Société des Ciments Libanais S.A.L.
Common Stock Valuation

by
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Approved by :

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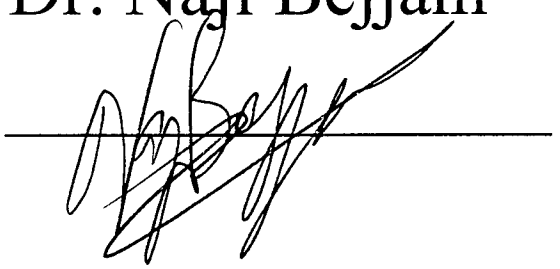
Dr. Naji Bejjani



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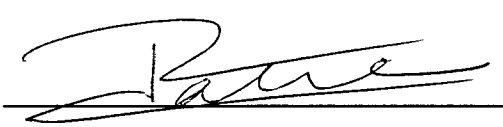

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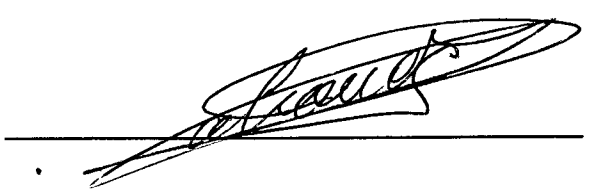

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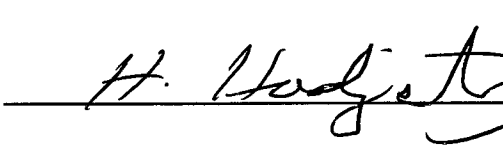

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CHAPTER I

Introduction

Research Topic

"Societe des Ciments Libanais S.A.L." common stock valuation.

Research Objective

The objective of this research is to find the fair[1] value of Societe des Ciments Libanais S.A.L ("SCL") common stock.

Methodology

Different valuation models were applied and the calculated stock value was compared with the official stock price in Beirut Stock Exchange ("BSE") to see if the company stock is overvalued or undervalued at a specific date (SCL stock was valued at December 31, 1996).

Why did we choose to value Societe des Ciments Libanais 's Common Stock ?

Currently, there are eight companies listed on the Beirut Stock Exchange : Solidere, Société des Ciments Libanais, Ciment Blanc, Uniceramic, Eternit, Banque Libanaise pour le Commerce, Bank of Beirut, and Banque Audi.

From these eight listed companies, we have chosen SCL due to the following reasons:

1) After the war, the cement industry has experienced a boom caused by the huge reconstruction projects conducted by the government (roads, highways, the expansion of Beirut International Airport, construction of power plants, the rehabilitation of the Beirut Central District by SOLIDERE, etc.....) and the large increase in the demand for construction permits by the private sector induced by the return of expatriate Lebanese and by the shortage in housing.

2) SCL is the oldest and largest producer of cement in Lebanon. The company's market share in 1996 was equal to 43.4%.

[1] The fair market value is the price at which both seller and buyer are willing to trade when neither is under compulsion or obligation to buy or sell and when both are in possession of all relevant information necessary to make an informed decision.

3) Lots of studies have been already conducted on SOLIDERE and on the banking sector in the last three years, but no valuation study has yet been conducted (as far as I know) on SCL by another MBA student in any Lebanese University.

Chapters Description

In Chapter II, we have discussed, in a comprehensive way, the methods used to evaluate common stocks.
A review of literature was conducted and a detailed explanation about each method and technique was given.

The two basic approaches studied in this chapter were : The *Fundamental Analysis* approach and the *Technical Analysis* approach.

In *Fundamental Analysis* approach we have studied the following three main models :

- ◊ The Discount Model.
- ◊ The Price/Earnings Ratio Model.
- ◊ The Asset Value Model.

We have also discussed the major assumptions of the *Technical Analysis* approach and described the tools used by technical analysts to forecast security prices.

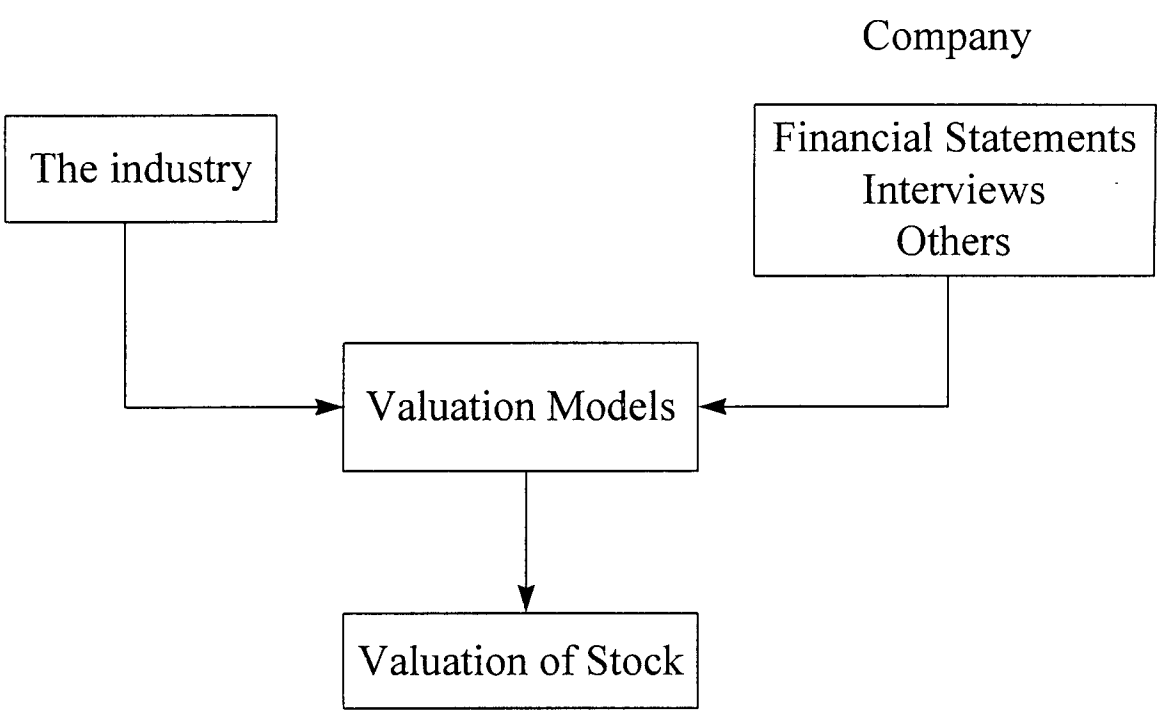
The Chapter III is divided into two parts : the Cement Industry in the Middle East and the Cement Industry in Lebanon.

The aim of the sub-chapter "The Cement Industry in the Middle East" is to have a broad view about the production, consumption, imports, and exports of cement in the following neighboring countries : Israel (including Gaza/West Bank), Saudi Arabia, Syria, Egypt, and Turkey.

In the sub-chapter "The cement industry in Lebanon" we have covered the following topics : the history of the cement industry in Lebanon, the cement industry structure (description of major competitors), market conditions (residential and commercial construction and public construction projects), cement consumption, imports, exports , and cement market forecast.

In the **chapter IV** "company analysis", we have discussed the following topics : SCL ownership structure, history, products, production facilities and processes, sales and distribution, raw materials and energy, environment and safety, dividend history, etc.....

The *Industry Analysis* and *Company Analysis* will have a major effect on the valuation models used.
The assumptions used to project SCL Financial Statements and the discount rate applied are based on facts and issues analyzed in the *Industry and Company Analysis* section.



In Chapter V, we have set the assumptions used in the Financial Statements projection and we have determined the discount rate used in the valuation models.
We have used three valuation models to value SCL common stock : The Discounted Dividend Model, The Discounted Cash Flow Model, and the Discounted Earnings Model.

Research Limiting Conditions and Risk Factors

This project is subject to the following limiting conditions and risk factors :

1. *Emerging Market Risks* : Investing in securities involving emerging markets, such as Lebanon, generally involves a higher degree of risk than in investing in securities in more developed countries. These higher risks include, but are not limited to, changes in the regulatory, tax and political environment that may affect the ability of investors to receive payment, in whole or in part, for their investments, although in Lebanon, until now, no restrictions have at any time been imposed on inward or outward remittances.

2. *Lebanon' s Political Risk* : Despite the fact that Lebanon has emerged from a civil war in 1990, the prospects of the Lebanese cement industry, in general, and of the company and the value of its securities, in particular, are necessarily affected by the ability of the government of Lebanon to maintain stability and to continue the redevelopment of the economic and social infrastructures of the country.

3. *Cement Industry Risk* : the Government has granted a license to import cement for Seament, which may indicate some liberalization of import restrictions which have historically protected the Lebanese cement industry.
   Furthermore, when the three Lebanese cement producers complete their respective major expansion projects, it is likely that local capacity will exceed local demand for cement . In such circumstances, the company and the other two cement producers will need to seek opportunities for exporting cement to neighboring countries.

4. *Uncertainty of Assumptions and Financial Projections* : there can be no assurance that the assumptions used in developing such projections will be correct, especially as the introduction of the SCL' s new production. line, beginning 1998, will substantially change the company's production operations.

5. *Environmental regulations* : Cement production involves quarrying activities, significant use of energy, and involves the emission of dust into the atmosphere. These factors may adversely affect the environment.
   While SCL' s operations are currently in compliance with applicable environmental regulations and standards in Lebanon, there can be no assurance that Lebanese regulators will not impose additional, more stringent

regulations on the company and on its operations in the future. That could have a material impact on the company's cost of sales or operating expenses.

6. *Inflation and exchange rates* : The 7% yearly inflation rate considered in the projected period could substantially rise as a result of the financing of budget's deficit, the increased dollarization of the economy, the capital outflows and/or other economic factors. In addition, exchange rates between the Lebanese Pound and the U.S. dollars could also be affected in the future by such economic factors.

7. *Market Liquidity* : The shares of SCL are listed in Beirut Stock Exchange but they are not actively traded. Days even weeks would pass without shares being traded at all.
   It should be noted that the stock market in Lebanon is substantially smaller, less liquid and more volatile than the stock markets in developed countries such as the United States, the United Kingdom, or France.
   The BSE is far from being an efficient market where prices of securities would reflect all known information quickly and accurately.

CHAPTER II

Review of

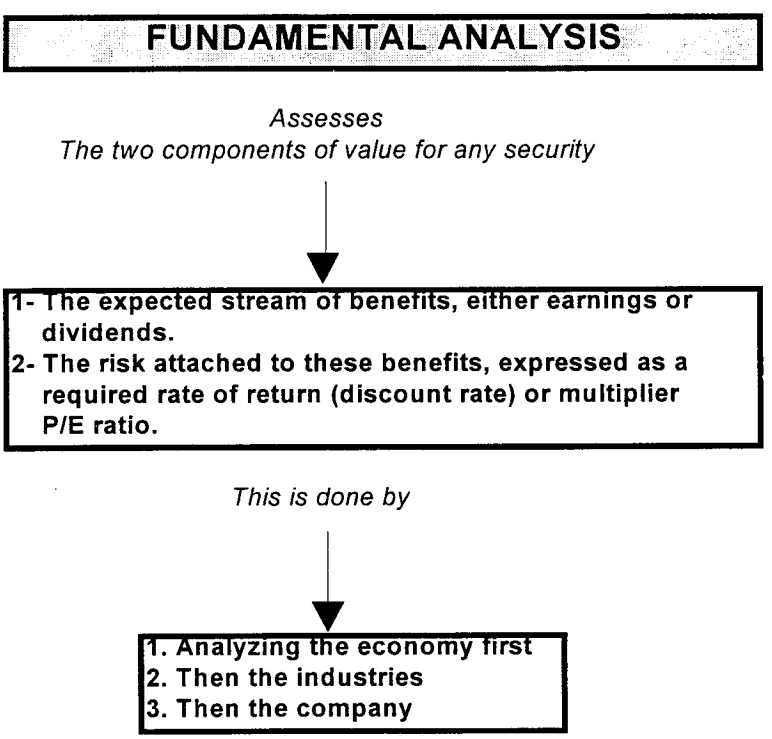
Valuation Models

There are two basic methods used to valuate equity securities : Fundamental Analysis and Technical Analysis.

FUNDAMENTAL ANALYSIS

Fundamental analysis attempts to forecast stock price movement by going to the fundamental determinants of value. Basic to this approach is the idea of intrinsic value.
A general definition of intrinsic value would be "that value which is justified by facts" e.g., assets, earnings, dividends, definite prospects, including the factor of management.[1]
A fundamental analyst will make an estimate of the intrinsic value of a stock by using information on the current prospects for the economy as a whole, for the industry in which the firm does business, and for the business itself.
The fundamental analyst will first analyze the overall economy; second, analyze the industry within which a particular company operates; and finally, analyze the company itself.

Although the first two steps - economy analysis and industry analysis - are important and should be done in the indicated order, great emphasis should be placed on company analysis.



Source : Investment analysis and management. 4th edition- Charles P. Jones page 323

[1] Security analysis by Graham et al. Copyright 1962 by McGraw-Hill.

Valuation Models used by Fundamental Analysis

A. The Present Value Approach

The current value of a security is equal to the discount (present) value of the future stream of cash flows that the investor expects to receive from the asset.

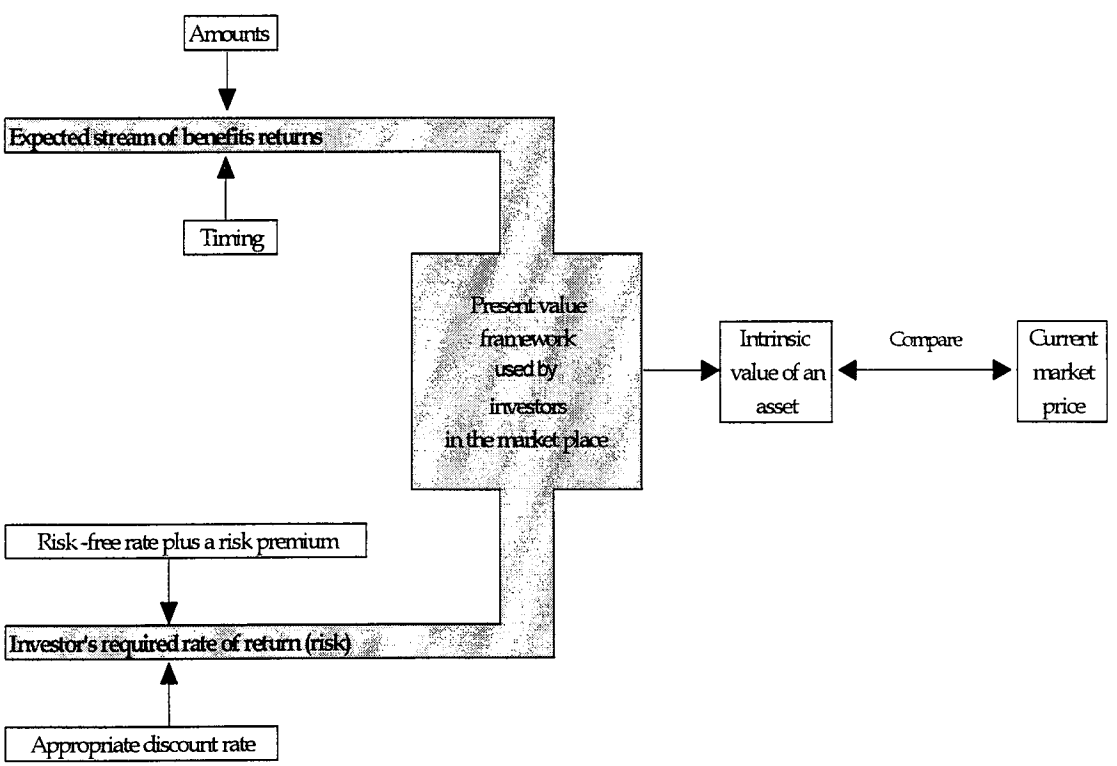
$$\text{Value of security} = \sum \text{cash flows} / (1+k)^t \qquad t = 1 \rightarrow n \qquad (1)$$

k = The appropriate discount rate or required rate of return.

For this approach an investor should :

1. Estimate the discount rate or the appropriate required rate of return.
2. Estimate the amount and timing of the future stream of cash flows.

The Present Value Approach to Valuation



Source : Investment analysis and management, 4th edition. Charles P.Jones. page 271

The *Discount Rate* or *the Required Rate of Return* or *Cost of Capital* k

The required rate of return is the minimum expected rate of return necessary to induce an investor to purchase a security. Given its risk, a security must offer some minimum expected return before a particular investor can be persuaded to purchase it.
The discount rate is composed of two elements : a risk free-rate and a risk premium rate :

k = discount rate = risk free rate + risk premium rate

The risk free rate , such as the return on treasury bills, consists of a real return component and an inflation premium.

Risk-free rate of return = Free rate of return + Inflation premium

The free rate of return is the price necessary to induce someone to forego consumption and to save, in order to consume more in the next period.

The real rate of interest is not static - it changes over time depending (1) on the rate of return, corporations and other borrowers expect to earn, and (2) on people's time preferences for current versus future consumption.

Because inflation is present in the economy, the risk free rate of return must contain a premium for expected inflation.

In addition to the risk-free rate of return available from riskless security, rational risk-averse investors purchasing a risky security expect to be compensated for this additional risk. The greater the risk of the asset, the greater the promised risk premium must be.
Because the real return and the inflation premium comprise a basic return demanded by all investors, the risk free return is a component of all securities.

The risk premium is made up of the following elements : interest rate risk, purchasing power risk, market risk, industry risk, and company risk.

Interest rate risk

Asset prices are sensitive to interest rate levels . If interest rates rise, investors will be looking for higher returns in whatever investment they make. The only way that they can produce these high returns is to be able to buy assets at lower price. Investors will be unwilling to purchase an asset unless its price

drops so that they can anticipate an adequate return.
This decreases the demand for asset and hence their prices. If an investor owns an asset and interest rates rise, the investor's return will in general decrease since the price of assets he holds will tend to drop.
On the other hand, if the investor has not yet purchased the asset, he is not affected by the drop. Thus, it is the unanticipated changes in the level and structure of interest rates during an investor's holding period that contribute to the risk.

Purchasing power risk

Nominal returns contain both a real return component and an inflation premium that compensates for the inflation anticipated over an investment holding period.
Inflation rates vary over time and investors do not always correctly anticipate change in the rate of inflation.
This results in a risk factor that can be termed "unanticipated inflation", which can cause the realized returns of securities to diverge from the returns expected, on the basis of the anticipated rate of inflation.

Market risk

The market risk is that part of a security's total risk that is dependent on fluctuations in the stock market as a whole. This risk is caused by broad forces independent of an individual security. For example, it is possible that the government will implement a successful set of fiscal and monetary policies that increases investor's interest in equity securities and, as a result, increase their value overall.

Industry risk

Industry risk refers to the possibility that virtually all firms in a given industry could be adversely impacted by some common factor that does not affect, to a much lesser degree, firms outside that industry. Economic, political, and social events can be industry-specific.

Company specific risk

Two companies can be in the same industry, can produce the same type of products or services for the same market, but yet have securities trading in the market with different risk levels for the investor.

Business risk, financial and *operating leverage risk,* and *management risk* contribute to the company-specific risk.

Business risk involves the probability that a company will suffer losses or profits less than the expected for a given period because of adverse circumstances related to the company's itself, such as lawsuits, strikes, losing major contracts, etc.....

Financial risk is the risk of using debt in financing the assets of a firm. The financial risk has two impacts : 1) Risk of default, and therefore possibility of bankruptcy and 2) Variability of the returns.

Operating leverage relates to the firm's cost structure ; It is high in companies with high fixed costs and a low variable cost of production.

Management risk relates to who is running the firm and how they are doing it. If a company is successful because of one or small number of very talented employees who may or may not stay, the company is a riskier investment than a firm with a tradition of stable, loyal management.

In the following pages, we will study three kinds of Present Valuation Model : The Discounted Dividend Model, the Discounted Cash Flow model, and the Discounted Earnings Model.

1. <u>The Discounted Dividend Model (DDM)</u>

Since dividends are the only cash payment a stockholder receives directly from a firm, they are the foundation of the valuation of common stock.
In this model, the value of a common stock is the present value of the future dividend stream in perpetuity. The concept is consistent with the assumption that the corporation will have a perpetual life.

$$Po = D1/(1+k) + D2/(1+k)^2 + D3/(1+k)^3 \quad + D\infty/(1+k)^\infty$$

$$= \sum Dt/(1+k)^t \qquad t = 1 \rightarrow \infty \qquad (2)$$

where

Po = the intrinsic value
D1, D2,... = the dividends expected to be received in each future period
k = the discount rate applicable for an investment with this degree of riskiness.

