CHAPTER I

INTRODUCTION AND DESIGN OF THE STUDY

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1.1 INTRODUCTION

Cement Industry is one of the key industries in India. It plays a dominant role in the national economy. From the point of view of economic development of the country, Cement Industry ranks second immediately after Iron and Steel industry. Cement is indispensable in construction works and the production and the consumption of cement to a large extent indicate a country's progress.

India is the seventh largest cement producing country in the world. Cement Industry gives employment to 90,000 persons in the country. It contributes about Rs. 50 crores per annum to the national exchequer by way of taxes and more than Rs. 30 crores to Indian Railways by way of freight. If given due attention, the industry may earn good amount of foreign exchange by brightening export possibilities and curtailing huge amount of cement import.
The history of cement making in India dates back to the year 1914 when Indian cement Limited was established at Porbandar. The First World War gave impetus to the industry. Seven cement factories came into existence between 1919 to 1924. By the year 1924, the number of cement factories rose to ten with a production capacity of 5.59 lakh tons. In 1929 Indian Manufacturers Association was established to end the competition among cement manufacturers. In 1930, the Cement Marketing Company of India was established and the distribution of cement through quota system was also introduced. During the inter-war period, the industry made a remarkable progress. The most important feature of the industry was the establishment of Associated Cement Company Limited (ACC) in the year 1936. The first state enterprise in Cement Industry was started at Bhadrawati in Mysore in the year 1938. There were 18 cement producing units at the time of partition of the country.¹

At the beginning of the First Plan, there were 21 cement factories and the production was 27.3 lakh tons. At the end of the Second Plan the number of cement factories rose to 34 with an actual production of 97.7 lakh tons. At the end of the Third Plan there were 38 cement factories with a production capacity of 126 lakh tons. On January 18, 1955, the government set up the Cement Corporation of India. In the Fourth Plan, the target was fixed at 180 lakh tons of cement
production while the actual production was only 147 lakh tons. In the year 1974, the number of cement units rose to 54. In the Fifth Plan the target of installed capacity was fixed at 250 lakh tons. The actual production was only 192 lakh tons. In the year 1977-78 the number of mills rose to 56 with a production capacity of 225 lakh tons. For the Sixth Plan (1980-85) the production target has been fixed at 340 lakh tons and an outlay of Rs. 421 crores had been provided for the development of the industry. By the end of Seventh Plan the production level is expected to reach 62 million tons.  

To get rid of the problems faced by the cement industry many institutions were set up. The most important one is the Cement Research Institute of India (CRI). It has been redesignated as National Council for Cement and Building Materials (NCB) with effect from 1st April 1985. The following are the objectives towards which NCB is directing its activities.

i. Industrial Information

ii. Manpower Development

iii. Consumer Protection and Rational Utilisation

iv. Environmental Improvement

v. Productivity Enhancement and Modernisation

vi. Calibration, Testing and Quality Control

vii. Project Evaluation, Systems Design and Engineering

Thus NCB is striving for the implementation and achievement of the above objectives. We can very well understand the relevance of environmental protection on seeing the importance given to it by NCB. Cement Industry is an inherent contributor to the environmental degradation by way of dust emission. Environmental awareness is being felt by the world at large and so each and every industry is showing or compelled to show interest in the preservation of environment and natural wealth.

The share of Cement Industry in polluting the environment is less when compared to other industries like Chemicals, Fertilizers and smoke from Automobiles.

In Cement Industry the main source of pollution is dust emitted during the process of manufacture of cement. Dust is generated when the raw materials are crushed into powdered form and also during clinkerisation, cement grinding and packing. The dust generated is vented out through the tall chimneys of the factory and it settles down in the surrounding areas. The dust is also causing nuisance to the workers and the staff. The workers engaged in cement grinding and packing are highly exposed to dust.

