CHAPTER - V

NEED AND CASE FOR
MINI CEMENT PLANTS
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The present consumption of cement per capita in India is about 60 Kg as against the world average of 220 Kg. The socio-economic growth of a country is closely linked with the expanded consumption of cement. Viewed thus, there is a vast scope for rapid expansion of cement industry in the country.

The demand and supply scenario projected for the current decade and the years to follow prove the need for expansion.

Table 5.1: Installed capacity, production and consumption of Cement in Four Zones during 1980
(In lakh tonnes)

<table>
<thead>
<tr>
<th>Zone</th>
<th>Installed</th>
<th>Production</th>
<th>Consumption</th>
<th>Deficit</th>
<th>Excess</th>
</tr>
</thead>
<tbody>
<tr>
<td>North</td>
<td>44.38</td>
<td>26.29</td>
<td>49.19</td>
<td>-22.90</td>
<td>-</td>
</tr>
<tr>
<td>East</td>
<td>41.88</td>
<td>26.39</td>
<td>34.83</td>
<td>8.40</td>
<td>-</td>
</tr>
<tr>
<td>West</td>
<td>79.90</td>
<td>56.97</td>
<td>52.29</td>
<td>-</td>
<td>4.28</td>
</tr>
<tr>
<td>South</td>
<td>89.00</td>
<td>68.25</td>
<td>58.07</td>
<td>-</td>
<td>10.18</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>255.16</td>
<td>177.90</td>
<td>194.38</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

+ Mini Cement Plants + White Cement

1.31 1.04

Grand Total 256.47 178.94 194.38

The above Table 5.1 gives the position of cement production, consumption and deficit, region-wise in 1980. The eastern zones had to be compensated for by considerable supplies on the southern and western zones. This involved considerable movement of this essential commodity from the production-units to the consumer creating additional load for the already over-burdened railway transport network.

The reasons for the imbalance between production and consumption of cement in any of the aforesaid zones can be ultimately traced back to geographically uneven distribution of the installed units. Out of a total 61 large plants, only 11 plants are situated in the northern zone.

In the year 1980 these plants contributed 14.5 percent of total production of this soft powder called cement but the northern zone itself consumed 25% of the cement available in the same year as shown in the Table 5.1. The eastern zone with 11 plants produced 14.75 percent but consumed 18 percent of the cement available in the year 1980. In the same year, the western zone with 15 plants produced 33 percent but consumed 27 percent while the southern zone with 24 plants produced 57.5 percent but consumed about 30 percent. The
anomalous distribution of cement units is due to the various techno-economic factors among which the availability of large reserves of cement grade limestone in the vicinity of a railway-line played a very pivotal role.

These two facilities, one being a natural wealth and the other an artificial one, are not uniformly available or distributed. Limestone, the chief raw material for cement making, has a very uneven distribution in different states and zones as shown in Table 5.2.

Table 5.2 : Regional imbalance in Cement production and Availability  
(In lakh tonnes)

<table>
<thead>
<tr>
<th>Year</th>
<th>For Zones with Consumption more than annual production</th>
<th>For Zones with Consumption less than annual production</th>
<th>Total imbalance deficit</th>
</tr>
</thead>
<tbody>
<tr>
<td>1978</td>
<td>-30.72</td>
<td>+21.75</td>
<td>- 8.97</td>
</tr>
<tr>
<td>1979</td>
<td>-32.69</td>
<td>+19.32</td>
<td>-13.37</td>
</tr>
<tr>
<td>1980</td>
<td>-31.34</td>
<td>+14.46</td>
<td>-16.88</td>
</tr>
</tbody>
</table>


Now the pertinent question is whether the required amount of cement can be obtained through the setting up of new plants or the expansion of large units or through
encouraging the network of decentralised mini cement plants spread over a wider area.

The conventional large size plants have broadly three types of disadvantages.

1. Geographically, the major deposits of limestone, the principal raw-material in cement industry, are located in the south of the Vindhyas. The major population and the cement consuming centres, on the other hand, are located in the north of the Vindhyas. As a result a substantial portion of the national production of cement has to be hauled over long distances before its consumption. The limestone deposits in the north are generally too small to sustain large size plants and have, therefore, remained unexploited.

2. Technically, the large size plants have long gestation periods mainly because of the protracted delivery of the machine meant for cement making. The period for gestation of bigger cement plants will be about 4 to 5 years, whereas it is about 1 to 2 years in the case of MCPs.