To apply this model, one needs to forecast the dividend stream, D1, D2, D3,....., and to estimate the appropriate discount rate, k, to use.

Future company earnings are forecasted based on three stage of fundamental analysis : market analysis, industry analysis, and company analysis. Dividends are calculated from these earnings estimates by assuming specific dividend payout ratio.

The Dividend Discounted Model : Zero Growth Assumption

In this model, dividends are not supposed to grow at all but remain constant. The no-growth case is equivalent to the valuation process of a preferred stock because the dividend remains unchanged.
Equation (2) simplifies the no-growth model to the following formula :

$$Po = D / (1+k)^t \qquad t = 1 \rightarrow \infty$$

$$Po = D / k \qquad (3)$$

Po = value
D = the constant dollar dividend expected for all future time periods.
K = the percentage discount rate.

The Dividend Discounted Model : Constant Growth Assumption

This Model assumes that the growth rate for the corporation analyzed is constant. It is thus most suitable for companies that we characterize as being of a stable, more mature variety, i.e.companies in such industries as electric and telephone utility, retailing, household products industries, and food processing.

The same general equation (2) will be applicable

$$Po = D1/(1+k)+D2/(1+k)^2 +D3/(1+k)^3 \qquad +D\infty/(1+k)^\infty$$

With

$D1 = D0*(1+g)$
$D2 = D1*(1+g) = D0*(1+g)^2$
$D3 = D2*(1+g) = D1*(1+g)^2 = D0*(1+g)^3$
and so on.
g is the constant growth rate of dividends
Do is the current dividend being paid
k is the appropriate discount rate

The constant - growth model equation can be shown as

$$Po = D0(1+g)/(1+k) + D0(1+g)^2/(1+k)^2 + \ldots\ldots\ldots + D0(1+g)^{\infty}/(1+k)^{\infty}$$

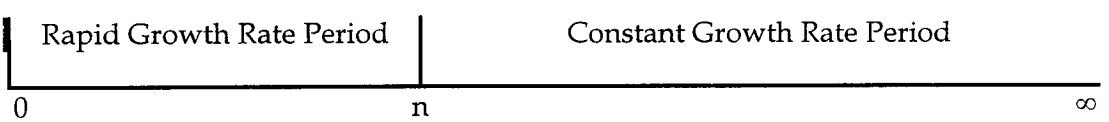
$$Po = D1/k-g \qquad (4)$$

Where D1 is the dividend expected to be received at end of year 1.

The constant - growth model is referred to as the Gordon Model (name after Myron J. Gordon, who played a major part in its development and use).
In practice, the constant growth model is used quite often because of its simplicity (not because of its accuracy) and because it is the best description of the actual behavior of a large number of companies.

The Dividend Discounted Model : Multiple Growth Assumption

Many firms grow at a rapid rate (or rates) and then slow down to an average growth rate. The constant growth rate is unable to deal with this situation and a new model, the multiple growth model, is needed.
Multiple growth is defined as a situation in which the expected future growth in dividends must be described using two or more growth rates.
A well known multiple growth model is the two period model. This model assumes growth at a rapid rate for some period, followed by a steady long term growth that is endurable.
For the above mentioned multiple growth model, we have the following time line diagram :



The model can be described in equation form as :

$$V = \sum Dt/(1+k)^t \qquad t = 1 \rightarrow \infty$$

$$= \sum Dt/(1+k)^t \quad t = 1 \rightarrow n \quad + \sum Dt/(1+k)^t \quad t = n+1 \rightarrow \infty$$

= PV of dividends paid in the first period + PV of dividends paid in the second period

2. The Discounted Cash Flow Model (DCF)

Discounted Cash-Flow (DCF) method can be used to estimate a company's worth based on the current value of its forecasted cash flows.
In the DCF approach, the value of a business is the future expected cash flow discounted at a rate that reflects the riskiness of the cash flow.
There are several Discounted Cash Flow models, but the most popular one is the Free Cash Flow Model.

The Free Cash Flow Model (FCF)

The free cash flow (FCF) model values the equity of a company's operations (the entity value that is available to all investors) less the value of debt and other investor claims that are superior to common equity (such as preferred stock).
The Company's Value is equal to :

Value of Operations - Value of Debt and other Investor Claims that are superior to Common Equity

The **Value of Operations** is equal to :

Present Value of Cash Flows* *during* explicit forecast period	+	Present Value of Cash Flows* *after* explicit forecast period

* Cash flows represent cash flow from operating and investing activities; thus these cash flows exclude cash flows relating to finance activities.

The value after the explicit forecast period is referred as the continuing value. Simple formula can be used to estimate the continuing value without the need to forecast the company's cash flow for an indefinite period.

3. The Discounted Earnings Model

Another approach to valuing a stock is to discount earnings instead of dividends. In a practical sense, it can be argued that dividends can be misleading as the board of directors can declare dividends even if the company shows a loss, as long as it has earnings from previous periods and sufficient cash to make the payment.

But, on the other hand, the Discounted Earnings Model is not widely used as

the accounting earnings are affected by arbitrary choices in such important areas cost of goods sold and depreciation.
In an article of the quality of earnings, Bernstein and Seigel stated [2] :

A company's reported earnings figure is often taken by the unsophisticated user of financial statements as the quantitative measure of the firm's well being. Of course, any professional knows that earnings numbers are, in a large part, the product of conscious and often subjective choices between various accounting treatments and business options, as well as of various external economic factors. If he wants to assess the true earning power of each company, the financial statement user must make some determination of the "quality of its earnings".

B. THE P/E RATIO APPROACH

An alternative fundamental analysis method of valuation often used is the P/E ratio or earnings multiplier approach.

The current market price of a publicly held company is equal to :

$$Po = \text{current market price} = E \times Po/Eo \qquad (5)$$

where E refers to the earnings (per share) used to calculate the P/E ratio as reported. For example it can be the most recent 12-month earnings.

To implement the earnings multiplier model to estimate the value of the stock, we must estimate the P/E ratio and the earnings for the next period.
The equation (5) then becomes :

P = estimated stock price = Estimated earnings x justified P/E ratio

Earnings are typically estimated for the next 12 months

For a privately held company, the valuation is more difficult. The historical earnings of privately held companies must first be adjusted to be consistent with the reported earnings of public companies. Then the average P/E ratio for the industry or for several comparable public companies can be used to arrive at an indication of value.

[2] Leopold Bernstein and Joel Seigel, "The Concept of Earnings Quality", *Financial Analysts Journal*, July-August 1979.

C. ASSET-BASED VALUATION MODEL (Adjusted Book Value)

The asset-based valuation model assign a value to the firm on the basis of the current market value of the individual components assets. To arrive at the (market) value of the firm's equity, liabilities (also at market value) are deducted:

Value = Assets - Liabilities

Book value is the reported net worth of the company. Except by coincidence, book value equals neither the market value of the firm nor the fair value of its net assets.
The amounts reported in the financial statements must be adjusted to provide a better estimate of the firm's tangible net worth.

In principle, market values should be used for all assets and liabilities that have a determinable market.

The following are examples of adjustments that should be made to a number of the balance sheet accounts.

Cash, Cash Equivalent, Marketable Securities

Cash and Cash Equivalent require no adjustment as they represent current cash balances with foreign currency amounts translated at current exchange rates.
For the Marketable Securities, the current market value should be used instead of original cost as it is a more relevant measure.

Trade Receivable and Other Receivable

Provision for debts unlikely to be collected would presumably have been made in the accounts of the business, but their adequacy would need to be reviewed.

Inventory

In the case of stocks and work-in-progress, the relevant valuation would be their historical cost. It would be important to study if it is necessary to make deductions for damaged or defective stocks, and for any stocks which are not readily sellable or which could be sold only at prices below the above valuation.

Intangible Assets and Deferred Charges

Intangible assets such as goodwill should be eliminated since it does not have a value separate from the business.

Deferred charges reflect unrecognized expenses. As cash outlays have occurred but yet have to be recognized as expenses, they should not be considered as assets and should be removed from the adjusted balance sheet.

The book value method of valuation (also called the asset value method of valuation) might be the most easy and simple method but it is the least used as it establishes the value based not on market value but on historical cost.

Technical Analysis

Definition

Technical analysts believe that understanding historical price-volume information of individual securities is the key for determining their probable future performance.
Typically, technical analysts record historical price-volume data on charts, study these charts in an effort to find meaningful patterns, and use these patterns to predict future prices.

Technical Analysts :

I. Focus on internal factors by analyzing movements in the stock. In contrast, Fundamental analysts focus on economic and political factors, which are external to the market itself.
II. Tend to concentrate more on the short run by forecasting short-run shifts in supply and demand.
III. Seek to forecast security prices rather than security values.

Assumptions

Edwards and Magee summarize the basic assumption underlying technical analysis as follows[3] :

1) *Market value is determined solely by interaction of supply and demand.*
2) *Supply and demand are governed by numerous factors, both rational and irrational.*
3) *In disregard of minor fluctuations in the market, stock prices tend to move in trends which persist for an appreciable length of time.*
4) *Changes in trends are caused by shifts in supply and demand.*
5) *Shifts in supply and demand, no matter why they occur, can be detected sooner or later in charts of market action.*
6) *Some chart patterns tend to repeat themselves.*

[3] R. D. Edwards and John Magee, *Technical Analysis of Stock Trends*, 4th edition 1958, page 86

Advantages and Disadvantages of Technical Analysis (TA) over Fundamental Analysis (FA) :

Advantages	*Disadvantages*
TA overcomes the problems inherent in financial reporting by not using it.	TA is too subjective. Judgments depend on market "feel".
TA is less costly in the terms of effort and time required than is FA.	TA is not based on solid economic theory.

Tools Used by Technical Analysts to Forecast Security Prices

I. Charts

The charting of price patterns is one of the classic technical analysis techniques. Technicians believe that stock prices move in trends, with price changes forming patterns that can be recognized and categorized.
There are two types of charts which are commonly used in technical analysis : the bar charts and point and figure charts.

Bar Charts

It is the most popular and simplest chart in technical analysis. Bar charts are plotted with price on the vertical axis and time on the horizontal axis.
In bar charts, the high and low prices for a stock are plotted for a given time period (a day, a week, a month, a quarter, or a year). These high and low prices are joined by a line which is marked by a tick designating the closing price for the stock.
The bottom of a bar chart usually shows the trading volume for the same given time period, permitting the simultaneous observation of both the price and volume activity.

Technicians using charts will search for patterns in the chart that can be used to predict future price moves. One of the famous chart pattern is the *Head-and-shoulder pattern (HSP)*.

HSP is a formation which signals that the security's price has reached a top and will decline in the future. The market action which forms HSP can be broken to 4 phases :

1. *Left shoulder* A period of heavy buying followed by a pause in trading pushes the price up to a new peak before the price begins to slid down.

2. *Head* A heavy buying raises a price to a new high and then allows the price to fall back below the top of the left shoulder.
3. *Right shoulder* A moderate demand lifts the price somewhat but fails to push prices as high as the top of the head before a decline begins.
4. *Breakout* Prices fall below the neckline, that is, the line drawn tangent to the left and right shoulders. This breakout is supposed to precede a price drop and is a signal to sell.

Technical analysts have described numerous patterns which are supposed to indicate the direction of future price movements. Some of the possible patterns include : Triangles, rectangles, double tops, triple tops, the inverted V, gaps, etc.....
It is obvious that most, if not all, of these patterns are much easier to identify in hindsight than at the time they are actually occurring.

Point-and-Figure Charts

Point and Figure Chart (PFC) is more complex than line or bar chart. PFC is not only used to detect reversals in a trend but it can also be used to set actual price forecasts, called *price targets.*
A point-and-figure chart is unidimensional. Both vertical and horizontal spaces measures prices. In PFC only *significant* price changes are included. The analyst establishes a level of significance before drawing the chart.
Xs are used when the price of the stock is going up and Os are used when the price of the stock is going down. An X or O is recorded only when the price moves by the specified amount.

II. Relative Strength

A well-known technique used to forecast individual stocks is the analysis of relative strength. The relative strength for a given stock is calculated as the ratio of the stock 's price to a market index, or an industry index, or the average price of the stock itself over some previous period.

The ratios are plotted to form a graph of relative price across time. The graph shows the strength of the stock relative to its industry, the market, or other factors.

III. Moving Averages

The moving averages method is one of the simplest used by people who study stock charts. It is also on of the best. A moving average is an average of

the closing price over a predetermined number of days. It is calculated every day and when a new day is added, the oldest day is dropped from the calculation.

For example, in a 30 days moving average, the closing price for 30 days is added together and then divided by 30 to get the average.
When a new day is added to the data, the price of the stock 31 days ago is removed from the calculation - hence the average moves with the data and therefore is called moving average.

The resulting moving average line supposedly represents the basic trend of stock prices. A comparison of the current market price to the moving average produces a buy or sell signal.

CHAPTER III

CEMENT INDUSRTY ANALYSIS

PART 1

THE CEMENT INDUSRTY IN THE MIDDLE EAST

OVERVIEW

In this chapter, we will study the cement industry in the following neighboring countries : Israel (including Gaza/West Bank), Saudi Arabia, Syria, Egypt, and Turkey.

The purpose of this chapter is not to analyze in depth the cement industry in the Middle East region (as it constitutes a whole research project in itself) but to have a broad view about the production, consumption, import, export, and price of cement in the above mentioned countries.

As a result of the work done, the studied countries can be divided into two main categories :

1) The first category represents countries with excess cement capacity and who are traditional exporters of cement. This category is constituted of Saudi Arabia and Turkey.

2) The second category represents countries with shortage in cement capacity and who could constitute, in the future, export markets for Lebanese cement industry. This category is constituted of Israel, Egypt, and Syria.

Exporters of cement such as Saudi Arabia and Turkey could not represent a threat (at least in the near future) to Lebanese cement producers in their local market even if they offer competitive prices. This is due to the following : 1) the Lebanese cement industry is totally protected by the government and 2) We expect that Lebanese cement industry will face a production surplus problem in the coming years (Please refer to Chapter III - part 2 "The cement industry in Lebanon" for a study about the future of the Lebanese cement industry).

The production surplus problem will be faced mainly by "Cimenterie Nationale" and "Ciment de Sibline" who will probably have idle capacity (as the increase in their production capacity is expected to be much more than the combined increase in the cement market consumption and their respective market share).
As for "Societe des Ciments Libanais" (SCL), the cement export will not play a major role in the company's future operation as the majority of its production will be absorbed by the local market. (Please refer to Chapter IV "Valuation" for a forecast of SCL sales during the period 1997 - 2003).

ISRAEL

Israel is currently experiencing a construction boom mainly facilitated by a number of infrastructure projects initiated by the government. The US$ 781M Ben Gurion airport project, the US$ 154M Carmel Tunnel and a long distance road linking Israel to the Palestinian territories, Jordan and Egypt are examples of governmental infrastructures projects.
Furthermore, the immigration of former Soviet citizens into the country has also added to the growth of the Israeli economy and more specifically to the growth of the cement consumption.

The emerging construction industry in the Palestinian territories will positively affect the Israeli cement industry. The Palestinian Housing Council estimates that 250,000 new homes will be constructed over the next decade. In addition to residential construction, various infrastructure projects are being undertaken.
The biggest is the Gaza port project representing an investment of US$ 60M.

Production

All Israeli cement is produced by one company : **Nesher - Israel Cement Enterprises**. The company has a total clinker capacity of 5.28Mta and a total cement capacity of 7.0Mta, spread over three cement plants.
The first one is the Ramla plant located near Tel Aviv. Until 1995, Ramla operated some 1.36Mt of capacity in its old wet-process facilities, but its recently completed new dry-process has pushed capacity to 2.9 Mta.
Nesher's production facilities at Haifa, in the north of the country have a capacity of 1.24 Mta, running on wet-process technology. Nesher's third plant, the Har-Tuv works near Jerusalem has a capacity of 1.14 Mta.
The company has 764 employees working in its three plants.

Consumption

Cement consumption has been moving up steadily over the past few years, rising from 4.5Mta in 1993 to around 5.6Mta in 1995.
In contrast to other Middle Eastern markets, Nesher's domestic cement sales are made largely in bulk, with the Israeli ready-mix sector alone taking some 42 per cent of production.

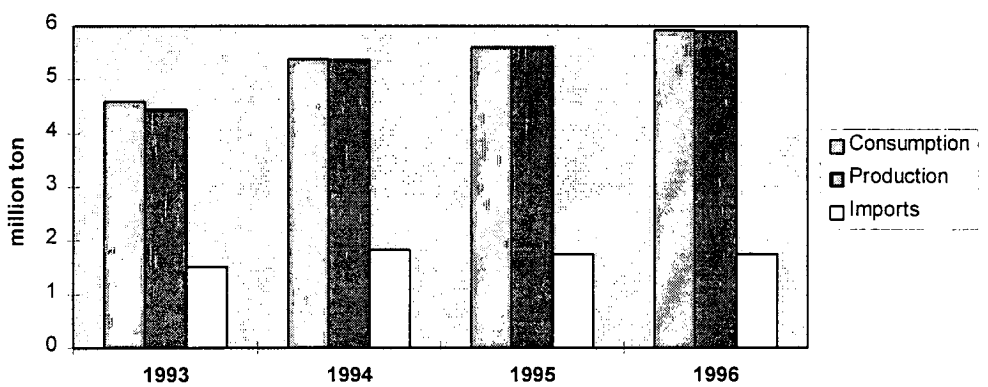
Exports

Included in the overall consumption figures, 1.5Mt are sold to the autonomous Palestinian territories of which 1.0Mt represents the West Bank market.
Nesher has the majority of the Palestinian market with neighboring Jordan supplying just 150,000t of cement.
All the Israeli cement is sold to the West Bank via one local distributor at prices US$17 lower than what it is sold in Israel.

Imports

Imports of clinker for grinding at the Nesher facilities have been rising steadily in recent years and amounted to 1.5Mt in 1995 mainly from Turkey, Greece, and Cyprus.
Independent imports of cement have also appeared in the Israeli market. Cement imports are expected o reach 300,000t in 1996 compared to the 200,000t imported in 1995.

Consumption grows as building boom continues



million tons	1993	1994	1995	1996 E
Consumption	4.598	5.384	5.600	5.925
Change %	+2.3	+13.0	+7.7	+5.8
Production	4.460	5.360	5.600	5.900
Exports*	0	0	0	0
Imports**	1.503	1.831	1.750	1.750

* exports to Palestinian territories are included in the overall consumption
** includes mainly imported clinker and very limited volumes of cement
Source : Global Cement Report - Second Edition

Prices

Currently, local cement prices range from US$66 to 73 per ton. Governmental approval has to be received for any price increase.
In terms of its own clinker imports, Nesher is paying around US$35-38 per ton, CIF Haifa, from where the clinker is transported by truck to the plants for final processing.

Outlook

The extensive construction programs anticipated in Israel, Ghaza, and the West Bank are expected to push up demand even higher. As a result, Nesher is planning to increase its production capacity and replace the old wet-process systems with new dry-process plants by the year 2003.

The Palestinian Cement Company - based in Ramallah - is in the process of signing an agreement with Czech PSP company for the construction of a 0.6Mta cement works in Jenin. The company has already raised about US$8.6M in equity through private investors.

The Arabian Cement Company is also planning a new plant with a capacity of 1Mta on the West Bank. This project represents an investment of US$150M, while the company itself is said to be backed by Hold Resources, a joint venture between Holderbank and Amman Resources of Jordan.

However, the willingness of the private investors to pour money into the construction and into the cement industry is heavily dependent on perceived advancement in the Middle-East peace process.

Saudi Arabia

Production

At present there are seven cement manufacturers in Saudi Arabia with an overall production capacity of around 13.0Mta of clinker and 14.0Mta of cement.
These figures include the expansion undertaken during 1996 by the two companies : Saudi Cement and Arabian Cement.

Saudi Arabia cement manufacturers' capacities (1995)

Manufacturer million tons	Production Capacity Clinker	Cement
Saudi Cement	3.098	3.274
Eastern Province	2.100	2.450
Yamama Saudi	2.750	2.860
Southern Province	1.500	1.560
Qassim Cement	1.200	1.260
Arabian Cement	1.200	1.260
Yanbu Cement	1.200	1.260
Tabuk Cement*	0	0
Total	**13.048**	**13.924**

* Plant is currently under construction. Production is expected by mid - 1998.

Source : Saudi Arabian Cement Manufacturers.

In March 1997, Southern Province Cement has opened a new plant which will bring total clinker capacity up to 15.2Mta and cement to 16.25Mta. Around June-July this year, Yanbu Cement expansion plan will raise these figures by a further 2Mta and 2.1Mta respectively.
Finally, once Tabuk cement comes on stream end of 1998, these capacities will have increased to around 19.6Mta of clinker and 20.9Mta of cement.

