968 and 1972 where the capacity has reached 4000 ton per day. Another one has taken place in year 1979 where the capacity has reached 7000 tons per day, i.e. 2000,000 tons per year. This plant is using the wet process and has a private harbor for its own export operations. Actual cement production by the Lebanese cement company reached 1.636 million tons in 1981 . Compared with 1.521 million tons in 1980. The company local sales increased by 95.2 percent while its exports fell by 50,3 %.In the Second half of 1981, cement exports totaled between 15 and 20 percent of the company's total sales ,compared with 28.18 percent of total sales in the corresponding

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» Marwan Iskandar and Elias Baroudi, The Lebanese Economy in 1981 - 1982, Middle East Economic, p.49 .

period of 1980 .

b) The National Cement Company (Chekka)

In year 1953, The National Cement Company was established by License N° 2422. production started in the year 1955 with a daily capacity of 280 tons. Expansions took place in the year 1964 and 1970 . Due to the increase in the price of fuel in 1979, the wet process applied was transformed to the dry process which consumed less fuel . The daily capacity reached 3500 tons in that year. This plant has its private harbor for export purposes. The National Cement company sales increased from 14,351 tons in 1980 to 229,759 tons in 1981 . An extimated 87% of its total yearly sales was made in the second half of the year while exports accounted to approximately 33% of toal sales during the second half in comparison with 36.6% in the corresponding period of 1980.

With the increase in production and local conseption of cement, prices also increased by 54.8% during 1981 first from LL 216 to LL 291 per ton and then to LL 350 per ton. The increase was attributed to the increase in the price of fuel oil from L.L. 425 a to LL. 750 a ton.

c) Description of Sibline Cement Project

A brief History and Preview

The promoter of «SIBLINE» Cement Project was the late

Kamal Jumblat , the well known politician , ex-minister and Deputy in Lebanon. In fact , the Sibline project was a dream to be realised to him, and was the subject of a Long struggle between him and the Lebanese goverment who had persisted to deny him the «License» for more than 15 years, However in 1974 the license Nö 8952 was granted , and a share holder firm was founded by the name of Sibline Cement Co. The other share holders were also well known figures amongst the Lebanese businessmen, such as Mr Adel Kassar. Mr Bouri and many others. In addition a Romania company called for_xeem joined as a shareholder of 19% shake and as the provider of the technical know-how.

The location of the plant is in Sibline Village near Saïda where the raw materials are abundant. The whole area occupied by the project is around 460,000 m² , out of which 50,000 m² will be used as the plantsite, the rest area will be used as quarries. In addition, the company bought another price of land of 10,000 m² in Jizzene area which will promide the «Argile» raw materials .

The date for starting operation is perhaps the most unfortunate. Orignaly , it was planned that operation would start during 1978. However, the break, out of the war in 1975 and the death of the late Jumblat delayed it to 1983. In 1982

the Israeli invasion caused the Board of Directors to delay the operating till September 1986 . In August 1986 it was however postoned again till summer 1987. The reasons given were technical, although it is believed that the political situation is the main factor for this delay.

ii) Designed capacity and degree of utilization

The desinged capacity of the plant is 277200 Tons,per year based on daily capacity of 850 Tons per day for 326 days per year . However , it is anticipated that the progress of the production will be as follows .

Year	Tons	capacity percentage
1987	166200	60%
1988	23545	86%
1989	277200	100%

From above, it could be noted that the maximum capacity of the plant constitute around 17.5% of total Market Demand, concluding that no indications for the company to face problems to Market its product, at this capacity level.In fact

the marketing management planned acquire 25% of the market share,considering that it would have an economic advantage in central and south Lebanon . Also the influence of the shareholders, M/S Bouri and Hassery in the constructions, industry in Lebanon should be taken into consideration .

iii) The share Capital and Investment

The initial capital raised for the established in 1975 was 20 million lebanese pounds. After words successive increase were made during 1979, 1980,1982 and 1986 , which raised the share capital to its present value of L.L. 300/ million divided over 11 million shares of face value L.L. 25 each i.e. the Nominal value of share capital is L.L. 275 million .

These increases were brought about, partly as a result of the losses and the preoperating expenditure caused by the delay in starting the operation , partly due to the increase in Prices over the ten years period of time , but most importantly because of the decision taken by the board of directors to the financing of the project 100% equity capital instead of the original policy of obtaining a long term to an arrangement by a group of banks. Apparently the reasons for this shift are due to the risk conditions prevailing and the high rates of interest.

In september 1986, the share capital was represented as follows :

	L.L. millions
Land	27
Civilworks	32
Engineering	68
Machinary	96
Pre,operating Exp.Accumlars	82
Current Assets	75
Total	380

IV-THE COST OF CAPITAL

Under normal conditions , the cost of capital would vary within the range of 10-15 percent. However due to the present conditions, and the ~~curatners~~ weakness of the Lebanese pound it is not feasible this range as a straight forward example.For about one year the Central Bank has been issuing bond at a rate 20 - 22 % and the market interest rate ranges ~~below~~ between 25 to 30 percent . Therefore the rate of 25% was ~~chown~~ chosen as the cost of capital .

VI- PROFITABILITY INDICATORS OF THE PROJECT

A- THE BREAK EVEN PRODUCTION LEVEL

The break-even production level can be calculated according to the following formula :

$$Q = \frac{F\ C}{P\text{-}AVC} = \frac{188,000,000}{1800 - 1100} = 268571 \text{ Tons}$$

Where Q = B.E Production level in Tons.