3. Financially, the large size plants are capital-intensive and are outside the pale of all but the big business-houses. Nevertheless, these investors were
reluctant to invest a large capital that cement plants required unless they were assured of lucrative prices for their product.

Theoretically, the following advantages are ascribed to the large-scale plants:

1) Heat-saving because of lower radiation heat-losses in the kiln area.
2) Lower capital investment per tonne produced.
3) Saving in personnel costs and
4) A general reduction in all other running costs such as spare parts, lubrication, maintenance etc. in practice.

After starting operation with the conventional large scale plant, it was found that the expected economical advantages were procured partially, as follows:

1. The fuel savings between 1000 and 3000 tonnes/day kiln should be between 40 and 60 Kcal/Kg of clinker and thus not more than 0.60 Dm/tonne.
2. The specific investment costs have not been brought down substantially by the installation of larger units. It is absolutely difficult to make an accurate statement since the various details furnished are not based on precisely defined investment amounts.
3. Whereas there is a saving on skilled production workers, long experience is necessary on servicing personnel.

Mention must be made of the fact that anti-pollution laws are continuously tightening up and this often results in a very monotonous procedure of securing approval especially where the construction of large cement works in industrially and densely populated area, is concerned. Above all, a great deal of capital is blocked up on such projects even during the lengthy planning, approval and construction-period.

The case for MCPs rests as to how far the disadvantages of large units could be overcome. The mini cement plant should prove that it includes a burning process of a kind which exhibits the economical features of a large scale plant.

The burner unit of mini cement plant which is to be competitive today must then meet the following requirements:

1. The environmental compatibility, the operating costs, the investment costs and the operational reliability must be definitely competitive with those of a large rotary kiln.

2. The unit must permit only fuel to be used and must, therefore, be flame-heated.
3. It must be easy to handle in order to avoid highly qualified technicians having to be on hand for small production runs.

4. Immediate starting and closure of the plant should provide additional advantage compared to the large rotary kiln, such as shutting down the plant at week-ends etc. This possibility represents an improvement in the working conditions for the employees also in the sense of humanizing the working environment.

In addition, the M.C.P has the following socio-economic advantages:

**Employment potential:**

There is no distinct pattern of man-power requirement of cement per tonne for the entire cement industry, which consists mainly of medium and large plants and has been in existence for about 16 years now. For plant size of 1000 tonnes per day (TPD) and above, the man-power deployment ranges between 0.18 and 2.76 per tonne of cement produced. But in the case of mini-cement plants in present operation, it ranges from 2 to around 4.5. The factors which govern this wide variation are mainly — age of the plants, management
control, technology adopted, degree of automation etc. So mini cement plants based on vertical shaft kiln require high man-power as compared to conventional large cement plants.

It is estimated that mini cement plants would be capable of providing direct employment to roughly eight thousand people on the basis of the potential sites identified for mini cement plants. They will, therefore, go a long way in promoting regional development and uplifting local economy.

Exploitation of natural resources:

At present, a large number of small deposits are lying idle because, these can not sustain the conventional large size cement plants. There are 10,676 million tonnes of total limestone reserves including about 1,070 million tonnes of measured reserve in Northern and North-Eastern regions which alone could sustain a large number of small plants. The mini cement plants offer an ideal solution to profitable exploitation of such deposits. Mini cement plants set up in such areas would simplify the availability of cement there, which otherwise may not be reaching the consumer at all or reach with difficulty with high incidence of transport cost.
So, MCPs can utilize the scattered limestone deposits of small quantities which would otherwise remain unutilized and thus contribute to the dispersal of cement industry in remote, far-flung and isolated areas where local terrain may not permit easy movement of large size cement machinery. The large size cement industry could not move to such areas, where the limestone deposits are in small quantity.

Intensification of Regional Development:

The share of mini cement plants in the production of cement is not very significant in quantified terms. However, indirect impact in terms of economic development of the region is expected to be noteworthy. More than hundred and odd mini cement plants established throughout the length and breadth of the country have already contributed to the development of their own respective regions. The gestation period being small, technology employing local skills with appropriate training, investment per tonne smaller than that needed for a large plant offer enormous potential for a balanced regional development.

MCPs can furnish small and medium-scale engineering sector with encouragement. The established machinery manufacturers in the heavy engineering sector are usually
somewhat reluctant to manufacture small plant machinery. On the other hand, the small and medium scale engineering sectors could supply the required machinery for a mini cement plant at cheaper rate and quickly.