Total Installed Capacity 1995-1998

Product	1995	1996	1997	1998
million tons	actual	actual	forecast	forecast
Clinker	13.048	15.335	18.530	19.580
Cement	13.924	16.296	19.644	20.894

Source : Saudi Arabian Cement Industry

The actual 1995 and 1996 production figures are higher than the total installed capacity for both clinker and cement. This is due to either exceeding installed capacities or adding clinker imports and stocks.

Product	Installed Capacity		Actual Production	
million tons	**1995**	**1996**	**1995**	**1996**
Clinker	13.048	15.335	14.899	16.236
Cement	13.924	16.296	15.773	16.437

Source : Saudi Arabian Cement Industry

Cement Sales and Prices

According to Saudi Arabian cement manufacturers, total sales in 1996 of 17.38Mt of cement have increased by more than 7.5 per cent on 1995 figures.
Domestic sales in 1996 were slightly over 15Mt, the difference between this and total sales representing exports of around 1.3Mt clinker and 1Mt cement, largely to Kuwait, Bahrain, Qatar, and Yemen.

Bulk cement represents just over 50 per cent of total sales, with selling prices ranging between SR200-215 (US$53-57) per ton for Type I cement and SR220-235 (US$59-63) per ton for Type V.
Prices for bagged cement were respectively ranging from SR210 (US$56) to SR220 (US$59) per ton and from SR230 (US$61) to SR245 (US$65).

The following table shows up-to-date sales statistics, by company, for the years 1993, 1994, 1995, and 1996 :

Manufacturer	Sales			
million tons	1993	1994	1995	1996
Saudi Cement	3.741	3.895	3.490	4.250
Eastern Province	2.760	2.886	2.390	2.562
Yamama Saudi	2.910	2.978	2.967	3.035
Southern Province	2.513	2.605	2.619	2.666
Qassim Cement	1.294	1.254	1.283	1.308
Arabian Cement	1.606	1.663	1.812	2.033
Yanbu Cement	1.705	1.711	1.570	1.525
Total	**16.529**	**16.992**	**16.131**	**17.379**

Future consumption

Analysis of the Saudi Arabian construction sector indicates rising demand but at levels lower than the 1980s and early 1990s. The activity of the private sector is expected to decrease during 1997 due to over-saturation in certain segments (e.g. commercial centers).
A projection of apparent consumption, production and subsequently the resulting surplus or deficit for the period 1996 to the year 2000 anticipate a surplus of cement of 4.0Mt in 1997, 4.5Mt in 1998, and in excess of 3-4Mt through to year 2000 assuming no further capacity is installed.

The future of Saudi cement industry

The Saudi Arabia has traditionally exported its cement surplus to the Gulf Cooperation Council (GCC) countries.
But starting 1998, the GCC states are expected to be essentially self-sufficient in cement with relatively small trade flows in the form of clinker exports to the UAE and cement exports principally to Bahrain.

One of the solutions to the problem of Saudi cement surplus is to reduce capacity by closing the less efficient plants and/or cutting down on planned expansions, as has been the case in similar situations in other parts of the world.

However, since each cement manufacturer is privately owned with separate obligations to its shareholders, this is not considered easily feasible because joint efforts are difficult to be put to practice.

To solve the coming cement surplus problem, Saudi Arabia has to seek alternative markets - markets outside the domestic scene - which means exporting on the international cement and clinker markets.

SYRIA

Syria's Ministry of supply and Internal Trade estimates that cement demand was about 6.5Mt in 1996, and the People's Assembly estimates that production was in the region of 4.5Mt. With imports being around 0.6Mt, there is a cement shortage of about 1.4Mt in Syria.

Cement Production

Syria has seven cement producers and nine plants. All companies are owned by the state, giving the government a total monopoly on manufacture, import, and distribution of cement. The total installed capacity is 6.243Mta. However, due to technical, financial and administrative reasons clinker production falls far short of the plant's nominal capacity.
Latest statistics show a national capacity utilization about 78 per cent.

Syria's Nominal and Actual Cement Production Capacity 1996*

Company	Plant(s)	Nominal	Actual	cap. util.
The Arab Co. for Manufacturing Cement and Building Materials	Aleppo	0.85Mt	0.85Mt	100%
The Adra Co. for Manufacturing Cement and Building Materials	Adra	0.83Mt	0.61Mt	73%
Al Rastan Corporation for Cement Industry	Rastan	0.13Mt	0.14Mt	102%
Al Shahba Cement and Building Materials	Bourg Islam	n/a	n/a	n/a
	Muslimiyeh	n/a	n/a	n/a
	Sheik Said	1.13Mt	0.98Mt	87%
The Syrian Co. for Cement Industry and Building Materials	Hama I, II	0.45Mt	0.46Mt	102%
Tartous Cement and Building Materials	Tartous	2.17Mt	1.43Mt	66%
The National Corp. for Cement and Building Materials	Dummar	0.19Mt	0.07Mt	36%
Total		**5.74**	**4.46**	**78%**

* Excluded Milihouse which does not sell cement to the public.

Source : International Cement Review, February 1997.

Cement Private Sector

The Syrian Economy and Foreign Trade Ministry issued regulations in November 1994 which ended the state monopoly in cement manufacture, importation and distribution, allowing private sector companies to get involved.
Up till now, only one company, namely the Syrian Saudi Company for Production of Gray Cement, has effectively started the construction of its plant.
The new plant is being financed by a group of Saudi and Syrian businessmen.
The contract for the plant is worth US$79m, and has been awarded in large part to FL Smidth. The new Kiln is designed for a capacity of 3,100tpd.
The new plant will be built at Hama, in the vicinity of the Syrian Company for Cement Industry.
The new plant is expected to come on-stream by 1999.

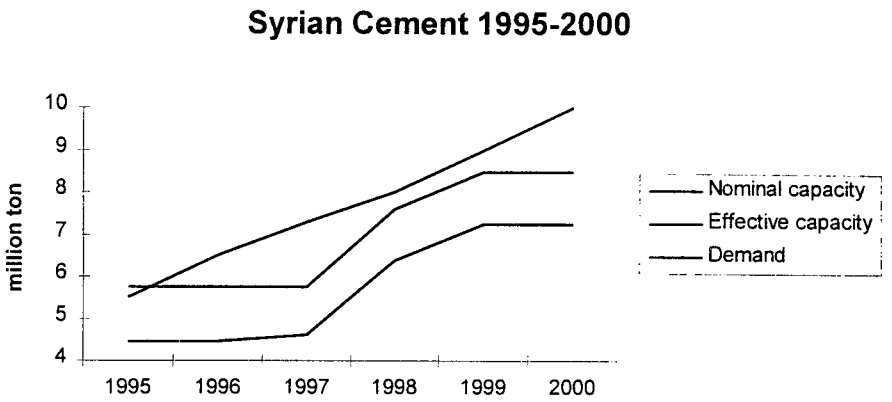
Cement Industry Forecast

A number of cement government-owned companies are currently planning the expansion of their plants capacity. Furthermore, a number of privately owned cement companies are expected to enter the Syrian market in the future as the total private capacity licensed since 1994 amounts to 8.3Mt.
Although the new capacity is likely to cut the expected increasing deficit in the period 1995-2000, the country is likely to be severely undersupplied.

Syrian Cement 1995-2000

Year	Nominal capacity	Forecast utilization	Demand*	Effective capacity	Deficit
1995	5.74Mta	78%	5.5Mt	4.46Mta	1.04Mt
1996	5.74Mta	78%	6.5Mt	4.46Mta	2.04Mt
1997	5.74Mta	80%	7.3Mt	4.6Mta	2.7Mt
1998	7.59Mta	84%	8.0Mt	6.375Mta	1.625Mt
1999	8.49Mta	85%	9.0Mt	7.235Mta	1.765Mt
2000	8.49Mta	85%	10.0Mt	7.235Mta	2.765Mt

* Forecast by the Ministry of supply.
Source : International Cement Review, February 1997.



Taxation Problem

One difficulty confronted by potential investors in the Syrian Cement industry is the high level of taxation on cement, with up to 60 per cent of the sale price currently allocated to the Ministry of Finance.

The Syrian Saudi Company is seeking clarification from the government as to the official policy for cement sales. It wants to know if it will be able to sell cement directly to the public and which taxes are likely to be levied on cement sales.

Egypt

The manufacture of Egyptian cement dates back to the beginning of the twentieth century, making the cement industry one of the oldest established industries in Egypt.
The Egyptian cement industry expanded gradually, and now is represented by eight companies operating ten plants with 16 dry lines and 22 wet ones.

Cement Manufacturers

The following table shows the cement companies in Egypt and the location of their main plants, their actual production for 1995/1996[1] as well as their approximate nominal capacities in the same period :

Company	Plant Location	95/96 Actual	95/96 Capacity
		(millions of tons)	
Alexandria Portland Cement Company	El Max	0.75	0.74
Ameryah Cement Company	Burg El Arab	2.34	2.08
Assiut Cement Company	Assiut	2.78	3.60
Beni Suef Cement Company	Beni Suef	1.07	1.04
Helwan Portland Cement Company	Helwan-Minia	2.99	3.38
National Cement Company	El Tebbin	1.90	3.68
Suez Cement Company	Suez and Quattamia	2.82	2.42
Tourah Portland Cement Company	Tourah	3.16	4.04
Total		**17.81**	**20.98**

Source : GDR Offering Memorandum, Suez Cement Company - November 1996.

Cement Supply and Demand

The table below shows the total annual delivery, imports, exports and consumption of cement in Egypt for the years 1990 to 1996 :

[1] The accounting year for the Egyptian public sector runs from July 1 to June.30. By way of example, "1995/1996" means the year from July 1, 1995 to June 30, 1996.

Year	Plant Deliveries	Imports	Exports	Apparent Consumption
		(000s of tons)		
1990/1991	15,268	0	0	15,268
1991/1992	14,943	11	112	14,842
1992/1993	15,881	0	359	15,222
1993/1994	16,166*	0	219	15,947
1994/1995	16,633*	1,133	115	17,651
1995/1996	17,822*	1,792	150	19,464

* Figures for these years are production figures rather than plant deliveries.
Source : Egyptian Ministry of Public Enterprises.

The above table illustrates how the gap between the local supply ("Plant Deliveries") and Demand ("Apparent Consumption") reached a high of 1.6 million tons in 1995/1996. The difference is met by imports.

Imports

During the 1970s and 1980s, imports into Egypt took up a considerable part of cement traded on the local market.
However, the situation was set to change as the Egyptian government planned and implemented a plan to increase domestic production capacity, aiming to make the country self-sufficient by the end of the 1980s.As a result, by 1989, the government was able to ban cement imports, eliminating the heavy burden on the country's foreign exchange resources.
Nevertheless, a steady increase in demand and the inability of local producers to meet this requirement put pressure on the government to re-open the door to imports.
Romania, Greece, Russia, and Turkey are the main exporters of cement to the Egyptian market.

Governmental Regulations and Tariffs

The Egyptian Government considers cement as a strategic commodity. The official price of cement was, until 1991, set by decrees issued by the Ministry of Reconstruction and Housing. Currently, a committee representing the cement companies looks at prices and studies the effect of imports and market forces. Prices are based on a cost-plus formula, and are now determined individually by the cement-producing companies themselves.

Current import duties stand at 10 per cent for unbagged cement and 20 per cent for bagged cement.

Projected Demand and Supply

The recent growth in demand is expected to continue. The major reasons for this expected rise in consumption are a significant increase in residential construction, development of new towns, continuing development of infrastructure projects and the rapidly expanding tourism projects along the Red Sea and northern coastlines.

The current total annual supply of cement of around 18 million tons is likely to increase to 22 million tons by the year 2000 due to the construction of new manufacturing capacity and efficiency improvements, assuming the completion of contracted expansion plans of 3.9 million tons. The annual supply of cement may increase to as much as 27 million tons by year 2000 if four further projects for which government permission has been granted, are effectively constructed.

Outlook

Despite the increase in production at existing plants and the construction of new plants, there is expected to be a continued deficit in domestically produced cement of approximately 2 million tons until 1998/1999.

Turkey

Turkish Cement Manufacturers

Big and fundamental changes have recently occurred in the Turkish cement industry. A large scale consolidation is taking place in two ways :

- Through privatization of state-owned plants and companies.
- By means of mergers and acquisitions.

None of the cement groups which have now become very influential existed 10 years ago. There were 41 plants acting in 41 ways. Today the number of plants has not changed very much, but through mergers and acquisitions there are now seven major groups including multinational owners, all from Europe.

In 1991, five cement plants were privatized. These five plants were purchased by the Ciments Francais Group (later taken over by Italcimenti Group). It was followed by other groups such as Ciments Lafarge, Ciments Vicat and lately by CBR's acquisition of the largest plant in Turkey, Cannakkale Cimento.

The followings are the major groups operating in the Turkish cement market during 1995 :

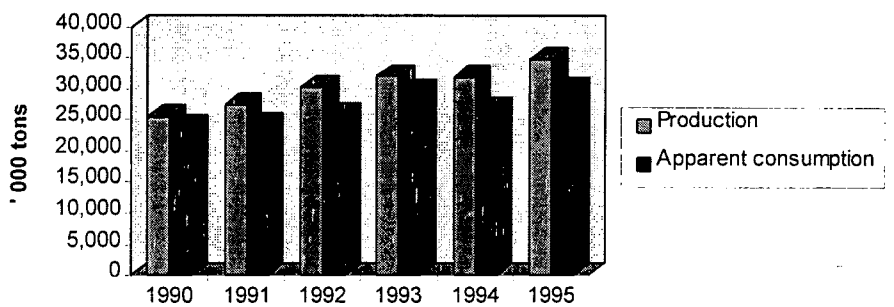
Set Cement	5 Plants
Lafarge	4 Plants & Fact
Rumeli Group	5 Plants
Sabanc OYAK	9 Plants & Fact.
Yibitafl	3 Plants
Bat Anadolu	2 Plants
Other Private	12 Plants
Government	8 Plants
Total	48 Plants & Fact.

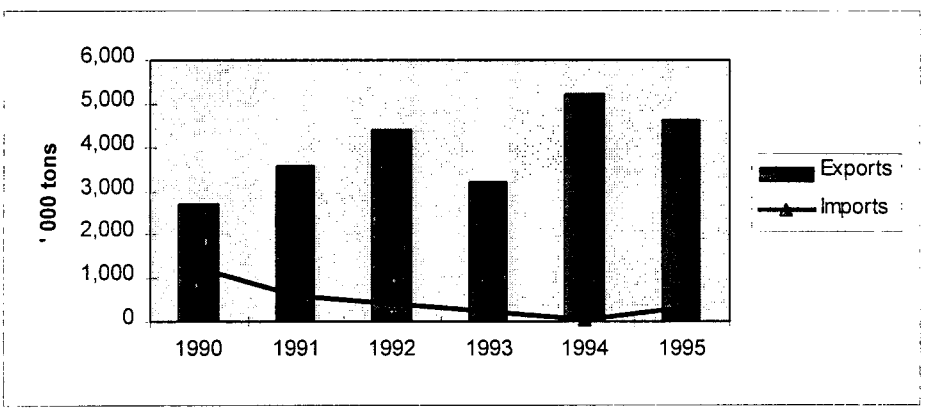
The major cement producers are establishing their own ready-mixed concrete producing subsidiaries. More than 70 per cent of the ready-mixed installations are owned by cement producers.

In 1995, 94% of the cement production in Turkey was made in the private sector. (compared to 93% in 1994, 92% in 1993, 77% in 1992, and 76% in 1991).
The privatization process has now been completed with the sale of the few remaining state - owned plants in 1996.

Production, Export, Import and Apparent Consumption

The following table and graphs show the production, export, import, and apparent consumption of the Turkish cement industry for the period 1990-1995 :





Quantities in 1000 tons	Production	Imports	Exports	Apparent Consumption
1990	25,378	1,220	2,682	23,799
1991	27,431	596	3,573	24,328
1992	30,194	398	4,417	25,965
1993	32,079	245	3,202	29,778
1994	31,897	51	5,204	26,703
1995	34,747	331	4,628	30,085

Source : "World Statistical Review" # 15, 16, 17, and 18. The European Cement Association - Cembureau.

PART 2

THE CEMENT INDUSRTY IN LEBANON

History of the Cement Industry in Lebanon

The establishment of the first cement plant in the region (Lebanon, Syria, and Jordan) was mainly due to the remarkable growth of cement imports over the period 1923-1929.
In 1929, a Lebanese and French group incorporated the Lebanese Cement Company (Societe des Ciments Libanais - SCL) with an initial capital of 180,000 Lebanese-Syrian pounds. SCL begins operations in 1931 with one kiln of 150 tons daily rated capacity.

But the company has faced financial difficulties right after commencing its operation due to the general business conditions, lack of experience, and low product quality vis-à-vis imports. This situation lasted until spring 1934 when a Swiss and Danish group bought the French and part of the Lebanese shares and supplied technical and financial assistance.
The capital was raised to 240,000 Lebanese- Syrian pounds and a second kiln of 400 tons daily was installed.

To meet the rising demand in housing, SCL has installed in 1949 a third kiln of 350 tons daily rated capacity. Similarly, imports have increased substantially during the period 1948-1950 contributing about 20% of the cement supply[1].
Public work projects have started since the early fifties to constitute a significant portion of the local cement demand. This has induced SCL to install a fourth kiln of 450 tons daily rated capacity in 1954.

In 1953, the monopolistic structure of the cement industry was broken by the establishment of a second competitive firm, the National Cement Company (Cimenterie Nationale-CN). CN started operation in 1955 with a kiln of 250 tons daily output.
In 1957, CN installed a second kiln of about 550 tons daily output ; and in 1958 the SCL replaced its first kiln by a larger kiln of 900 tons daily.

During the period 1960-1968, Lebanon has witnessed a new expansion era of the construction industry. The industry production has increased to full capacity and thus inducing further expansion. In 1966, CN installed a third kiln of 725 tons daily output.
The government tried to protect the local cement industry by :

- ✓ Imposing of 20 Lebanese pounds (approximately US$7) duty tax per ton of imported cement, and that tax was 50 per cent lower for the imported cement of Arab origin.

[1] Starting 1951, imports of cement were included under the decree # 6780 listing the articles needing a license.

- ✓ Granting a third license for a the manufacturing of gray Portland cement. The new license was accorded in 1964 to the Orient Cement company.[2]

In 1974, the decree # 8952 was issued calling for the establishment of a company with limited liability "Ciment de Sibline"[3]. The company was supposed to begin operation in September 1983 but due to the Battle of the Mountain the company's plant in Sibline began producing clinker and cement only in July 1987.

During the period 1974-1978, the management of the National Cement Company - CN made an important modification by shifting the production from the wet to the dry process, thus saving power and fuel consumption.

The Cement Industry in Lebanon

Introduction

There are three manufacturers of gray cement in Lebanon, Societe des Ciments Libanais (SCL), Cimenterie Nationale (CN), and Ciment de Sibline (CDS).
There is one manufacturer of white cement, Societe Libanaise des Ciments Blancs.
Gray cement consumption has risen much in excess of domestic production capacity. All three manufacturers are importing clinker, while the government has given permission for the establishment of a cement importing operation by the well-known international trading company Seament.
All the domestic producers are currently increasing their clinker capacity.

Industry Structure

The Lebanese market is supplied by four companies, as follows :

A. Societe Des Ciments Libanais S.A.L ("SCL")

Societe Des Ciments Libanais is the oldest and largest producer of clinker and cement in Lebanon. SCL's share of the market has

[2] Due to financial difficulties in raising its capital, the company was not established.
[3] The official Decree was issued to Messrs. Kamal Joumblatt, Toufic Assaf, Nassim Majdalani, and Najib Alameddine.

dropped from a pre-war high of 65% to 43.45 % in 1996.
SCL currently produces clinker under the "wet" process but it is in the process of building a new kiln which will produce clinker under the "dry" process.
[Please refer to Company Analysis subchapter for a detailed description of SCL].

B. Cimenterie Nationale S.A.L ("CN")

Overview

Cimenterie Nationale, which is a privately held company controlled by the Doumet and Esseily families, is the second largest producer of clinker and cement in Lebanon.
The company was established in 1953 as a joint stock company specialized in the production of artificial Portland cement.