P = Price/ton = L.L. 1800

AVC = Average variable cost per tons = L.L. 1100

FC = Fixed cost = LL 188 millions.

The fixed costs are calculated as follows :

a) Annual Depreciation	L.L. 20 million
b) Personnel Salaris	L.L. 10 "
c) Management salris	L.L. 18 "
d) Insurence & contingancies	L.L. 10 "
e) other costs.	L.L. 35 "
f) cost of capital 25%	L.L. 95 "
	L.L.188 Million

As noted above the cost of capital was added to the fixed costs, since the project is totally financed by equity capital , Accordingly the obligation to make a return on equity

cannot be ignored. Tax on the other hand was ignored since the project is exempted.

B. NET PRESENT VALUE (NPV)

In order for the company to be sure that the project is economically feasible and if it is worth the investment,the Net Present value of its whole operation should be calculated as an important profitability indicator :

$$NPV = -C_0 + \frac{R_1 - C_1}{(1+r)^1} + \frac{R_2 - C_2}{(1+r)^2} - \cdots \frac{R_n - C_n}{(1+r)^n}$$

Where,

C_0 = immediate and additional capital bounded in the project.

$R_1 \cdots\cdots R_n$ = Revenue stream over the life of the project,

$C_1 \cdots\cdots C_n$ = cost stream over the life of the project.

r = Weight average cost of capital.

Assume that the life of this project is 15 years from 1987 to 2001 , and the operating costs are distributed according to the utilized capacity , (as of capacity study above) at each period.

Therefore , we discount the net revenue stream at 25% rate which is the cost of equity.

Table VII , shows a positive NPV which indicates that the project is profitable provided the prevailing conditions do not seriously deteriorate .

C. Internal Rate of Return (IRR) :

Another major investment criterion for testing the economic feasibility of this project is the internal Rate of Return. It is the rate of discount which brings the different between discounted revenues and discounted costs to zero:

$$= - C + \frac{R_1 - C_1}{(1+P)^1} + \frac{R_2 - C_2}{(1+p)^2} + \ldots \frac{R_n - C_n + S}{(1+p)^n}$$

P = IRR = 30% is computed by a program calculation.

VII- Conclusion : Recommendation and Summary :

The verious methods used to test the profitability of the project , have all indicated that it is feasible.It was shown that inspite of the fact that the demand for cement is not at its best conditions, and no exports have been made for the last few year the project is profitable in the long run, Moreover being the project promoted by very important and influencial persons such as Mr. Walid Jumbulat , Mr Hareery, Mr Kasar , Mr Bouri and other will undoubtly give the projec-

an excellent advantage for profit marking .

However, the risk factor is also evident , adn we can it ugnored the fact that the project had failed to start operation since more than ten years . Moreover , the political conditions, at present and in the foreseen future are by no means encouraging. Accordingly , my final conclusion is that the project is financially feasible under the assumed conditions of the market.

Recommendation:

After studying this project from many sides and aspects . I recommend that Sibline management to study an expansion program which starts when the war in Lebanon stops over. Specially knowing that after the war a high demand for construction which leads to a big consumption of cement.

SUMMARY :

Sibline project was planned by Kamal Jumblat in an attempt to improve the conditions of his region, Chouf and Mountain. The project was studied and perfected by his son, Walid , who was in the process of leadership development and who realized the importance of the existence of a cement factory in the region.

Sibline Factory accomplished two great advantages for the Mountain and Chouf people. It created new job opportunities, and freed the people from the high costs of transportation from Shekka factories.

TABLE VII

PROJECT NET PRESENT VALUE

YEAR	TIME	ACCUMALATED LOSSES&PRE. OP.COST	FIXED COSTS	VARIABLE COSTS	CAPITAL OUTLAY	TOTAL OUTLAY	REVENUE	NET REVENUE	N.P. INDEX	N.P.V.
1986	0	82000,000	-	-	223,000,	305000,	0	(3050000000)	1	(305,000,
1987	1	-	73000000	182820000	0	255820000	299160000	433400000	0.800	34,672,00
1988	2	-	73000000	258995000	0	331995000	423810000	91815000	0.640	58761600
1989	3	-	73000000	304920000	0	377920000	498960000	121040000	0.512	61972480
1990	4	-	73000000	304920000	0	377920000	498960000	121040000	0.410	49626400
1991	5	-	73000000	304920000	0	377920000	498960000	121040000	0.328	39701120
1992	6	-	73000000	304920000	0	377920000	498960000	121040000	0.262	31172480
1993	7	-	73000000	304920000	0	377920000	498960000	121040000	0.209	25997360
1994	8	-	73000000	304920000	0	377920000	498960000	121040000	0.168	20334720
1995	9	-	73000000	304920000	0	377920000	498960000	121040000	0.134	16293600
1996	10	-	73000000	304920000	0.	377920000	498960000	121040000	0.107	12951280
1997	11	-	73000000	304920000	0	377920000	498960000	121040000	0.086	10409440
1998	12	-	73000000	304920000	0	377920000	498960000	121040000	0.069	8351760
1999	13	--	73000000	304920000	0	377920000	498960000	121040000	0.055	6657200
2000	14	-	73000000	304920000	0	377920000	498960000	121040000	0.044	5325760
2001	15	-	73000000	304920000	0	377920000	498960000	121040000	0.035	4236400

TOTAL NET PRESENT VALUE +81229,360

CIMENTERIE SIBLINE