Such MCPs make lower demands on the infrastructural facilities because of their simpler distribution pattern and thus ease the load on the already over-burdened railway system. Because, the movement of cement by rail to farther destinations has been lessened as cement produced by the MCP is transported mostly by road either through the trucks owned by the company or merchants thereby reducing the strain on the transportation infrastructure of the country. It is possible to select the sites in the vicinity of the sales region. This results in a considerable transportation cost-saving.

The smaller machine parts are easier to handle if repairs are necessary. Various small items of equipments can be supplied by a local industry around the site of the mini cement plant. Few spare parts should be kept on stock since accessories for small machine such as motors etc, are commercially available in the nearby market. The training of personnel is easier for the plant operation and quality control. Since the production is on small-scale, strict quality control systems can be adopted.
**Economic Viability:**

Initially, mini cement plants are defined as plants up to the capacity of 200 tones per day. Later, in 1987, the Government of India has enhanced the capacity of the mini cement plants up to 600 tonnes per day. Several forums, special working groups and committees have been deliberating on the viability of these plants. Since 1976, processes available for commercial exploitation for the production of cement in the small scale are through vertical shaft kiln and small Rotary kiln. Apart from the technological limitation, scaling down of technology leads to losing advantages of economies of scale resulting in higher investment costs per tonne and lower fuel efficiency.

The efforts of the Cement Research Institute of India right from the initial stage have been to develop a technology for the production of cement on a small scale with an investment per tonne not higher than that needed for a large cement plant. Therefore, a mere scaling down of the conventional large Rotary kiln technology was obviously not the rejoinder. An appropriate technology based on the VSK process offered an ideal solution to the problem.
Capital Cost: For CRI-VSK Plants:

Capital costs for different capacities are given in the table below. The comparative investment data reveal that against an investment of Rs. 900 for a large plant of one million tonne per annum, a 50 tonnes per day, 100 tonnes per day and 200 tonnes per day mini cement plants based on vertical shaft kiln would require Rs. 842.30 Rs. 608.39 and Rs. 652.92 respectively. The two vertical shaft kiln plants M/s Veda Cement, Hosadurga and Lokapur cements Pvt Ltd, Lokapur which have gone on commercial production during 1981 have further confirmed the level of capital required to set up such plants.

Table 5.3: Techno economic data of CRI-VSK mini cement plants of various capacities

<table>
<thead>
<tr>
<th>Tonnes per day</th>
<th>50</th>
<th>100</th>
<th>200</th>
</tr>
</thead>
</table>

A. Capital investment:
(Rs. in lakhs)

<table>
<thead>
<tr>
<th></th>
<th>129.13</th>
<th>201.70</th>
<th>393.98</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Capital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Working Capital</td>
<td>9.85</td>
<td>18.80</td>
<td>36.95</td>
</tr>
<tr>
<td>Total Capital</td>
<td>138.98</td>
<td>220.57</td>
<td>430.93</td>
</tr>
</tbody>
</table>

B. Investment per tonne of installed Annual Capacity

<table>
<thead>
<tr>
<th></th>
<th>842.30</th>
<th>668.39</th>
<th>652.92</th>
</tr>
</thead>
</table>

Source: Techno-economic viability of CRI-VSK Mini Cement Plant, Dr. (Mrs.) R. Ramachandran and others CRI, Nat. Seminar on MCPs, 26-27, May 1982, New Delhi, CRI, p. 77
Cost of Production (CRI-VSK plants):

The ex-works cost of production of cement in vertical shaft kiln based plants of different capacities and their related profitability may be seen in the following tables 2 and 3. As against Rs. 300 to Rs. 310 for a dry process large plant, the ex-works cost of production of cement work out to be Rs. 381.84, Rs. 331.41 and Rs. 315.98 in 50 TPD, 100 TPD, and 200 tonnes per day VSK plants respectively.

The production cost in a small vertical shaft kiln plant could be further reduced if reasonable price is fixed for low volatile fuel. As against the pit-head cost of Rs. 120/- (yearly) per tonne for ordinary coal, low volatile fuel which is essential to VSK process, costs Rs. 220/- to Rs. 250/- per tonne. This factor alone is responsible for a higher cost of production by Rs. 20/- to Rs. 25/- per tonne. Even though 450 million tonnes of low volatile fuel (Jhama) have been reported to occur in the lease hold of BCCL alone in Jharia Coal Fields, there is practically no demand for this coal at present. Coke breeze continues to be available at a rate cheaper than the Jhama coal.
Another important factor influencing upward production cost in case of vertical shaft kiln based plant is the wages and salaries component, it being a labour-intensive technology. Whereas this component is around Rs. 17 per tonne for a large conventional plant of 1500 tonnes per day capacity, it is about Rs. 32/- per tonne for a 200 tonnes per day capacity plant based on vertical shaft kiln. Therefore, the difference works out to be Rs. 15/- per tonne. This differential too can be reduced substantially by certain modifications/automation in the plant which would, however, increase the capital cost marginally. The capital cost per tonne of installed capacity would still compare favourably with conventional plants.