Factory

The factory is located in Chekka in Northern Lebanon covering an area of 0.5 million square meters on the seafront.
CN has two rotary Kilns using the dry process and equipped with pre-heaters, grate coolers, and electrostatic precipitators. Clinker is ground in eight cement mills with a total productive capacity of 210 tons per hour.
Cement is bagged by two rotary packers or loaded in bulk directly from the cement silos.
CN is undoubtedly the lowest cost producer at present (as it uses the economic dry production method since 1979). It operates two dry process Kilns which produce 750,000t of clinker, which it supplements with imports, selling 1.25Mt of cement in 1995.

Production Facilities

CN has a private wharf from where clinker, fuel, petcoke, and additives are imported. The company also owns two quarries where raw materials are extracted. The plant also has its own electrical diesel (heavy fuel) power station.

Human Resources

Cimenterie Nationale employs 570 people : 37 at its head office in Yarze, 5 at its sales office in Antelias, and 528 at its plant in Chekka.

130 people work in the company's mechanical and electrical workshop.

Expansion Project

CN has invested about US$50 million on upgrading its existing Kilns and expanding its plant with the installation of a 2000tpd Kiln and a raw mill. The contract has been carried out by Kloeckner Humboldt Deutz (KHD). CN's clinker capacity has rise to around 1.5Mta.
The eight-year, US$50 million loan for CN was arranged by Schroder Asseily & Co. Limited in March 1995. The loan carries 350 basis points over LIBOR and provides for a three years grace period.

C. Ciment De Sibline S.A.L ("CDS")

Overview

The company is the smallest producer of clinker and cement in Lebanon.
Its market share has been declining since 1992, when it reached 13.3%, to 10.63% in 1996. A second production line is currently under construction.
The company's main facilities are located in Sibline, Southern Lebanon.
Sibline is well placed to benefit from the eventual reconstruction of the Israel-occupied part of the country.

Production Facilities

The company currently operates one production line using the cost-efficient "dry" process. The line has a nominal capacity equal to 240,000 tpa of clinker or 270,000 tpa of cement. But through design improvements and upgrades, the company has been able to achieve equal or better actual outputs.

Raw Materials and Energy

Limestone and clay, used in the production of clinker, are extracted from the company's quarries. Sand is purchased locally from third party and Gypsum rock is imported.

The company currently utilizes imported heavy fuel oil to run its production line.
Unlike its larger competitors, the company does not produce its own electricity, but purchases energy from the Government.

Port Facilities

In September 1995, the Government granted the Company the exclusive right to use the Jieh Port facilities, which are located 2 kms from the company's facilities.
CDS is planning to invest US$7 million to upgrade the facilities at Jieh, to receive up to 4000t of clinker, where it is currently restricted to 2500t.

Management

The members of the Board of Directors are elected by the shareholders for a period of three years, currently expiring on December 13, 1997.

The Directors of the company are :

Walid Jumblat	Chairman & General Manager
Adnan Kassar	Vice Chairman
Alex Bouri	Representative, Seament
Marwan Hamade	
Adel Kassar	
Irad Investment Company	
Jacques Sehnaoui	
Mustapha Razian	Representative, Almal Investment Company

Authority to manage the daily operations of the Company has been delegated to Mr. Nicolas Nahas, Acting General Manager.

Expansion Project

CDS is investing over US$100 million to expand its clinker capacity to 1.02Mt through a contract with Technip of France, which involves the installation of a new dry process Kiln. Of this investment, US$5.7 million is assigned to the acquisition of additional limestone reserves.

The expected nominal annual capacity after the completion of the expansion plan will be as follows :

Clinker	1,020,000 tons
Cement	1,140,000 tons (from company's clinker) 1,340,000 tons (including imported clinker)

When completed, end 1997, the kiln will transform CDS 's operations.
Fuel consumption will fall from its current level of 860Cal/kg of clinker to 760Cal/Kg, electricity consumption will fall from 134KWh/t of cement to 95KWh/t. Dust emission will improve from 70mg/m^3 to under 30mg/m^3.

In addition to the Expansion Project, the company plan to undertake the following projects when it shall have the necessary funds :

1. Substitution of Heavy Fuel Oil with Coal and Petcoke.
2. Electrical Generation.
3. Development of Jieh Port Facilities.

D. Seament

Since 1993, Seament has had a license to import cement. The license sets the quantity to be imported and the price at which it is sold locally, and it is subject to renewal every six months.
The Seament Group, owned by the Lebanese Bouri family, is a major cement producer and distributor which operates in more than 24 countries.
The share of the market of imports has risen from 4.1% in 1992 to 11.09% in 1996.

Market Conditions

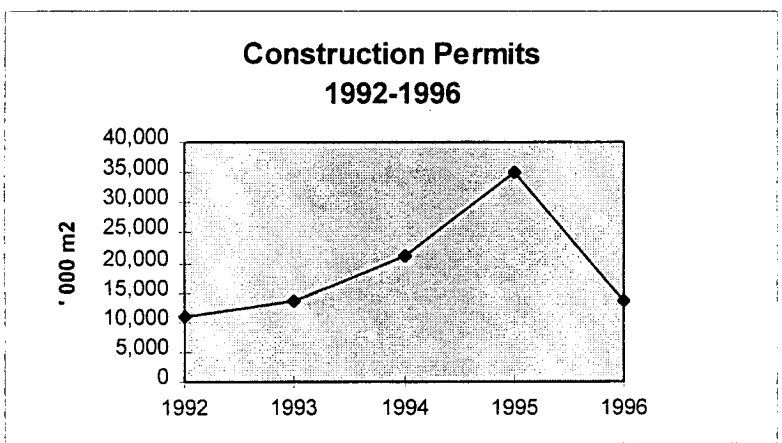
The market for cement depends primarily on the construction industry and on public investment in infrastructure.

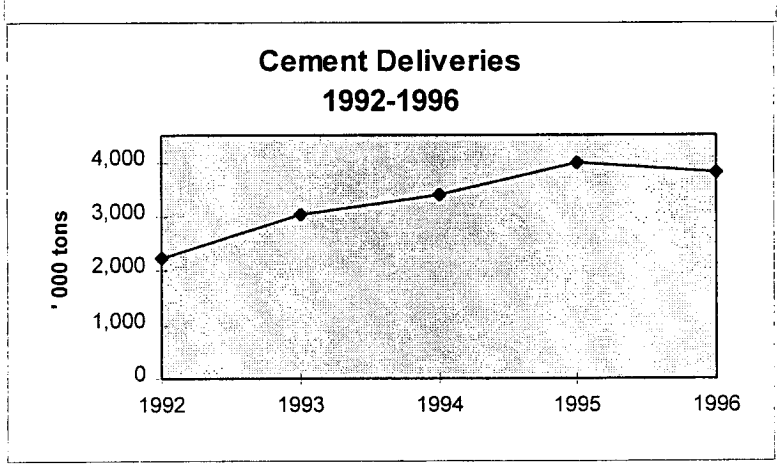
Residential and Commercial Construction

Since 1991, the construction industry has been booming. Arabs and expatriate Lebanese have invested heavily in the real estate sector which has absorbed most of the capital inflows from abroad. Political stability within the country and a keen housing shortage has also encouraged the private construction growth.
The following table set forth selected indicators related to the construction industry :

Selected Indicators	1992	1993	1994	1995	1996
Construction Permits					
Area (000 sq. meters)	10,745	13,427	21,197	34,950	13,498
Cement Sales (000 of tons)	2,219	3,028	3,396	3,979	3,803

Source : Etudes et Consultations Economiques, Bulletin de la Construction et du Batiment : several reports.





The following remarks should be mentioned about the aforementioned table:

◊ The figures of construction permits can not be used for projections on the cement industry as acquiring a building permit does not commit the permit holder to build. A permit can last for 4 years and it can be renewed for another 4 years.

◊ The huge decrease in construction permits in 1996 (a decrease of 61.4% from 1995 and 36.3% from 1994) was due to two main reasons :

1. Recession in the construction industry caused by : the huge increase in the supply of residential and commercial buildings against a moderate demand, and to the general recession of the Lebanese economy which started beginning 1996.

2. In 1994 and 1995, a large number of construction permits, awarded by the Beirut and the North Lebanon Association of Engineers, was issued to legalize existing structures built without a permit during the war years.
   There is no information available on the breakdown of these figures into building permits for new and existing real estate.

◊ The decline in the consumption of cement in 1996 was less sensitive to the economic recession than area of construction permits (a decrease of 4.4% for the consumption of cement between 1996 and 1995 against a decrease of 61.4% in the area of construction permits for the same period). This was due to the above mentioned point # 2) and to the fact that the consumption of cement during 1996 is partly on projects which have already started in the period 1992-1995.

Lebanese Central Bank Statistics shows an annual increase in the bank loans to the construction sector.

in billion of LL.	1994	1995	1996
Loans to Construction & Contracting	1,447	2,168	2,950
Total Loans	7,660	10,385	14,048
Percentage of Loans to C & C	18.89 %	20.88 %	21.00 %

Source: Lebanese Central Bank reports.

The central Bank of Lebanon (BDL) has announced on 13 March 1997 (circular # 1506) the suspension of regulations requiring local commercial banks to invest a minimum of 40 per cent of their LL. deposits in treasury bills. The BDL 's move came at the same time as a decision by Lebanese Banker's Association to cut the LL. prime lending rate to 16 per cent from 18 per cent.

Both decisions are expected to encourage LL. lending to construction industry and increase the number of mortgage loans granted to low and medium income class who currently suffer from shortage in the long and medium housing credit.

The long term potential of Lebanon's real estate market is undisputed. But for now, the real estate market is extremely oversupplied in the upper segment of the market and undersupplied in popular and middle-class housing. In late 1996, it was reported that 80,000 to 100,000 apartments were empty in Beirut alone, most of which were luxurious units.

On the other hand, Lebanon's short term needs are estimated at 60,000 housing units and 15,000 offices and an annual projected demand of between 30,000 and 40,000 units over the next ten to fifteen years[4].
But potential demand has, so far, failed to translate into actual demand due to the following reasons: high prices, inadequate financing, demolition of the middle-class during the war, and a mismatch between the type of units built and those needed. Today, a high proportion of Lebanese families earn less than $1,000 a month. This has unable them to purchase even the cheapest housing apartment, priced at between US$25,000 - US$30,000.
The excess supply does not have a great impact on prices as the majority of the private real estate projects are financed by the investors' own funds.

There are a number of large construction projects that are affecting/will affect the demand for cement.

The largest of these projects is the reconstruction of the Beirut Central District (BCD) by Solidere.
Solidere is the largest land and real estate development company in the Middle East, with a mandate to develop 4.69 million m^2 of built-up area in central Beirut over a period of 25 years.
A two-stage plan has been adopted for the project. Phase I, anticipated to be completed in 1999, includes the completion of the infrastructure works in the BCD, cleaning up the Normandy landfill, and construction of two marinas on the Reclaimed Land.
Phase Two, commencing in year 2000, includes the completion of the development of the BCD and the Reclaimed Land

Another company similar to Solidere, Linord, was established to develop an area of the coast north of Beirut. The site will include a commercial, tourist and residential area and a free zone.

[4] "Lebanon 1997-8" page 150-151. Oxford Business Group.

Linord has not commenced yet its operations but it is expected to raise a capital of up to US$ 200 million through an Initial Public Offering (IPO) during 1997.

The Consolidated Contractors Company (CCC) has been appointed construction manager for the redevelopment of the Phoenicia hotel in Beirut. Total finance for the project of more than US$ 80 million was finalized in May 1996.
The Middle East Capital Group (MECG) is managing a capital increase of up to US$ 20 million for the Societe Hoteliere de Tourism to finance the expansion of the Al Bustan Hotel north of Beirut. In addition, Ali Abdullah Jammal is planning to build a new 250-room, five star hotel next to the Carlton hotel in Beirut.

Public Construction Projects

The Council of Construction and Development (CDR), which is a public institution related to the Prime Minister's office, prepared a 13-year (1995-2007) construction plan called "Horizon 2000".
The plan covers the construction and improvement of the whole infrastructure of the country.
The program expenditures are estimated now at about US$18 billion for public investments. CDR has placed contracts for some US$3.3 billion (representing 1,131 contracts) of which US$563 million (representing 798 contracts have been completed as of September 30, 1996)[5].

The following contracts, directly affecting the cement market, are awarded or about to be signed by the Lebanese government:

1. Publicly financed projects

- *Airport project* :

  US$450 million for the expansion of Beirut International Airport, including the construction of an additional 71,000 sqm of built space and 3,500 m long runaway of which 1,900 m will go into the sea. The expansion contract has been awarded to Karakula, a local contractor, and Hochtief-CCC, a German-Lebanese joint venture.

- *Elyssar Project*

  A large-scale project for the construction of the southern suburbs of Beirut

[5] "Beirut In Motion" 1996 issue, page33-35. CDR reports.

is currently under preparation. The project, which is known as the "Elyssar" project, involves the construction of infrastructure and over 2,000 housing units by 1998-1999.

- *Lebanese University*

The construction of the Lebanese University at Hadath consists of 13 faculty buildings, library, dormitories, central administration, central catering, conference center, and parking. The German "Ed Zueblin" firm has signed the contract valued at US$198 million.

- *Roads and Highways*

The program covers the rehabilitation of approximately 6,300 Kms of roads over a period of five years at an estimated cost of US$1,250 million. The Ministry of Public works spent about US$105 million in 1995 and US$150 million in 1996 for that purpose.

2. Build-Operate-Transfer (BOT) projects

- *Beirut Sports City Commercial Center*

The project consists of an area of 136,000 m^2 of commercial and leisure facilities, a swimming pool, a diving pool, and an open-air multi-purpose stadium.
The project was awarded to the local company "Enedco" at US$150 million on a B.O.T. basis for 45 years.
The project was started in 1995 by the launching of the construction of the Olympic Stadium, which is expected to be completed before the 8th Pan Arab Games.

- *Arab Highway and the Beirut Ring Road*

The Arab Highway linking Beirut to the Syrian Border, and the Beirut Ring Road are carried out on a BOT basis.
The 123Km-long highway will go through two tunnels and over ten bridges. It will take three years to build and will cost about US$700 million. Dumez and Bouygues, both of France, have won the contract to build the highway and the southern section of the ring road, expected to cost up to US$700 million.
The Beirut Ring Road will require the construction of 36.5Km of new roads around Beirut. A consortium of Bouygues with Walter Bau and Dyckerhoff & Widmann, both of Germany, will build the northern section of the ring road at a cost up to US$350 million.

- *Beirut International Culture and Conference Center*

  The project consists of a congress Hall, conference facilities, a theater, a 3 stars and 5 stars hotel, and commercial, cultural and recreational areas. The US$350 million and 260,000 sqm project will be awarded under a BOT contract to a shareholding company.

The macroeconomic assumptions made in "Horizon 2000" plan have turned out to be very optimistic. The 8% economic growth in 1994 has decreased to 6.5% in 1995 and to 4% in 1996. Growth is likely to reach 4%-5% in 1997 and 1998. This fall short of the 8% yearly forecast by the "Horizon 2000" plan.
The government is now facing the following dilemma : it was at the same time to stimulate the economy and reduce deficits. It is not an easy task with a 1996 total net public debt of US$ 10.3 bn (representing 78% of the GDP) and a 1996 budget deficit amounting to 51.1% of expenditure [6].

To finance the reconstruction program, the government is using different channels : loans, soft loans, grants from foreign countries and financial institutions, private sector contribution through BOT projects and privatization (postal system), and issuance of local treasury bills and international Eurobonds.

The future of the "Horizon 2000" plan depends primarily on the continuing course of the peace process. The pace at which the private and public construction projects will be executed depends essentially on the political situation in Lebanon and the resolution of the Israeli-Arab conflict.

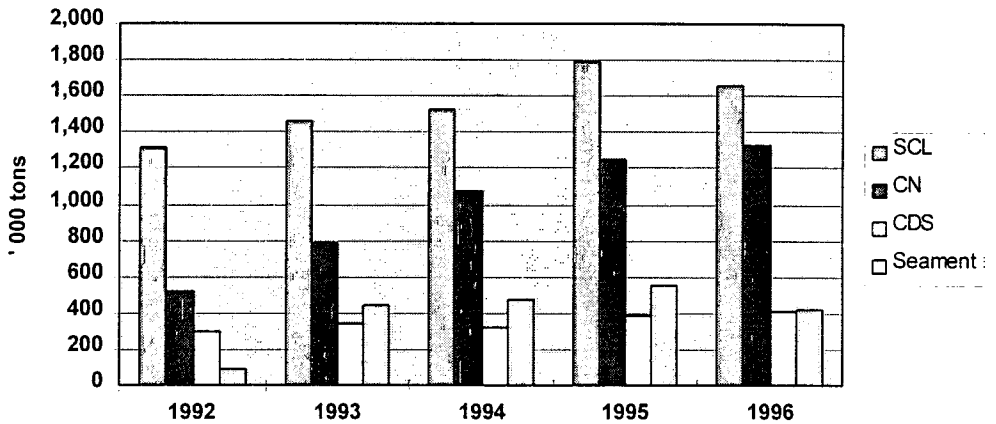
Cement Consumption

The following table shows total cement sales for each of SCL, CN, CDS, and Seament for each of the years 1992 through 1996, inclusive.

	1992		1993		1994		1995		1996	
	1000t	%	1000t	%	1000t	%	1000t	%	1000t	%
SCL	1,317	59.4	1,462	48.3	1,524	44.9	1,786	44.9	1,652	43.4
CN	515	23.2	788	26.0	1,075	31.7	1,252	31.5	1,325	34.8
CDS	295	13.3	340	11.2	318	9.4	386	9.7	404	10.6
Seament (Imports)	92	4.1	438	14.5	479	14.1	555	13.9	422	11.1
TOTALS	2,219	100	3,028	100	3,396	100	3,979	100	3,803	100

[6] "Lebanon 1997-98" page 48-49 ; Oxford Business Group

Cement Sales
1992-1996



Since 1993, the three domestic producers have been unable to satisfy domestic demand.
The shortfall has been covered by imports of clinker, which is then used to produce cement, and by increase in the imports of cement.
SCL' s share of the market has dropped from a pre-war high of 65% to 43% in 1996. This is attributed to the lack of capacity, higher production cost, resulting from the need to import clinker and the higher energy costs inherent in the wet production process (SCL operates four wet process Kilns ; one of them has recently been shut down).
CN has benefited from the drop in SCL market share. Its market share has risen from 23.2% in 1992 to 34.8% in 1996.

Cement Imports and Exports

The government has given permission for the establishment of a cement importing operation by Seament. The license sets the quantity to be imported and the price at which it is sold locally, and it is subject to renewal every six months.
The price of imported cement is set by the government in consultation with domestic producers. This will keep the price of cement high to protect local producers and will, on the other hand, keep them from increasing their prices.

Lebanon does not export cement as the local production does not satisfy consumption. But a very small percentage of production is exported to Syria

who currently suffers from a severe shortage in cement (please refer to Chapter III - part 1 "The Cement Industry in the Middle East" for a detailed study about the cement industry in Syria).

Cement Prices

The following table shows the prices of local and imported bagged cement in December 1994, 95, and 96 :

in US$ (per ton)	Dec 94	Dec 95	Dec 96
Cement (ex factory)	58.00	61.00	66.00
Taxes	3.64	3.76	3.87
Transportation & discharge[7]	6.00	8.00	8.00
Total price of local cement	67.64	72.76	77.87
Total price of imported cement[8]	67.00	70.00	74.50

Source : Etudes et Consultations Economiques, Bulletin de la Construction et du Batiment several reports.

Local cement prices are determined by supply and demand. The price of imported cement is set by the government in consultation with domestic producers.
The prices in June 1997 were equal to US$77 per ton for bagged local cement and US$75 per ton for bagged imported cement.
The total price of bulk cement is generally lower than the total price of bagged cement by US$5-7.
For distributors, the price difference between local cement and imported cement is given to them as a discount by local cement producers. Of course, all consumers prefer to purchase the imported cement (because of its lowest price) but due to the limited quantities offered, they are obliged to purchase local cement.

Taxes and Customs Duties

The government taxes local production of cement at the factory gate at LL. 6,000 per ton. The tax is paid by the distributor and collected by the cement company for the Lebanese Ministry of Finance. The same rate apply for imported cement.

[7] Transportation to Beirut site.
[8] The prices of imported cement were taken from Seament company itself.