Profitability:

The operating costs of the mini cement plants are expected to be about Rs. 50/- per tonne of cement higher than what they are in a 1500 tonnes per day cement plant. The profitability as assessed by the ratio net profit/net worth on the basis of the said costs works out to be minus 0.6%. A retention price of Rs. 344.39 per tonne and 6.7% on the basis of this retention price and additional incentives by way of
rebate of Rs. 35.75 per tonne and a freight saving of Rs. 45 per tonne would account for the profitability.

In view of this reduced profitability, the Government of India have announced a new pricing policy and a scheme of partial decontrol of cement. The highlights of this scheme as applicable to the mini cement plants are:

i) The mini cement plants are exempted from price and distribution control.

ii) Mini cement plants will be eligible for such excise-rebates of Rs. 35/-per tonne in the year 1982.

iii) This scheme became effective from the 28th February 1982.

It would be relevant to assess the impact of the new scheme on the profitability of the mini cement plants.

To arrive at the profitability it is assumed that,

i) The selling price of the cement would be Rs. 1100/-per tonne. This price is inclusive of all taxes and is, in fact, the price the consumer will have to pay.

ii) The freight on cement transport incurred by the mini cement plants is based on an average haulage of 150 kilo-meter per tonne by road.
On this basis, the profitability works out as under: (1982)

Table 5.4: Profitability

<table>
<thead>
<tr>
<th>Items</th>
<th>Rs./tonne</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost of production and Depreciation</td>
<td>355.76</td>
</tr>
<tr>
<td>Interest Charges</td>
<td>96.79</td>
</tr>
<tr>
<td>Packing charges</td>
<td>63.93</td>
</tr>
<tr>
<td>Freighr</td>
<td>75.00</td>
</tr>
<tr>
<td>Stockist's margin</td>
<td>80.00</td>
</tr>
<tr>
<td>Central Excise</td>
<td>100.00</td>
</tr>
<tr>
<td>Sales Tax at 8%</td>
<td>81.48</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>852.96</strong></td>
</tr>
<tr>
<td>or say</td>
<td><strong>853:00</strong></td>
</tr>
</tbody>
</table>

Selling price of cement: 1100.00
Contribution per tonne: 247.00


This works out to be a post-tax of 23%. Thus a mini cement plant under the present scheme appears to be a very alluring proposition.

However, a word of caution is necessary. It will be seen that the profitability workings are based on the assumption that the entire production of the mini cement plant is sold within a radius of 200-250 kilometers (average distance 150 kms). In the event of a large plant which happens to be
located within this radius, it is likely that the sales falling within this radius will be lost to the mini-plant and that it will have to seek most distant areas, for, a large plant has a distinct advantage of economies of scale over a mini-plant and it would always be in a position to sell its product cheaper than what a mini cement plant does. A logical conclusion that can be drawn from this would then be that a mini cement plant under the existing pricing and distribution scheme generally is a very attractive proposition subject to a very careful assessment of potential sale of cement in a given location.

**Investment costs:**

The costs of investment under mini cement plants are less for framing a production line. The calculations made have shown that a mini cement plant can be built at low specific costs of investment. Here, in terms of fixed costs resulting from depreciation and interest on capital, the mini cement plant is able to vie with large plant.

**Energy costs:**

The mini cement plant can be realised only if the new type of kiln achieves a heat-consumption of approximately 770 Kcal/Kg. of clinker.
Transport cost being saved:

In the process of marketing the homogenous mass product cement the transportation of which is very costly, the location of the plant is of primary importance.

The majority may not be merry, but minority may be merry and feasible as well because "small is beautiful" as Schumachar says, but, we can conveniently append to his words as 'small is beautiful, innovative and is socio-economically feasible'.
REFERENCES

1 Bharne, D.S., "Mini Cement Plants - Its Economic Viability, National Seminar on MCPs, 1982, CRI, New Delhi, 1982, p.82.