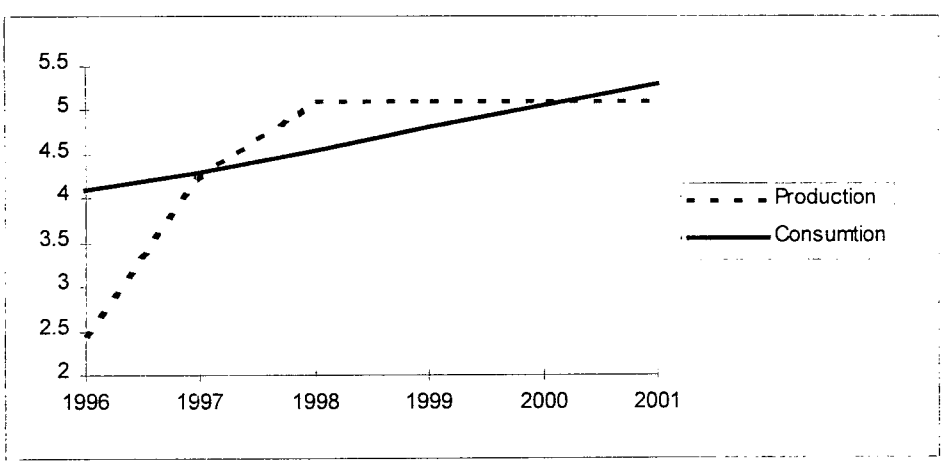
Customs duties levied on imports are currently 25% in respect of clinker, 5% on fuel oil and 2% on coal. Custom duties on imports of industrial equipment range from 1 to 12%.

Cement Market Forecast

According to a study conducted by Ciment de Sibline and International Cement Review (ICR) in 1995, the cement industry should be in little danger of excessive overcapacity despite the substantial increase in domestic production. Over the next two years, imports should be phased out, leaving the country about self-sufficient.

Year	1996	1997	1998	1999	2000	2001
Cement Production Mt						
SCL	1.20	2.40	2.40	2.40	2.40	2.40
CN	0.85	1.40	1.50	1.50	1.50	1.50
CDB	0.42	0.42	1.2	1.2	1.2	1.2
Total	2.47	4.22	5.10	5.10	5.10	5.10
Consumption	4.10	4.30	4.55	4.80	5.05	5.30
Deficit	1.63	0.08	0	0	0	0.20
Surplus	0	0	0.55	0.30	0.05	0

Source : *Ciment de Sibline / International Cement Review (ICR) Research.*



A comparison between actual and forecasted 1996 consumption figures shows that the forecast done was based on very optimistic assumptions.
Indeed, the actual 1996 consumption was equal to 3.8Mt compared to a forecast of 4.1Mt.

The decrease in 1996 consumption (from 1995 actual figures and from 1996 forecasted figures) was mainly due to political instability in Lebanon and the region. The Israeli bombing of Southern Lebanon in April 96, parliament elections in summer of the same year, and the cessation of the Middle East peace process are the main examples of political instability.

An adjusted cement market forecast for the period 1997-2001 shows the possibility of a future production surplus instead of a break-even.

Year	1997	1998	1999	2000	2001
Cement Production Mt					
SCL	1.60	2.20[9]	2.20	2.20	2.20
CN	1.30	1.50	1.50	1.50	1.50
CDB	0.40	1.20	1.20	1.20	1.20
Total	3.30	4.90	4.90	4.90	4.90
Consumption	3.80	4.00	4.10	4.20	4.30
Deficit	0.5	0	0	0	0
Surplus	0	0.90	080	0.70	0.60

The above adjusted forecast is based on the following:

- The 1997 production figures for the three local companies were taken equal to 1996 actual production. This is due to the fact that the three new production lines will not be finished before early 1998.

- Production figures for the period 1998-2001 are based on the assumption that the three cement plants will be operating at their new full capacity[10].

- The recession which has characterized the construction sector since the last quarter of 1995 is still evident in the first quarter of 1997. There was a drop in the number of construction permits and in cement deliveries compared with their levels in the first quarter of 1996 (respectively 30.9% and 6.9%). Moreover, the value of the number of unsold apartments stands at around US$ 8 billion.[11]

[9] The annual cement production was taken equal to 2.2Mt based on information published by SCL.
[10] The full capacity of a cement plant (or the actual nominal capacity) is calculated by multiplying the daily 24 hours capacity by a number of 300 -310 days per year.
[11] Bank Audi Quarterly Economic Reports. First quarter 1997

For the above reason, we estimate that the 1997 cement consumption will be the same as it was in 1996.

- Lebanon 's reconstruction is heavily dependent on foreign finance. The inflow of capital investment from Lebanese expatriates, Arab investors, and foreign countries and institutions is partially linked to the advancement of the Middle East peace process.
  Accordingly, we forecast a moderate growth in the consumption of cement (100,000 ton/year) during the period 1998-2003.

The expected production surplus problem in the coming years can be solved by exporting the cement production surplus.

Future Cement Markets

The cement manufacturing is a highly regional industry. (For example, 260 production plants and 40 grinding plants are spread over the 23 European Cement Association member countries[12]). The regionalization of the industry flows from factors such as high transportation costs and low unit value of cement.
Accordingly, Lebanese cement manufacturers should look first on opportunities in the nearby regional markets.
In the Chapter III - part 1, we have already studied the cement industry in the following countries : Israel, Saudi Arabia, Syria, Egypt, and Turkey.

Saudi Arabia & Turkey

No opportunities exist in Saudi Arabia or Turkey markets as the two countries are traditional exporters of cement.

Israel

Although Israel has imported in the last three years 1.75 million ton of clinker (per year), we do not think it represents a future cement or clinker importing market due to the Israeli occupation of the South of Lebanon. A business normal relations between Lebanon and Israel could not be achieved without the total resolution of the Israeli - Arab conflict. But unfortunately the peace in the Middle East region seems to be very far since the arrival of Mr. Benjamin Netanyahu to prime ministry position in Israel.

[12] European Cement Association - Cembureau publication.

Egypt

A deficit in domestically produced cement of approximately 2 million tons per year is expected in Egypt until 1998/1999. Accordingly, Lebanon could export part of its expected cement surplus to Egypt. But, the relatively long distance between the two countries could negatively affect any future cement export plans to Egypt.

Syria

The Syrian cement market represents the most important opportunity to Lebanese Cement Manufacturers due to the following reasons :

1. The huge gap existing in Syria between the cement quantities produced and the quantities consumed could be narrowed by Lebanese cement exports.

2. The special political relations between Lebanon and Syria could help to open the Syrian markets for Lebanese products. In 1996, the volume of Syria's exports was equal to US$200 million compared to a volume of US$70 million representing Lebanese exports to Syria. The cement exports to Syria could help to balance the trade between the two countries.

3. The close distance between Lebanon and Syria play an important factor in the success of cement export plan to Syria. The reconstruction of the railroad between the two countries (which existed before the war) will certainly help in facilitating the transport of cement.

But on the other hand, the big difference between the economic systems of the two countries may negatively affect any cement export from Lebanon to Syria.

Finally, Societe des Ciments Libanais (SCL) has an advantage to export its expected future cement surplus over other local producers by using the huge network of its main shareholder, Holderbank.

CHAPTER IV

COMPANY ANALYSIS

Introduction

Societe des Ciments Libanais ("SCL") is the largest cement producer in Lebanon. The company's share of the Lebanese cement market was 43.4% in 1996. SCL is controlled by Holderbank which owns 51.75% of the equity, and with whom SCL has a technical assistance agreement.

SCL' s production facilities consist of one large cement plant with a current capacity of 1,200,000 tons of clinker and 1,800,000 tons of cement. The company has its own port and a power generation plant located within its premises in Chekka.
SCL has a controlling interest in Electronic Data Processing Center S.A.R.L. (EDP) and Societe Libanaise de Beton S.A.L. (SOLIBE) and a minority interest in Societe Libanaise des Ciments Blancs S.A.L. (SLCB).

History

The company was incorporated in February 1929 as a joint stock company for a term of 99 years. The joint founders included Archbishop Antoine Arida and a French group, which was replaced by Holderbank Group - Switzerland in 1933. The following are the main events characterizing the company's history

1931	SCL began its first year of production
1933	Holderbank Group became the main shareholder
1964	SCL entered the Beirut Stock Exchange
1968	Annual production exceeded one million tons per year
1972	SCL completed the construction of its own port facilities
1978	Installment of a new kiln increases annual production to over 1.7 million tons per year. A power generation plant was built near the production plant in Chekka
1995	SCL began the construction of a new production line to enter the market, end 1997, with 1.8 million tons of clinker and 2.2 million tons of cement
1996	SCL stock was re-traded in the reopened BSE

Raw Materials and Energy

The company owns reserves for its principal raw materials of limestone of at least 100 years and marl of at least 50 years located in Chekka area near the production plant. Clay, gypsum, and slag are purchased from third - parties, the first two raw materials are being imported.

Since 1993, the company was obliged to import clinker through Union Maritima International S.A., a subsidiary of Holderbank. The 1996 imports of clinker, mainly from Bulgaria, was equal to 218,000t.
Imported clinker has resulted in higher cement costs. It has represented the largest single external component of the company's cement production cost. The completion of the new production line is expected to eliminate any need for imported clinker.

Fuel and electricity costs comprise the second largest component of the company's cement production cost.
SCL uses three kind of fuel : Oil, coal, and petcoke. Oil is used in the company's power generation plant. Coal and petcoke are used as fuels in the Kilns.
All fuels are imported from third party through the company's own port.

SCL has been self-sufficient in meeting its electricity needs since 1978. Electricity is generated by seven diesel units with a total nominal capacity of 40 megawatts. The company has also a concession for hydraulic energy generation at Nahr el Joz with a nominal capacity of 5.5 megawatts.

Production Facilities

The company currently operates three kilns at its production facility in Chekka. (A fourth, 46 years old kiln was put out of service in 1996). The ages of the kilns are 19, 30, and 41 years respectively.
SCL uses the "wet" process in its largest kiln and the "semi-wet"[1] process in the other two.

The aggregate rated nominal capacity is 1,250,000 tons of clinker and 2,000,000 tons of cement. Nominal capacity is calculated on the basis of plant operating 24 hours a day for 280 days a year.

[1] The semi-wet method consists of the filtration of the slurry material to reduce its water content from 38% (wet process) to about 18%.

In most recent years, the actual clinker production was much lower than the nominal capacity due to an increase in the incidence of production lines stoppages. The availability of clinker imports has allowed the company to improve the cement production capacity utilization rates.

Cement and Concrete Sales

Cement

The following table shows the company cement sales by volume and value during the years 1993-1996.

	1996	1995	1994	1993
Volume ('000 of tons)	1,661	1,786	1,524	1,463
Value (millions of LL)	159,209	173,768	147,957	148,770

Source : SCL annual reports.

The company's share of Lebanese cement market was 59.4% in 1992, 48.3% in 1993, 44.9% in 1994, 44.9% in 1995, and 43.4% in 1996. The decrease in market share since 1992 is due to the following reasons :

1) Lack of capacity.

2) Higher production costs resulting from the need to import clinker and high energy costs inherent in the wet and semi-wet methods.

3) The frequent stoppage of the old production lines.

The company has no long-term contracts for the supply of cement. All of the company's sales of bagged cement are made through approximately 30 distributors who take delivery at the plant and are responsible for transport to customers. Commission paid to distributors is the major component of competition between cement suppliers. The commission paid is approximately equal to US$2.

The percentage sold in bulk (quantities) was equal to 6% in 1992, 9% in 1993, 10% in 1994, 12.4% in 1995, and 16.6% in 1996. Transport of bulk cement are made exclusively by Societe des Transports Lourds S.A.L. ("STL").

Eighty to 85% of SCL cement sales are made to the private sector especially to the real estate business. As to the public construction projects and to big infrastructure projects, they only constitute 15% of SCL sales[2].

Concrete

The following table shows SOLIBE sales of ready mixed concrete in volume for the years 1993-1996

	1996	1995	1994	1993
Volume ('000 of cubic meters)	180	89	52	24

The huge increase in SOLIBE 96 concrete sales (an increase of 100% from 95 sales) was mainly due to two new contracts signed : the first for the Beirut Central District project (102,000 m^3) and the second for SCL new production line project (31,000 m^3).

New Kiln Project

In 1995, SCL has begun the construction of a new kiln ("kiln No.7") and certain additional buildings in the company's premises in Chekka. The new kiln will have a nominal annual production capacity of 1,800,000 of clinker, based on the kiln operating 24 hours a day for 310 days a year.
When the new kiln starts its production in the end of 1997, two of the three existing kilns will be closed down permanently with the third and youngest kiln as a standby.

The new kiln will use the new "dry" production process which is expected to save fuel costs of 20% to 30%. Costs savings are also expected from elimination of the need to import clinker (the cost of clinker produced in house is lower than the one imported). The maintenance cost is also expected to decrease as the three older kilns will no longer operate.

A US$111,200,000 contract for the construction of the new kiln was signed with Polysius S.A. The contract includes infrastructure, design, connections to existing equipment, construction supervision, pre-operating expenses and certain additional equipment and buildings.

[2] Interview with SCL general manager, Mr. Carlos Khoury. "Commerce du Levant " May 23, 1996.

Total project expenses were estimated as follows :

Description	millions of US$
Contract Polysius	111.2
IKN cooler	4.8
Infrastructure and miscellaneous equipment	8.7
Engineering, project supervision & management	12.3
Contingencies	8.7
Site preparation and logistics, pre-operating expenses	5.5
Custom duties, taxes and insurance	8.6
Provision for exchange risks*	15.0
Total	**174.8**

* The contract amount, although payable in US$, is linked to the rate of exchange between US$ and French dollars. The company has offset its currency exchange risk by entering into hedging arrangements.

The above project costs do not include interest expense incurred during the construction period and related costs of financing.

The actual project cost paid was US$165 M with a US$7 M provision for exchange risk instead of US$ 15M.

Kiln No.7 project financing

The project was financed by the following methods :

a) *Equity contributions* : The share capital was increased several times during 1995 and 1996. The share capital was first increased from LL20,543,202,500 to LL41,086,405,000. then to LL73,955,529 and finally to LL234,192,509,000.

b) *Issuance of bonds* : SCL has issued a US$50 million Euro-Bonds in January 1996. The maturity date of the 9% serial bonds is January 16, 2003.
The company intends to issue a second US$35 million bonds before July 1, 1997.

c) *Local banks financing* : The company 's expansion was also financed through a US$35 million loan organized by a consortium of local banks headed by Banque Libano-Francaise (BLF). This loan will be settled by the above mentioned second US$35 million bonds issue.

d) *Export credit financing* : In July 1996, the company has signed a US$20.2 million credit loan agreement with Bank Indosuez-Paris. The loan was guaranteed by a group of six Lebanese banks and insured by the French export credit insurance company, COFACE.
Furthermore, SCL has signed a US$13.5 million credit loan with Commerzbank-Frankfurt. This loan was guaranteed by a group of six Lebanese banks and insured by the German export credit insurance company, HERMES.

Relationship with Holderbank

Holderbank, through Holderbank management and Consulting Ltd. and Holderbank Consulting Ltd., provides technical assistance and research relating to the cement and ready-mixed concrete to SCL. The company has also access to Holderbank existing and future cement patents and inventions. For all these services, the company pays Holderbank an annual fee equal to 1.5% of its net sales.
In addition, the company has agreed to pay market rates for a number of specific jobs (engineering work to build cement plants, general business administration jobs, etc....) provided by Holderbank.

Intellectual Property

The company has only the "Baalbak" brand name and logo as intellectual property.

Environmental Issue

After a long period characterized by an absence of regulations, environmental awareness is increasing in Lebanon.
In May 1996, the environmental organization "Greenpeace" and the "Association for the protection of the Environment in Koura" declared that "the cement, asbestos, and chemical industries[3] in Chekka and Selaata are a major source of marine, soil, and air pollution".

[3] The companies involved are : Societe des Ciments Libanais, Societe Libanaise des Ciments Blancs, Cimenterie Nationale, Eternit S.A.L., and the Lebanese Chemical Company.

Sample tests carried out by the Earth Research Center at Exeter University in England showed that ground water in Chekka is polluted by a wide range of toxic chemicals, while emissions from cement and asbestos factories pollute the air and the Mediterranean sea.
A petcoke sample, used as fuel in the "Cimenterie Nationale", showed a wide range of PAH which causes cancer.
Also according to the same study, the "Cimenterie Nationale" and the "Societe des Ciments Libanais" discharge their toxic effluents directly into beaches or near beaches where people swim.

In December 1996, the environment ministry has set up a committee to look into claims that the two cement factories in Chekka were emitting fumes that pose a serious health threat to the region 's inhabitants. This action was taken after the death of five people by lung cancer in Chekka area. Talal Chartouni, a doctor at the environment ministry said that the factories were posing dangers to north Lebanon's population, but that it was medically incorrect to claim the deaths were linked to these plants[4].

The three local cement manufacturers believe that their current production facilities comply with the Lebanese environmental regulations (which currently lacks some clarity) and, to some extent, to International environmental standards.

The pollution problem associated with the cement industry is not something new, it began decades ago. However, the political and financial influence of cement companies, the need of cement for Lebanon reconstruction project, the ignorance of people, and the economic benefit of Chekka inhabitants (purchasing of land, employment, etc....) have till now protected the cement companies from any serious legal measurements.

The environmental ministry and the environmental groups were very active in the last two years. A press campaign was conducted against pollution in December 96 (the well known daily newspaper "Al-Nahar" is currently assigning one full page for environmental issues) and the Lebanese general public is now very concerned about environmental topics.
In return, the cement companies are improving their production facilities to meet high environmental standards.

In June 1997, the "Cimenterie Nationale" has installed new electrostatic filters

[4] "Daily Star" newspaper - December 4, 1996.

to push dust, SO2 and NOx emissions below German Standards.
SCL management believes that the company will be in favorable position to meet higher environmental requirements when Kiln No. 7 commences operation.

Management

The board of directors is currently constituted of 12 directors of whom Mr. Carlos Khoury is the sole full-time director.

Board of Directors

Thomas Schmidheiny	Chairman
Carlos Khoury	Vice Chairman - General Manager
Maronite Patriarchate	Administrator
Jean Asfar	Administrator
Benoit Koche	Administrator
Micheline Sehnaoui-Boulos	Administrator
Kurt Hafeli	Administrator
Farouk Jabre	Administrator
Mazen Salha	Administrator
Martin Schon	Administrator
Andreas Pestalozzi	Administrator
Nabil Sehnaoui	Administrator

Employees

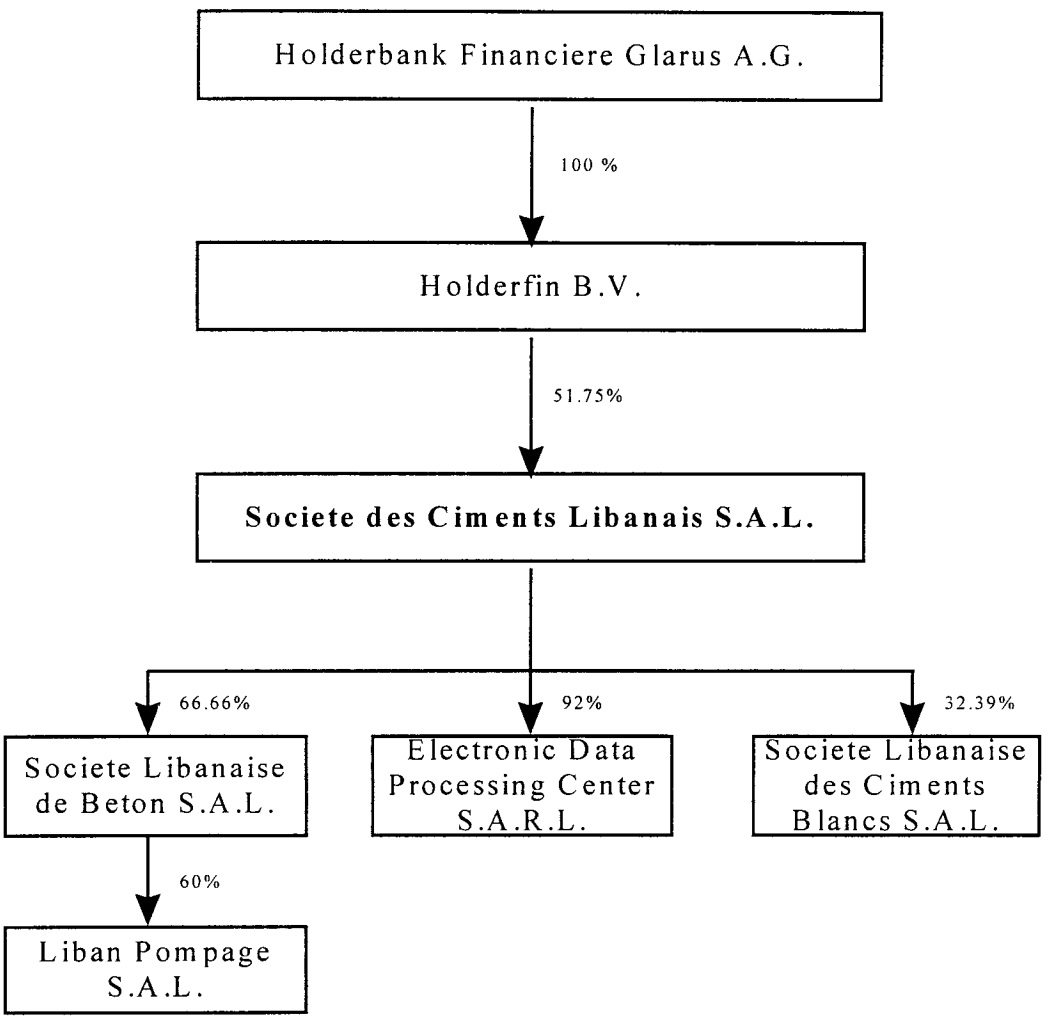
The company and its subsidiaries have approximately 765 employees and independent contractors. The following table shows the number of employees within the Group.

	# of employees
SCL	717
SOLIBE	30
EDP	18
Total	**765**

Day-to-day operations are managed by the General Manager, Mr. Carlos Khoury, Dr Marc Wurtz, General manager of Operations and Dr. Jean-Paul Kandlaft, Vice President - Finance and Administration.

Ownership Structure

The diagram below illustrates the shareholding structure, as at December 31 1996, of the company and its subsidiaries.



Holderbank Financiere Glarus A.G. ("Holderbank") is one of the world's leading cement and ready-mixed concrete companies. Holderbank is a holding company based in Switzerland with activities in more than 45 countries. The company has been listed on Swiss Exchange SWX since 1958.

Electronic Data Processing Center S.A.R.L ("EDP") was established in 1967. It provides data processing and computing services to SCL and third parties. In 1996, 95% of EDP works was provided to *Societe des Ciments Libanais* and the remaining to *Societe Libanaise des Ciments Blancs S.A.L.*

Societe Libanaise de Beton S.A.L. ("Solibe") was established in August 1992. Solibe is engaged in the production, distribution and, through its subsidiary *Liban Pompage S.A.L.*(incorporated in August 1993), in the pumping of concrete.

Societe Libanaise des Ciments Blancs S.A.L.("SLCB") is a white cement producer operating at half its optimal capacity. It covers around 80% of the domestic market and exports 50% of its production to Syria[5]. The company is currently listed on Beirut Stock Exchange (BSE).
SCL has a minority interest in *Societe Libanaise des Ciments Blancs S.A.L.*

Share Capital

At 31/12/1996, the company's share capital amounted to LL234,192,509,000 consisting of 234,192,509 shares, fully paid, of nominal value LL1,000 each.
Shares are either in registered or bearer form. Under Lebanese law, registered shares give double voting rights in favor of any shareholder after a period of two years. At present almost all the registered shares are held by Holderfin.

The outstanding shares are held as follows :

Shareholder	**Total**	**% of share outstanding**
Holderfin (wholly-owned subsidiary of Holderbank)	121,194,623	51.75
Others	112,997,886	48.25
Shares outstanding	**234,192,509**	**100**

Those of the Company's shares not held by Holderfin are spread among over 2,200 investors.

The share capital was increased several times during 1995 and 1996. The share capital was first increased from LL20,543,202,500 to LL41,086,405,000 by a

[5] "Lebanon 1997-98" page 90. Oxford Business Group

capitalization of reserves and an increase in the nominal value per share from LL500 to LL1000.

The share capital was also increased in August 1995 to LL73,955,529,000 by an issue of 32,869,124 shares with a nominal value of LL1,000 each.

In May 1996, the share capital was further increased to LL234,192,509,000 by : capitalization of reserves (LL123,259,215,000) and cash capital increase (LL36,977,765,000).

Dividend History

The following table shows the cash dividend paid on the shares of the company in the years 1993-1996

	1995	1994	1993
Number of shares entitled to dividends	73,955,529	41,086,405	41,086,405
Amount of ditributable profits available	LL16,024,538,489	LL15,570,860,299	LL 17,761,321,082
Total amounts of dividend paid	LL 7,987,197,132	LL 7,149,034,470	LL 16,121,894,458
Amount of dividends paid as a % of ditributable profits	49.84%	45.91%	90.77%
Dividend paid per share *	LL 108	LL 174	LL 392

* before deducting the 5% withholding tax on dividends paid.

In 1996, the total amount available for distribution amounted to LL10,953,680,837 and the number of shares entitled to dividends, at 31/12/96, was equal to 234,192,509. No dividends were paid to the shareholders due to the following reasons :

1. The Ministry of Finance (MOF) has made a claim against the company for LL7.9 billion in respect of complementary taxes and fines related to the financial years 1992 & 1993. The MOF argued that part of "raw materials and expenditure" expense account should be capitalized and

depreciated over a period of three years.
The company has refused to pay this amount and presented an opposition but it was forced to take a provision.

2. Due to SCL financial commitment related to Kiln No.7 project, the company will not be able to pay the LL7.9 billion requested by MOF and 1996 dividends without the need for an additional expensive credit.

SCL will pay the 1996 dividends only if it succeeds to cancel the MOF claim.

SCL Stock price movement in Beirut Stock Exchange

The shares of the company were listed on the Beirut Stock Exchange (BSE) from 1964 to 1983, when the BSE suspended operations because of the war.

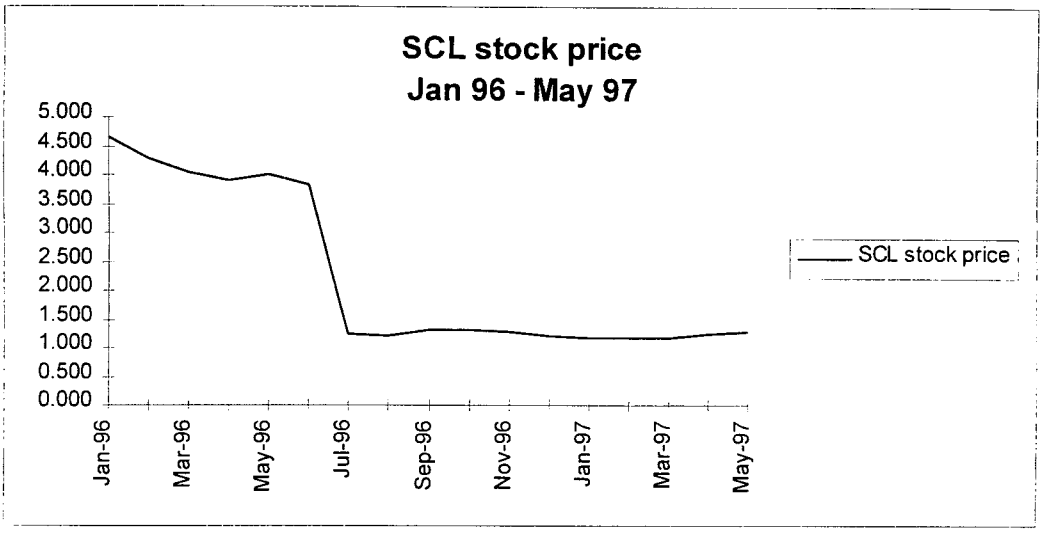
In January 1996, the trading was restarted on BSE with three companies : Societe des Ciment Libanais, Societe des Ciments Blancs, and Eternit Libanais.

The following table shows the monthly average SCL stock price and the monthly total volume traded.

	Jan-96	Feb-96	Mar-96	April-96	May-96	June-96
Stock price (US$)	4.641	4.273	4.038	3.907	3.994	3.816
Volume traded	20,160	46,747	11,550	33,502	7,113	83,028

	July-96	Aug-96	Sep-96	Oct-96	Nov-96	Dec-96
Stock price (US$)	1.253	1.197	1.307	1.313	1.288	1.194
Volume traded	20,864	29,623	5,100	7,000	6,100	29,330

	Jan-97	Feb-97	Mar-97	April-97	May-97
Stock price (US$)	1.156	1.159	1.168	1.243	1.279
Volume traded	6,280	3,111,407	116,000	287,373	622,731



The following remarks should be mentioned :

- The SCL stock was first traded, in January 22, 1996, at a price equal to US$4.625. The stock has slightly decreased to US$3.625 during the period January 22, 1996 till July 1, 1996.

  Then, the stock price has suddenly decreased to US$1.030 in July 2, 1996. This was due to the increase of capital from LL73,955,529,000 to LL234,192,509,000 by : capitalization of reserves (LL123,259,215,000) and cash capital increase (LL36,977,765,000).

  At July 1, 1996 - before 1996 capital increase

  Number of shares = 73,955,529
  Stock price = US$ 3.625
  SCL market value = 73,955,529 x US$ 3.625
  = US$ 268,088,793

  At July 2, 1996 - after 1996 capital increase

  Number of shares = 234,192,509
  Stock price = US$ 1.030
  SCL market value = 234,192,509 x US$ 1.030
  = US$ 241,218,284

The decrease in SCL value was adjusted later by the market through an increase in SCL stock price to an average of US$ 1.279 in May 1997.

In May 1996

Number of shares	= 234,192,509
Average Stock price	= US$ 1.279
SCL market value	= 234,192,509 x US$ 1.279
	= US$ 299,532,219

In May 1997, the SCL market value is approximately equal to SCL market value in July 1, 1996 (US$ 268) plus the 1996 cash capital injection (US$ 23.8M)

- SCL stock was inactive in BSE during the past two years. Days, even weeks, would pass without a single trade taking place. (For example, no transaction was booked during the period January 8, 1997 till February 13, 1997).

SCL Financial Highlights

Balance Sheet

The table below shows the SCL audited balance sheet, for the last three years extracted from SCL' s annual reports.

	1996 ('000 LL)	1995 ('000 LL)	1994 ('000 LL)
Assets			
Cash and Banks	128,502,290	28,013,801	10,015,071
Debtors	6,465,553	5,532,767	3,560,750
Inventories	59,165,107	52,154,303	50,681,201
Current Assets	**194,132,950**	**85,700,871**	**64,257,022**
Investments	**6,091,306**	**5,688,959**	**4,424,810**
Medium and long term loans	8,992,705	9,126,845	9,068,576
Long term advances	11,881,640	34,944,890	1,108,662
Long-Term Loan	**20,874,345**	**44,071,735**	**10,177,238**
Intangible assets	3,339,101	2,750,250	368,554
Tangible assets	456,757,352	327,494,257	38,508,921
Fixed Assets	**460,096,453**	**330,244,507**	**38,877,475**
Total Assets	**681,195,054**	**465,706,072**	**117,736,545**
Liabilities			
Bank overdrafts	72,653,698	29,568,238	5,234,864
Creditors	37,516,896	17,972,671	16,364,945
Current Liabilities	**110,170,594**	**47,540,909**	**21,599,809**
Long term loans	107,831,049	0	0
Provision for staff indemnity & other provisions	14,649,296	13,712,694	13,165,467
Long-term liabilities	**122,480,345**	**13,712,694**	**13,165,467**
Total Liabilities	**232,650,939**	**61,253,603**	**34,765,276**
Shareholders' Equity			
Share capital	234,192,509	73,955,529	20,543,202
Legal reserve	201,103,984	313,182,627	45,573,057
Retained income	13,247,622	17,314,313	16,855,010
Total Shareholders' Equity	**448,544,115**	**404,452,469**	**82,971,269**
Total Liabilities and Shareholders' Equity	**681,195,054**	**465,706,072**	**117,736,545**

The main points to note in the Balance Sheet are :

1. SCL has revalued part of its fixed assets in order to take advantage of the law 282/93 which allowed companies to revalue their fixed assets to their current market value and to pay a tax of 1.5% instead of 6%.
   The revaluation has increased SCL fixed assets by LL274.9 billion divided between :

   * LL112.5 billion could be added to the capital and on which the company has paid a 1.5% tax.
   * LL162.4 billion could not be added to the capital (the amount was booked on a special reserve account) and on which the company has not paid a tax. Furthermore, the amount is not depreciable.

2. The tangible fixed assets account has increased by LL144.5 billion (LL7.5 billion in 1995 and LL137 billion in 1996) representing work in progress and cost of financing of the kiln No. 7 project.

3. The "long term advances" account represents advances given to the contractors of the kiln No. 7 project. LL23.1 billion were transferred to tangible fixed assets in 1996. The remaining balance is also expected to be transferred to the same account in 1997.

4. The majority of the account "Medium and long term loans" in the assets side represents loans given by SAL to its subsidiary SOLIBE.
   At 31/12/96, the loans given by SCL to SOLIBE were :

For purchase of land	US$ 1,250,000 @ 1552 =	LL 1,940,000,000
Other loans	US$ 3,590,000 @ 1552 =	LL 5,572,141,115
Total	US$ 4,840,000	LL 7,512,141,115

   SCL is charging SOLIBE a 9.5% yearly interest on the US$ 3,590,000 loan.
   As for the US$ 1,250,000 loan, SCL has exempted SOLIBE from paying any interest on this loan in 1995 and 1996. The SCL shareholders have also approved to exempt SOLIBE from any interest on the US$ 1,250,000 loan for the 1997 financial year.

5. At 31/12/96, the "long term loans" account in the liabilities side is constituted of the US$50 million bonds (LL 77,600,000,000) and US$19,478,769 (LL 30,231,049,000) long term banks credit loans out of US$68.7 million aggregate long term credit lines granted by local and international banks to SCL in 1996.

6. In May 1995, the share capital was raised from LL20,543,202,000 to LL73,955,529,000 : LL20,543,203,000 capitalization of reserves and LL32,869,124,000 cash payments.
   In 1996, the share capital was also raised by LL160,236,980,000 divided between LL123,259,215,000 capitalization of reserves (mainly fixed assets revaluation reserve) and LL36,977,765,000 cash payments.

Income Statement

The table below shows the SCL audited income statement, for the last three years extracted from SCL' s annual reports.

	1996 ('000 LL)	1995 ('000 LL)	1994 ('000 LL)
Sales, net	159,208,613	173,767,799	147,956,503
Cost of sales	(117,206,366)	(134,179,671)	(108,785,172)
Gross profit	42,002,247	39,588,128	39,171,331
Operating expenses	(17,234,759)	(13,916,332)	(11,379,902)
Operating income	24,767,488	25,671,796	27,791,429
Investment income	771,732	201,283	614,918
Interest receivable	1,605,748	1,109,623	1,283,260
Interest payable	(2,952,414)	(1,536,911)	(1,001,839)
Income before taxation	24,192,554	25,445,791	28,687,768
Yearly income taxe and extra provision taken for prior years	(9,199,411)	(2,912,359)	(2,513,000)
Net income before prior years adjustments	14,993,143	22,533,432	26,174,768
Prior years adjustments	0	0	634,373
Net income for the year	14,993,143	22,533,432	26,809,141

Included in the 1996 income tax a LL7.9 billion provision for taxes and fines related to financial years 1992 and 1993 (LL6.2 billion on 1992 and LL1.7 billion on 1993). The company has refused to pay this amount and presented an opposition but it was forced to take a provision.

CHAPTER V

VALUATION

Valuation Date

Societe des Ciments Libanais stock is valued at December 31, 1996.

Valuation Methodology

The following models were used to value SCL stock :

1. The Discounted Cash Flow (DCF) Model.
2. The Discounted Dividend Model.
3. The Discounted Earnings Model.

Projection period

The projection period of the valuation is 1997 - 2003.

Assumptions to projected Financial Statements - 1997 through 2003

General

- We have used the financial statements of Societe des Ciments Libanais for projection and not the consolidated financial statements of the whole Group.
  A comparison between 1996 SCL financial statements and 1996 SCL consolidated financial statements shows that there is no big difference between the two.

in '000 of LL	1996 SCL consolidated FS	1996 SCL FS	%
Current assets	198,255,971	194,132,950	97.92
Fixed assets	470,303,672	460,096,453	97.83
Current liabilities	114,381,212	110,170,594	96.32
Long term liabilities	123,160,891	122,480,345	99.45
Net sales	174,195,619	159,208,613	91.40
Cost of sales	129,605,265	117,206,366	90.43

- The assumptions taken are based on SCL historical performance and on information provided by SCL financial manager.

- The yearly inflation rate is taken equal to 7%.

- As the LIBOR[1] rate ranged between 5.35% and 5.72% during the period January 1996 - June 1997, an average 5.5% LIBOR rate was taken for the projected period.

- The $/LL rate used is equal to 1,500 for all the projected period.

- Unless otherwise mentioned, all costs will increase by the yearly 7% inflation rate.

- The company's new production line will not be put in service before 1/1/1998.

- Tax rates, applicable laws and practice in Lebanon will not change throughout the period of the financial projections.

Notes to projected income statements

Sales

Year	1996	1997	1998	1999	2000	2001	2002	2003
	actual	projected	projected	projected	projected	projected	projected	projected
Market consumption ('000 tons)	3,803	3,800	4,000	4,100	4,200	4,300	4,400	4,500
SCL market share	43.4%	43.4%	47%	47%	47%	47%	47%	47%
SCL sales (' 000 tons)	1,651	1,649	1,880	1,927	1,974	2,021	2,068	2,115
Price per ton (US$)	66	67.5	69	70.5	72	73.5	75	76.5
Discount per ton (US$)	2	2	2	2	3	3	3	3
Net sales (million of LL)	159,209	162,034	188,940	197,999	204,309	213,721	223,344	233,179

Sales are projected based on the following assumptions :

1) The market consumption figures were based on the work done in the chapter III - part 2 "The Cement Industry in Lebanon".

2) The 1997 SCL market share was taken equal to its 1996 market share as the new production lines of the three cement local producers will not effectively start before 1998 and as no changes, from 1996, has occurred in the cement industry during the first half of 1997.

3) Starting 1998, the import of cement is supposed to stop and the 11% Seament share will be divided equally between the three local companies. Accordingly, SCL market share will increase to 47%. The 11% Seament share is divided equally between the three local

[1] The London Interbank Offered Rate (LIBOR) is the interest rate at which major international banks in London lend dollars to each other.

cement companies as they are all increasing their production capacities.

4) The price of cement will increase by US$1.5 per year during the projected period.
This assumption was taken based on the fact that current Lebanese cement prices have not changed since middle 1996 and that they are currently in range with cement prices in neighboring countries. So, the US$1.5 yearly increase in price will be caused by the normal inflationary increase in cost.

5) The current US$2 discount per ton will continue till the year 2000 where it will increase afterwards to US$3 per ton during the period 2000-2003 due to an expected increase in competition.

6) No export of cement is assumed to happen. This is due to the fact that the export of cement will not play an important role in SCL sales as most of the company's future production will be absorbed by the local market.

	1997	1998	1999	2000	2001	2002	2003
Actual production	1,649	1,880	1,927	1,974	2,021	2,068	2,115
production capacity	1,649	2,200	2,200	2,200	2,200	2,200	2,200
%	100%	85.5%	87.6%	89.7%	91.8%	94%	96.1%

7) All the SCL cement quantities produced in one year will be sold in the same year.

Cost of sales

The following are the key assumptions for the components that make up cost of sales.

Semi finished product (clinker)

SCL have imported 218,000t of clinker in 1996 with a cost of LL64,500 per ton. In 1997, the cost per ton of clinker will increase by the 7% inflation rate.
Starting 1998, the cost of the imported clinker will be equal to zero as all the clinker will be produced in-house by the new SCL production line. The clinker produced in-house will have a lower cost than the imported one.

Raw materials

The cost of raw materials per ton of produced clinker was equal to LL9,900 in 1996. This cost will also increase by a yearly 7% inflationary rate during all the projected period.

Labor cost

The labor cost was taken as a fixed cost during the whole projection period (without even an inflationary increase). The expected increase in salaries (caused by the normal increase in the cost of living) should reasonably be offset by the company's policy to reduce the number of employees (as the three existing production lines will be stopped and the new production line will need a reduce number of laborers).
In the coming years, SCL does not intend to recruit new employees in place of the ones that are retired. The company has no intention to fire any employee as this action will have financial and social implications.

Energy cost

Energy cost is divided between : fuel oil for electricity generation and coal and petcoke for kilns.
In 1996, fuel oil cost was equal to LL5,900 per ton of produced cement and coal and petcoke cost was equal to LL16,400 per ton of produced clinker.
Starting 1998, these variable costs will decrease by 30% due to the utilization of the new dry production process. As other costs, energy costs will also increase by 7% per year.

Bags

In 1996, the cost of bags per ton of bagged cement was equal to LL5,600. This variable cost will also increase by 7% per year during the total projection period.
An assumption was taken that all the cement sold by SCL will be in bags. There is no impact on the NI for this assumption as the additional US$4 in the price of bagged cement is offset by approximately the US$4 cost of bags per ton.

Consumable materials

In 1996, the cost of consumable materials per ton of produced cement was equal to LL2,100. As other cost components, consumable materials will also increase by 7% per year.

Maintenance cost

In 1996, the maintenance cost was equal to LL6,400 per ton of produced cement. An increase of 10% is expected in 1997.
With the stoppage of the three old production lines beginning 1998, the maintenance cost will decrease by 50% from 1997 and then increase by 5% yearly.

Depreciation expenses

72% of the depreciation expenses is classified as cost of sales with the rest under operating expenses. The depreciation expenses of all machinery and equipment used in the production process are usually classified as cost of sales.

Operating expenses

Operating expenses are constituted of depreciation expenses (28% of the total depreciation expenses), employees salaries, selling and marketing expenses, municipality taxes, and other expenses.

Investment income

The investment income will increase by a yearly 10% rate. 50% of this income will be distributed as dividends to SCL company.

Interest receivable

Excess cash, after payment of loans, dividends and working capital requirements is invested in marketable securities at an assumed yield of 6% per annum.
Furthermore, SCL is charging a 9.5% interest rate on a long term loan given to SOLIBE.

Interest payable

Represents interest payable on the US$50 million and the US$35 million bonds and interest on long term bank loans
As the new production line will not start its operation before 1998, the 1997 interest expenses were capitalized[2].

[2] Based on International Accounting Standards number 23.

Notes to projected Balance Sheets

Accounts receivable

Based on historical performance, accounts receivable were taken equal to 20% of sales for all the projected period.
As the company has no history of doubtful debt since 1992, all the accounts receivable will be assumed as collected in the following year.

Fixed assets

The following assumptions were taken for fixed assets :

1) LL112,500,000,000 (US$75 million) will be added to Fixed Assets "work in progress" in 1997. The amount represents the remaining cost of the new Kiln #7 project.

2) At the beginning of 1998, two thirds of the "work in progress" will be transferred to "machinery" and the remaining one third to "building and installations".

3) The average yearly investment in fixed assets (other than the kiln #7 project) is equal to LL8 billion divided equally between "machinery" and "building and installations". These additions are supposed to happen at the middle of each year.

4) The 1997 financial interest on long term loans was added to "work in progress" in 1997.

Accounts payable

Based on historical performance, accounts payable were taken equal to 20% of cost of sales (Excluding depreciation expense which is a non cash expenses and cost of labor which is totally paid in cash) for all of the projected period.

Long term loans

Starting 1/1/1997, SCL will use the total US$13.5 million credit line (not used in 1996) given by Commerzbank and insured by HERMES. All long term loans will be settled according to their initial conditions.

Cash dividends

For all the projected period, the company will distribute 90% of the available profit to shareholders. This assumption is based on the following reasons :

* As the company has not distributed any dividend in 1996 and as shareholders have contributed two times, in the last two years, in cash capital increase, SCL management will be bound to pay high dividends to shareholders

* Large availability of cash.

* SCL has no major investment plans in the coming years as it has just finished the installation of a new dry production line.

* Before starting with the new production line, the amount of dividends paid as percentage of distributable profits was equal to 90.37% in 1992 and 90.77% in 1993.

Projected Financial Statements - 1997 through 2003

The pages in the next section comprise the following :

Projected Combined Income Statements
Projected Combined Balance Sheets
Projected Combined Statements of Cash Flows

The projected financial statements should be read in conjunction with the historical audited financial statements and the aforementioned assumptions.

PROJECTED INCOME STATEMENTS

(thousands of LL)

	1996 actual	1997 projected	1998 projected	1999 projected	2000 projected	2001 projected	2002 projected	2003 projected
Sales, net	159,208,613	162,033,900	188,940,000	197,999,250	204,309,000	213,720,750	223,344,000	233,178,750
Cost of sales	(117,206,366)	(125,924,528)	(140,933,935)	(146,489,160)	(154,592,994)	(161,242,538)	(167,635,525)	(177,767,796)
Gross profit	42,002,247	36,109,372	48,006,065	51,510,090	49,716,006	52,478,212	55,708,475	55,410,954
Operating expenses	(17,234,759)	(18,846,401)	(31,911,521)	(32,811,701)	(34,594,060)	(35,692,353)	(36,562,001)	(38,745,706)
Operating income	24,767,488	17,262,971	16,094,544	18,698,389	15,121,946	16,785,859	19,146,474	16,665,249
Investment income	771,732	848,905	933,796	1,027,175	1,129,893	1,242,882	1,367,170	1,503,887
Interest receivable	1,605,748	4,541,030	4,936,755	6,035,752	6,079,592	5,545,776	4,906,355	5,525,997
Interest expense	(2,952,414)	(2,952,414)	(15,056,880)	(14,035,065)	(12,226,172)	(8,671,279)	(5,116,386)	(2,143,492)
Income before taxation	24,192,554	19,700,492	6,908,216	11,726,251	10,105,259	14,903,238	20,303,614	21,551,641
Yearly income tax and provision taken for prior years	(9,199,411)	(985,025)	(690,822)	(1,172,625)	(1,010,526)	(1,490,324)	(2,030,361)	(2,155,164)
Net income for the year	14,993,143	18,715,468	6,217,394	10,553,626	9,094,733	13,412,915	18,273,253	19,396,477

PROJECTED BALANCE SHEETS
(thousands of LL)

	1996 actual	1997 projected	1998 projected	1999 projected	2000 projected	2001 projected	2002 projected	2003 projected
Assets								
Cash and Banks, net	26,600,000	49,944,425	59,770,476	81,561,064	86,862,268	82,903,990	77,300,962	92,598,121
Accounts receivable	31,207,408	31,063,541	37,788,000	39,599,850	40,861,800	42,744,150	44,668,800	46,635,750
Inventories	59,165,107	59,415,107	59,665,107	59,915,107	60,165,107	60,415,107	60,665,107	60,915,107
Prepayments and other debit balances	4,506,737	7,442,019	7,837,744	8,936,741	8,980,581	8,446,765	7,807,344	8,426,986
Current Assets	**121,479,252**	**147,865,092**	**165,061,327**	**190,012,761**	**196,869,755**	**194,510,012**	**190,442,213**	**208,575,965**
Investment	**6,091,306**	**6,554,345**	**7,063,688**	**7,623,966**	**8,240,271**	**8,918,207**	**9,663,936**	**10,484,238**
Medium and long term loans	8,992,705	10,598,453	12,204,201	13,809,949	15,415,697	17,021,445	18,627,193	20,232,941
Long term advances	11,881,640	0	0	0	0	0	0	0
Long-Term Loan	**20,874,345**	**10,598,453**	**12,204,201**	**13,809,949**	**15,415,697**	**17,021,445**	**18,627,193**	**20,232,941**
Intangible assets	3,339,101	3,339,101	3,339,101	3,339,101	3,339,101	3,339,101	3,339,101	3,339,101
Tangible assets (including WIP)	456,757,352	577,150,860	530,519,502	485,669,993	439,860,484	395,975,605	355,308,813	313,682,020
Fixed Assets	**460,096,453**	**580,489,961**	**533,858,603**	**489,009,094**	**443,199,585**	**399,314,706**	**358,647,914**	**317,021,121**
Total Assets	**608,541,356**	**745,507,852**	**718,187,820**	**700,455,770**	**663,725,308**	**619,764,369**	**577,381,255**	**556,314,265**
Liabilities								
Accounts payable	16,891,883	18,738,040	16,100,442	17,468,074	18,950,600	20,557,656	22,299,658	24,187,872
Other credit balances	20,625,013	9,651,753	9,672,470	10,364,138	9,847,072	9,408,449	9,050,093	8,880,132
Current Liabilities	**37,516,896**	**28,389,793**	**25,772,912**	**27,832,211**	**28,797,673**	**29,966,105**	**31,349,751**	**33,068,004**
Long term loans	107,831,049	234,959,180	218,150,294	192,591,408	154,099,189	102,673,637	51,248,085	23,617,700
Provision for staff indemnity & other provisions	14,649,296	14,899,296	15,149,296	15,399,296	15,649,296	15,899,296	16,149,296	16,399,296
Long-term liabilities	**122,480,345**	**249,858,476**	**233,299,590**	**207,990,704**	**169,748,485**	**118,572,933**	**67,397,381**	**40,016,996**
Total Liabilities	**159,997,241**	**278,248,269**	**259,072,502**	**235,822,915**	**198,546,158**	**148,539,038**	**98,747,132**	**73,085,000**
Shareholders' equity								
Share capital	234,192,509	234,192,509	234,192,509	234,192,509	234,192,509	234,192,509	234,192,509	234,192,509
Reserves	201,103,984	203,862,053	204,483,792	205,539,155	206,448,628	207,789,920	209,617,245	211,556,893
Retained income	13,247,622	29,205,021	20,439,016	24,901,191	24,538,013	29,242,903	34,824,369	37,479,864
Total Shareholders' equity	**448,544,115**	**467,259,583**	**459,115,318**	**464,632,855**	**465,179,150**	**471,225,331**	**478,634,123**	**483,229,265**
Total Liabilities and Shareholders' Equity	**608,541,356**	**745,507,852**	**718,187,820**	**700,455,770**	**663,725,308**	**619,764,369**	**577,381,255**	**556,314,265**

PROJECTED STATEMENT OF CASH FLOWS
(thousands of LL)

	1996 actual	1997 projected	1998 projected	1999 projected	2000 projected	2001 projected	2002 projected	2003 projected
Cash flows from operating activities :								
Net income for the year	14,993,143	18,715,468	6,217,394	10,553,626	9,094,733	13,412,915	18,273,253	19,396,477
Adustments for :								
Depreciation	13,101,003	15,468,307	54,631,358	52,849,509	53,809,509	51,884,879	48,666,792	49,626,792
(Gain)/Loss on disposal of FA	(261,357)							
(Income) / Loss on investment	(771,732)	(848,905)	(933,796)	(1,027,175)	(1,129,893)	(1,242,882)	(1,367,170)	(1,503,887)
Increase in provision for EOSI and other provisions	936,602	250,000	250,000	250,000	250,000	250,000	250,000	250,000
Interest on affiliates		(1,605,748)	(4,541,030)	(4,936,755)	(6,035,752)	(6,079,592)	(5,545,776)	(4,906,355)
Changes in current assets and current liabilities :								
Accounts receivable	(28,918,075)	143,867	(6,724,459)	(1,811,850)	(1,261,950)	(1,882,350)	(1,924,650)	(1,966,950)
Inventories	(7,010,804)	(250,000)	(250,000)	(250,000)	(250,000)	(250,000)	(250,000)	(250,000)
Prepayments and other debit balances	(1,263,303)	(2,935,282)	2,539,557	2,232,011	4,386,164	5,007,659	4,579,449	2,680,965
Accounts payable	6,653,595	1,846,157	(2,637,598)	1,367,631	1,482,527	1,607,055	1,742,002	1,888,214
other credit balances	12,890,630	(10,973,260)	20,717	691,668	(517,065)	(438,624)	-358,356	-169,962
Net cash from operating activities	10,349,702	19,810,603	48,572,143	59,918,665	59,828,272	62,269,061	64,065,544	65,045,294
Cash flows from investing activities :								
Acquisition of fixed assets	(119,906,157)	(123,980,175)	(8,000,000)	(8,000,000)	(8,000,000)	(8,000,000)	(8,000,000)	(8,000,000)
Dividend from affiliated companies	261,367	385,866	424,453	466,898	513,588	564,946	621,441	683,585
Other adjustments	996,090							
Net cash from investing activities	(118,648,700)	(123,594,309)	(7,575,547)	(7,533,102)	(7,486,412)	(7,435,054)	(7,378,559)	(7,316,415)
Cash flows from financing activities :								
Bonds and long term loans	107,831,049	127,128,131	(16,808,886)	(25,558,886)	(38,492,219)	(51,425,552)	(51,425,552)	(27,630,385)
Increase in capital	36,977,765							
Dividend paid	(8,355,379)	0	(14,361,659)	(5,036,089)	(8,548,437)	(7,366,733)	(10,864,461)	(14,801,335)
Net cash from financing activities	136,453,435	127,128,131	(31,170,545)	(30,594,975)	(47,040,656)	(58,792,285)	(62,290,013)	(42,431,720)
Net increase / (decrease) in cash and banks	28,154,437	23,344,425	9,826,051	21,790,588	5,301,204	(3,958,278)	(5,603,028)	15,297,160
Cash and banks beginning of the year	(1,554,437)	26,600,000	49,944,425	59,770,476	81,561,064	86,862,268	82,903,990	77,300,962
Cash and banks end of the year	26,600,000	49,944,425	59,770,476	81,561,064	86,862,268	82,903,990	77,300,962	92,598,121

Valuation Models

We have valued SCL stock by using three valuation models : The Discounted Cash Flow (DCF) model, the Discounted Dividend model, and the Discounted Earnings model.

Discount rate and Residual value

In order to determine an appropriate discount rate for a specific investment, one must first determine the applicable risk free cost of capital and then add a risk premium.
The free cost of capital used in the valuation is the 9% yield on Lebanese Treasury Bills maturing in 2000 denominated in US$.
With respect to any particular investment, each investor may wish a different risk premium reflecting such investor's assessment of the risks involved in that investment and the cost of capital to such investor. Different investors may therefore have different opinions as to the discount rate which should be applicable to a given investment.

The following three discount rates were used in each valuation model :

	Degree of risk		
	Low	**Moderate**	**High**
Risk free rate	9	9	9
Risk premium	3	7	11
Total applicable discount rate	12	16	20

The net present value of the business beyond the projection period is calculated using the Gordon model assuming constant growth for the period after the projection. Three different growth rates were used in each valuation model to reflect the investors' different opinions about the expected SCL growth after the year 2003.

	case 1	**case 2**	**case 3**
Growth rate after the projection period	0%	2%	4%

A combination between the three discount rates and the three growth rates has given us nine cases that could be applied in each valuation model.

	Discount rate	Growth rate
Case 1	12%	0%
Case 2	12%	2%
Case 3	12%	4%
Case 4	16%	0%
Case 5	16%	2%
Case 6	16%	4%
Case 7	20%	0%
Case 8	20%	2%
Case 9	20%	4%

Discounted Cash Flow (DCF) Model

The DCF model estimates the value of the equity of a business by estimating total business value and subtracting from this the value of debt used to fund operations. Total business value comprises the following basic components :

- ◊ The present value of cash flows from operations during a projected period of operating the business.
- ◊ An estimate of '"residual value" which is the present value of the business attributable to operations beyond the projection period.

The required rate used to discount each projection period's cash flows represents the required return on equity.

The net cash flows that are used to value SCL' s share price are as follows :

in millions of LL							
	1997	**1998**	**1999**	**2000**	**2001**	**2002**	**2003**
Cash Flows	(103,784)	40,997	52,386	52,342	54,834	56,687	57,729

Cash flows represent cash from operating and investing activities; thus these cash flows exclude cash flows relating to financing activities.

The net present value resulting from discounting the above stated cash flows and the residual value using an 16% discount rate and a 4% growth rate (case # 6) is as follows :

Net present values of cash flows for the years 1997 - 2003	LL 73,267,694,000
Add : present value of residual cash flows (4% constant growth)	170,218,185,000
Total	243,485,879,000
Less : Long term loans outstanding at December 31, 1996	(107,831,049,000)
Net value	LL 135,654,830,000
Total number of shares outstanding at December 31, 1996	234,192,509
SCL stock value	**LL 579**

The same calculation was applied for the remaining eight cases

SCL stock value using the Discounted Cash Flow (DCF)Model

	Discount rate	Growth rate	SCL stock value (in LL)
Case 1	12%	0%	881
Case 2	12%	2%	1,067
Case 3	12%	4%	1,345
Case 4	16%	0%	398
Case 5	16%	2%	475
Case 6	16%	4%	579
Case 7	20%	0%	117
Case 8	20%	2%	155
Case 9	20%	4%	203

Discounted Dividend (DD) Model

In this model, the value of the common stock is the present value of the future dividend stream in perpetuity.

The dividend that are used to value SCL common stock are as follows :

in LL	1997	1998	1999	2000	2001	2002	2003
Dividend per share	61	22	37	31	46	63	67

The net present values resulting from discounting the above stated dividend per share and the residual value of the business using a 16% discount rate and a 4% growth rate (case # 6) is as follows :

Net present values of dividend per share for the years 1997 - 2003	LL 181
Add : present value of residual dividend per share (4% growth)	198
SCL stock value	**LL 379**

The same calculation was applied for the remaining eight cases

SCL Stock value using the Discounted Dividend (DD) Model

	Discount rate	Growth rate	SCL stock value (in LL)
Case 1	12%	0%	459
Case 2	12%	2%	510
Case 3	12%	4%	586
Case 4	16%	0%	330
Case 5	16%	2%	351
Case 6	16%	4%	379
Case 7	20%	0%	254
Case 8	20%	2%	265
Case 9	20%	4%	278

Discounted Earnings (DE) Model

Another approach to value the SCL stock is to discount earnings instead of dividends.
The earnings that are used to value SCL common stock are as follows :

in millions of LL							
	1997	1998	1999	2000	2001	2002	2003
Earnings	18,715	6,217	10,554	9,095	13,413	18,273	19,396

The net present values resulting from discounting the above stated earnings and the residual value of the business using an 18% discount rate and a 4% growth rate (case # 6) is as follows :

Net present values of earnings for the years 1997 - 2003	LL 53,287,986,000
Add : present value of residual dividend per share (4% constant growth)	57,192,052,000
Total value	LL 110,480,039,000
Total number of shares outstanding at December 31, 1996	234,192,509
SCL stock value	**LL 472**

The same calculation was applied for the remaining eight cases

SCL Stock value using the Discounted Earnings Model

	Discount rate	Growth rate	SCL stock value (in LL)
Case 1	12%	0%	571
Case 2	12%	2%	633
Case 3	12%	4%	727
Case 4	16%	0%	411
Case 5	16%	2%	437
Case 6	16%	4%	472
Case 7	20%	0%	318
Case 8	20%	2%	331
Case 9	20%	4%	347

Conclusion

Each investor may have different risk rate and growth rate reflecting his cost of capital and his assessment of the risks involved in the investment in SCL common stock.

In our opinion (as a potential investor), the most appropriate valuation method for "Societe des Ciments Libanais" case is the Discounted Cash Flow method with a discount rate of 16% and a growth rate of 4%.

Accordingly, we believe that SCL common stock value is equal to LL 579.

Our opinion is based on the followings :

1) The Discounted Cash Flow method is the most appropriate valuation method for SCL valuation as :

   * The huge increase in depreciation expenses from LL15 billion in 1997 to a yearly average of LL50 billion during the period 1998 - 2003, which is caused by the introduction of the new production line, will severely decrease the SCL Net Income during the period 1998 -2003.
     According to the Lebanese Laws, machinery should be depreciated over an average period of 5 years but SCL new production line could be used at least for a period of 20 years. Therefore, The SCL future Net Income should not be used to value SCL stock and accordingly the Discounted Earnings Method is not recommended for valuation.
     The Discounted Cash Flow Method overcomes the problem of highly abnormal depreciation expenses by deducting the latter from the Net Income, to compute the net cash from operating activities, as it represents a non cash expenses.

   * The same abovementioned problem (the highly abnormal depreciation expenses) exists for the Discounted Dividend method. Furthermore, SCL has not a stable policy concerning the Dividend Payout Ratio (DPR) which has decreased from a 90% in 1992 and 1993 to 46% in 1994,to 50% in 1995 and to zero in 1996. Thus the assumption taken that the DPR will be equal to 90% during the period 1997-2003 is highly uncertain.

2) At 31/12/96, the EPS of SCL stock was equal to LL64. A SCL stock value of **LL579** will give us a P/E ratio of 9.
   As no cement company other than SCL is listed in Beirut Stock Exchange and as 4 Lebanese banks are currently listed and actively traded, the P/E ratio of the Lebanese banking industry was compared with SCL' s P/E ratio.

In July 1997, the P/E ratio of the following banks was equal to :

	P/E
Audi Bank "C" share	15.90
BLC "C" share	13.12
Byblos Bank "A" share	14.34
Byblos Bank "B" share	14.56
Bank of Beirut	14.96
Average P/E ratio	**14.50**

A spread of 3.3 exists between the P/E ratio of the banking industry in England (which has a P/E ratio of 17.2) and the P/E ratio of the extractive industries (which has a P/E ratio of 13.9) in the same country[3]. The same spread could be taken between the Lebanese banking industry and the Lebanese cement industry as the former is considered by investors as a very stable industry with high expected growth and as it was, during the last 20 years, less sensitive to the political and economic risks than the cement industry.

Accordingly, we believe that a P/E ratio of 11 is the most appropriate for the Lebanese cement industry.

But contrary to the listed Lebanese banks, SCL stock is not liquid in Beirut Stock Exchange. An investor may have to wait for days or weeks to sell his investment at the current market price. Thus, a further spread of 2 points should be deducted from the above mentioned P/E ratio of 11 to account for the liquidity problem facing SCL investor. Consequently, a P/E ratio of 9 for SCL is deemed to be the most suitable.

In conclusion, a discount rate of 16% and a growth rate of 4% will give us a value for SCL stock equal to LL579 with a P/E ratio of 9 which reflects investors assessment of the risk associated to the cement industry and to SCL specific risk.

3) The gross sales will increase by a yearly 4% in 2002 and 2003. Thus, it will be the most appropriate to assume that the same trend will continue during the years beyond the projection period. Accordingly, a 4% growth rate is taken for SCL stock valuation.

4) We could not apply the P/E ratio valuation model as SCL is the only Lebanese cement company listed in BSE. So it was impossible to find an appropriate P/E ratio for the cement industry in Lebanon to use it in a P/E ratio model.

As for the technical analysis techniques, they can only be used in developed stock markets where the stocks are very active and the prices

[3] Financial Times. July 16, 1997.

are totally determined by supply and demand.

In my opinion, an investment in SCL stock should be made only if the stock market price is equal or lower than LL579.
A big difference exists between SCL stock price at 31/12/96 (LL1650) and SCL value (LL579) according to this study. In my opinion, the current SCL stock price in BSE does not reflect the real value of the company as SCL stock was inactive, illiquid, and inefficient in Beirut Stock Exchange during the past two years :

* SCL stock was inactive in BSE during the last two years. Days, even weeks have passed without a single trade takes place. The maximum volume traded was in February 1997 (3,111,407 stock out of 234,192,509 representing total outstanding shares). The volume traded in February 1997 was an exception as the total monthly volume traded, between January 1996 and May 1997, ranged between a low of 5,100 stock in September 1996 and a high of 622,731 stock in May 1997.

* SCL stock price has not changed from approximately LL1650 since July 1996. The decision of SCL not to distribute dividends for 1996 financial year did not decrease the stock price in BSE. This example is a clear proof that SCL stock is inefficient or in other words does not reflect all known information quickly and accurately.

* A comparison between the daily quantity supplied, demanded, and executed shows that SCL stock is highly illiquid. An investor may have to wait for days or even weeks to sell his investment.

Finally, we believe that the current SCL stock price will gradually decrease in the future to arrive to a price around LL600. The pace at which this decrease will occur depends on the elaboration of the re-emerging BSE and the development of Lebanon's financial and capital markets.

APPENDIX

CEMENT

Definition[1]

Cement is "any material that hardens and becomes strongly adhesive after application in plastic form. In engineering and building construction the term usually refers to a finely powdered, manufactured substance consisting of gypsum plaster or Portland cement that hardens and adheres after being mixed with water."[1]

History of Cement

The Romans were the first who developed a cement that produced structures of remarkable durability. Most of the building foundations in the Roman forum were constructed of a form of concrete. The great Roman baths built about 27 BC, the Coliseum, and the huge Basilica of Constantine are examples of Roman architecture in which cement was used.

The cement we know nowadays (the Portland cement) was discovered in 1824 by Joseph Aspdin who was a bricklayer and mason in Leeds, England. Aspdin's method involved the careful proportioning of limestone and clay, pulverizing them, and burning the mixture into clinker, which was then ground into finished cement. The new product was named Portland Cement because concrete made of it resembled a highly prized natural building stone quarried on the Isle of Portland, off the British coast.
But it was almost 20 years later when J.D. White and Sons set up a prosperous factory in Kent that the Portland cement industry saw its greatest period of early expansion, not only in England, but also in Belgium and Germany. Portland cement was used to build the London sewer system in 1859-1867.

How Cement is made

Portland cement is a closely controlled chemical combination of calcium, silicon, aluminum, iron, and small amounts of other ingredients to which gypsum is added in the final grinding process to regulate the setting time of the concrete. Lime and silicia make up about 85% of the mass.

The exacting nature of Portland cement manufacture requires some 80 separate and continuous operations, the use of great deal of heavy machinery and equipment, and large amounts of heat and energy. The capital investment per worker in the cement industry is among the highest in all industries.

[1] Encarta Encyclopedia 1997

Each step in manufacture of Portland cement is checked by frequent chemical and physical tests in plant laboratories. The finished product is also tested to ensure that it complies with the applicable specifications.

Raw materials and the preparation for burning

Rock blasted from the quarry face is transported to a primary crusher, where the piano-sized rocks are broken into pieces the size of baseballs. A secondary crusher reduces them to the size of a gravel. Some plants now crush materials in one stage.
While the plant's quarry yields the primary ingredient, limestone, other raw materials are often brought in from outside sources (Figure I).

In the plant laboratory, technicians analyze the raw materials and determine the correct proportion of limestone and other materials needed for the final cement product.
Once analyzed, the raw materials are blended in the proper proportions and ground even finer. Some cement plants use heavy wheel-type rollers that crush the materials into powder against a rotating table. Other facilities grind the raw materials in ball or tube mills-horizontal steel cylinders filled with thousands of steel balls. As the mill turns, the balls tumble on to the materials and crush it into powder.

In the type of cement-making called the *dry process,* the raw materials are now ready for the Kiln. In an older system known as the *wet process,* water is added to the raw feed during the grinding, producing a creamy mixture called *slurry,* to simplify mixing and proportioning. After grinding, the slurry is stored in large, open tanks under agitation (Figure II).

Kiln chemistry

As the raw materials move down to the progressively hotter kiln, they undergo complex chemical and physical changes requiring intense heat. Expressed at its simplest, the series of chemical reactions in cement-making convert calcium and silicon oxides into calcium silicates, cement's principal constituents.
While kiln systems vary, there are three major zones :

a) Drying and preheating zone - 20oC to 900oC.
b) Calcimining zone - 600oC to 900oC.
c) Burning zone - 1200oC to 1480oC.

Conversion by fire

Whether in dry powder or slurry form, the raw meal is ready for the huge

rotating furnace called a kiln. It's the heart of the cement-making process ; a horizontally sloped steel cylinder, lined with firebrick, turning from about one to three revolutions per minute. The kiln is the world's largest piece of moving industrial equipment.

1. To save energy, modern cement plants preheat the materials before they enter the kiln. The preheater tower dominates the landscape, rising more than 200 feet.
   The tower supports a series of vertical cyclone chambers through which the raw meal passes on its way to the kiln.
   Hot exit gases rising from the kiln heat the material as it swirls through the cyclones.

2. Some preheaters contain a furnace or precalciner at the bottom of the preheater tower just before the kiln. Material from the last stage cyclone enters the precalciner along with hot combustion air and fuel. As much as 95% of calcination-the removal of carbon dioxide from raw materials-takes place here.

3. From the preheater, the material now enters the kiln at the upper end. It slides and tumbles down the kiln through progressively hotter zones toward the flame. Remaining carbon dioxide in the raw materials is driven off, and the intense heat triggers other chemical reactions.

4. At the lower end of the kiln, powdered coal, natural gas, oil or waste-derived fuels feed a white-hot flame that reaches 1870oC which is one-third of the temperature of the Sun's surface. Here in the hottest zone, the materials reach nearly 1480oC and become partially molten. They emerge from the lower end of the kiln as a new substance : red-hot particles called clinker.

5. Pollution control devices, such as electrostatic precipitators or fabric filters called baghouses, remove particulate from exit gases before they enter the atmosphere. This strict control of emissions enable cement plants to meet high air-quality standards. Many plants return all or a portion of the collected particles, called cement kiln dust, to the kiln as part of the raw feed.

The final grind

As the clinker leaves the kiln, it tumbles on to a reciprocating grate through which fans force cool air. The heat recovered as the clinker cools is returned to the kiln or preheater to save energy.

Once cooled, the clinker is ready to be ground into the familiar gray powder we know as cement.
During final grinding, a small amount of gypsum is added to the clinker to control the setting time of the cement.
In ball mills, the clinker is ground to a super-fine powder composed of micron sized particles as small as 1/25,000 of an inch. It can now be considered Portland cement. The cement is so fine it will easily pass through a sieve that is fine enough to hold water.(Figure III).

Bagged or Bulk

From the grinding mills, the cement is conveyed to silos where it awaits shipment. Most cement is shipped in bulk by transport trucks, railroad cars, or barges. The cement is loaded at the storage silos by overhead equipment that can fill a large tanker in only a few minutes. A small percentage of the finished product is bagged for customers who need only small amounts of cement.

Types of Portland Cement

According to specifications set by the American Society for Testing Materials, there are 5 types of Portland cement :

Type I It is the ordinary type of Portland cement that is designed for use in general concrete construction. It is suitable for all uses except where special conditions justify the selection of another type.

Type II It is the moderate heat Portland cement which is generally suitable for large structure and to concrete structures constructed during hot weathers.

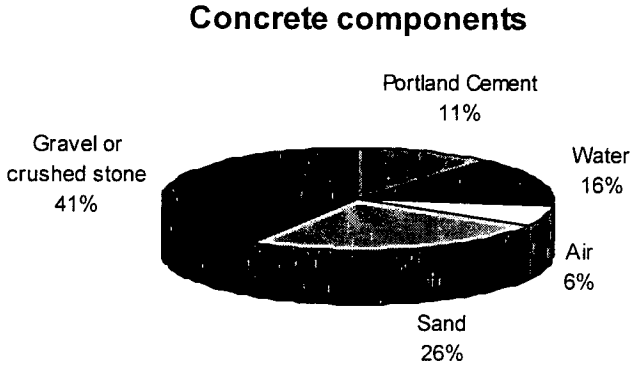
Type III It is the rapid hardening Portland cement for use where high early strength development is desired.

Type IV It is the low heat Portland cement desired for use where low heat of hydration is required.

Type V It is the sulphate resistance Portland cement that is applicable where concrete is exposed to a severe sulphate action as in the case of soils and waters of high alkali contents.

Cement and Concrete

Cement is the key ingredient of concrete but it makes up just 11% of the mix.



How Cement Works

When stone, sand, water, and Portland Cement are mixed together in the proper proportions, the water and cement form a paste that coats every stone and grain of sand and fills the spaces between them. The water initiates a chemical reaction called *hydration*. This reaction forms a gel which, as it hardens, binds the stones and sand into a solid mass that becomes stronger and stronger.

The cement's rate of Hydration determines the setting and hardening time of the concrete. The rate of hardening can be precisely controlled. The Gypsum ground into cement at the plant regulates setting time. Different types of cement have different setting times, and concrete additives are available to speed or slow settings. Temperature also affects setting time.

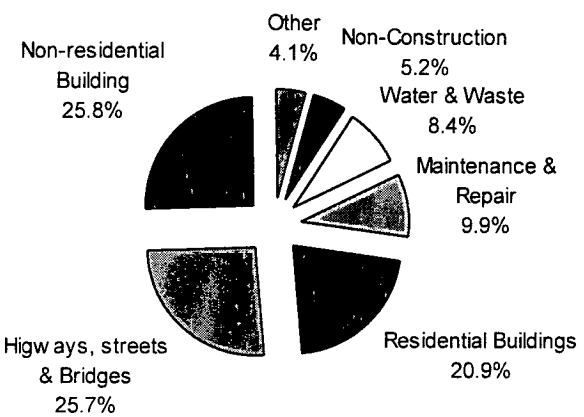
Although most strength development occurs in the first few days, concrete can gain additional strength for years if moisture is present and cement hydration is sustained.

The shape of things to come

A steady stream of advances continue to build on concrete's traditional strengths.

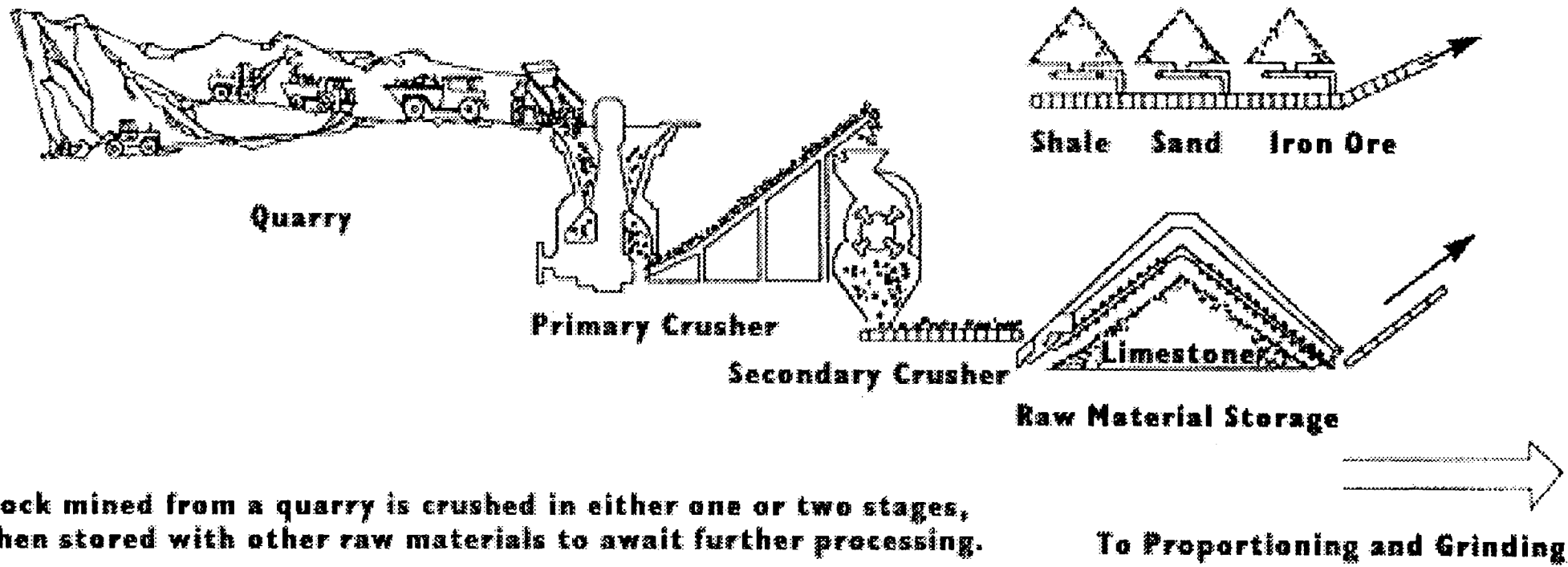
A whole range of admixtures can customize concrete to flow like water, reduce setting time from days to hours, or dramatically increase strength. Yet for all its sophistication, modern concrete retains the stone-like properties that have made it the foundation of all we build. And it all begins with the fine gray powder called *Portland Cement.*
The following details the use of Portland Cement by Type of Construction.

Uses of Portland Cement by type of construction



[i] The information of this appendix, unless otherwise mentioned, are based on the web page of the Portland Cement Association.

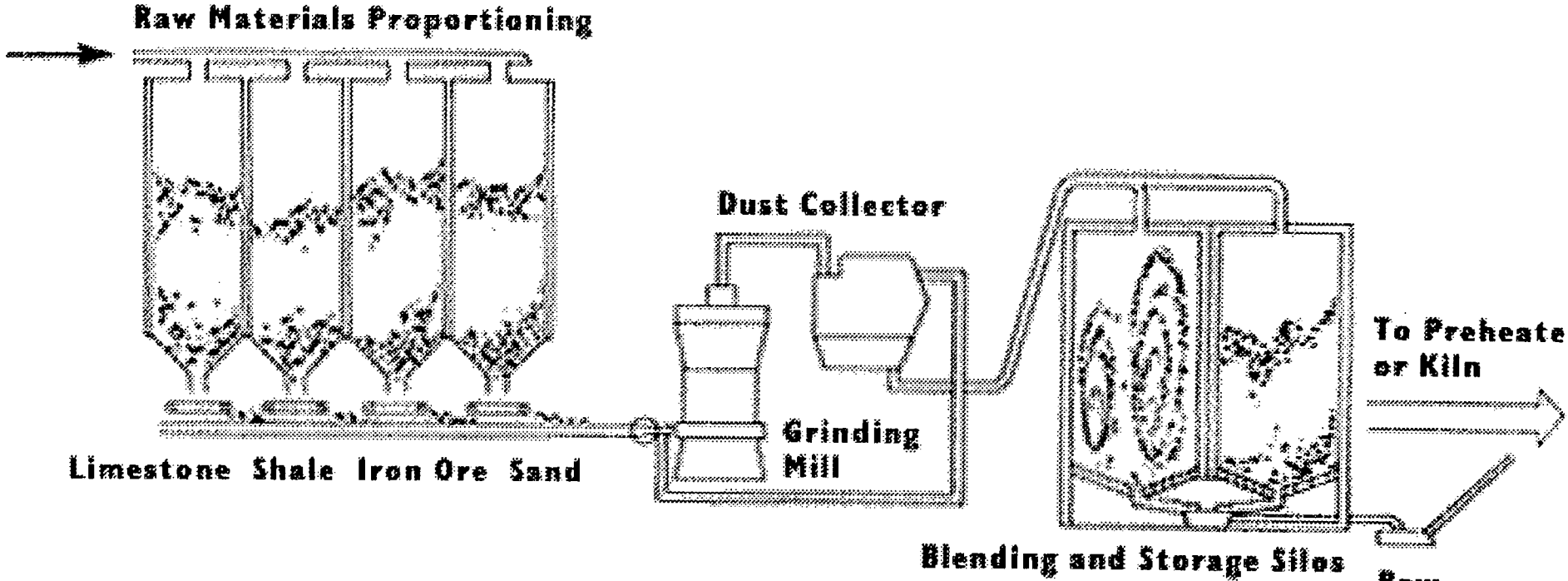
FIGURE I



Rock mined from a quarry is crushed in either one or two stages, then stored with other raw materials to await further processing.

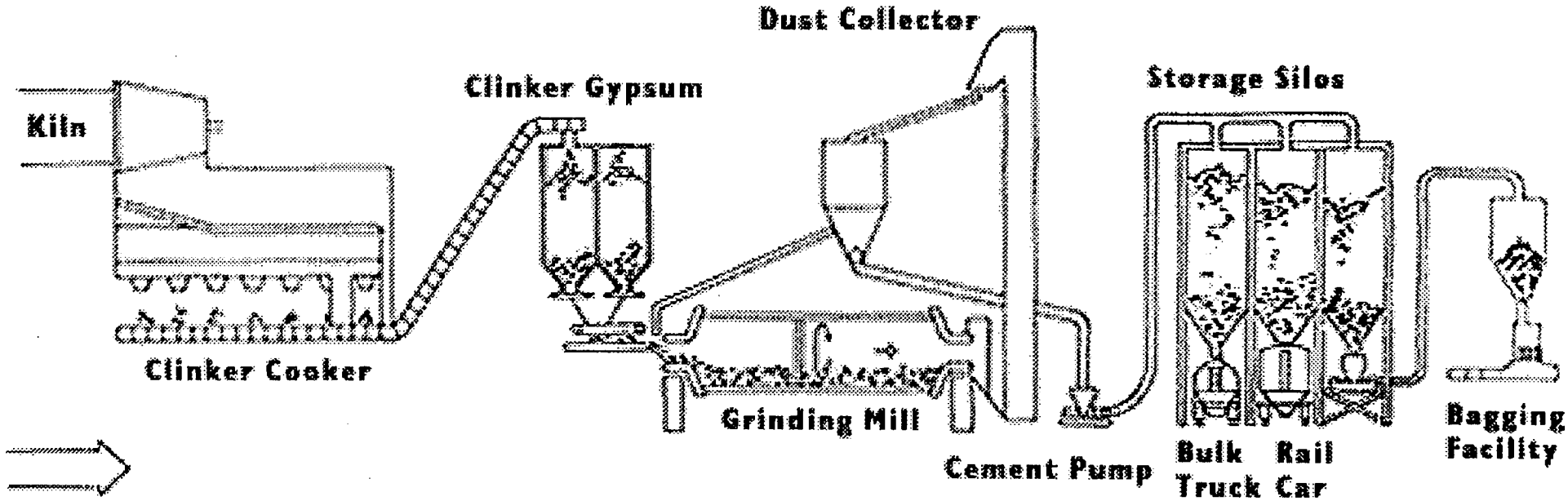
To Proportioning and Grinding

FIGURE II



After analysis, the raw materials are proportioned, ground to fine powder, and blended. Some cement plants add water to the material during grinding, then blend and store it as a slurry.

FIGURE III



Once cooled, the clinker is ground with a small amount of gypsum. It's now portland cement-ready to be bagged or shipped in bulk.

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