The cement dust is a nuisance to the residents nearby the factory. During windy seasons, they have to sweep their houses frequently. The vegetation around the houses look grey.
The durability of clothes of the workers are also affected. Moreover, cement dust affects the farming operations. It has the effect of changing the nature of the soil. Certain crops are unsuitable which are previously grown in the area. The ploughing operation becomes difficult due to the cement dust settling on the land.

Now-a-days, cement industry is giving due importance to environment and has come forward to instal many equipments which will reduce the dust emission. The Electrostatic Precipitators, Bag filters and Cyclone separators are being installed in the cement factories. The need for growing plants around the factory is felt and huge investment is being made in this. The plants act as filter media. They collect the dust fall from the factory thus reducing the dust emission from spreading. The present legislation has compelled the cement factories to instal the dust arresting equipments. The Pollution Control Board has paid visits to the factories and check whether the dust emission is well within the standard or not.

A study on the environmental impact of Madras Cements Limited at Ramasamy Raja Nagar, Kamarajar District which is regarded as one of the technologically advanced cement factory in Tamil Nadu, will highlight the effect of cement dust emission on the ecosystem. The findings of the study will give environmental
awareness to the public and will highlight the commitment of Madras Cements Limited to protect the environment.

1.2 STATEMENT OF THE PROBLEM

Environmental pollution is assuming dangerous proportions throughout the globe and India is not free from the disastrous effect of pollution. Studies have revealed that our lakes and rivers are polluted far beyond the permitted limit. Even the mighty Ganga in the North and the Cauvery in the South are so heavily polluted that they have become a menace to aquatic life and human population. Air Pollution, apart from becoming a threat to human health is threatening to damage almost all our valuable national wealth.

This may be the outcome of Modern living, Industrialisation and Urbanisation. A recent survey reveals that everyday millions of gallons of industrial wastes and effluents are discharged into the rivers, streams, lakes and sea. This is found particularly in densely populated industrial cities. As far as air pollution is concerned, it is caused mainly by the industrial emission, transport emission, meteorological conditions, etc.

The industrial sector depends upon the constantly advancing technology. Such technology often results in the generation of more wastes which may be hazardous to human health and
adversely affect the ecosystem. It has also been said that industries are the major villain in environmental pollution followed by the transport sector.

Cement Industry is also contributing towards air pollution by way of dust and particulate emission. The deposition of cement dust on the plants prevents sunlight on the leaves which is very much essential for the growth. The collection of cement dust on the agricultural lands after a long period may change the nature of the soil and may make it unsuitable for certain crop cultivation. It will in the long-run affect the agricultural income. Moreover, exposure to dust emission will cause lung cancer, emphysema and other chronic respiratory diseases in human beings. Further the shower of cement dust causes a lot of nuisance to living conditions. People have to sweep their houses frequently, keep their belongings in closed shelves, find a safe place to dry the washed clothes and preserve drinking water from dust pollution.

The impact of cement industry on the environment is studied with reference to Madras Cements Limited. Madras Cements Limited, in its existence over 25 years is operating efficiently and has been giving due care and consideration to the well-being of its workers. Its commitment to social obligation can very well be understood on seeing the installations it has made
to combat air pollution caused by it. The environmental impact of Madras Cements Limited has been assessed by finding out an accurate answer to the following questions.

i. What is the impact of Madras Cements Limited on the farming operations in the nearby villages?

ii. What is the impact of Madras Cements Limited on the living conditions of the people?

By arriving at an answer to the above two questions, the impact of cement industry on the environment can be known and the steps to be taken by the industries concerned may also be brought to the limelight.

1.3 REVIEW OF PREVIOUS STUDIES

This study is the first of its kind. No study on this topic has been undertaken so far. As far as the cement industry is concerned, the major impact on the environment is Air Pollution. So studies concerned with air pollution are reviewed by the researcher.

Air pollution study in India was first conducted in Calcutta (1955-59) by Chakraborty and Rao (1962).

Bhabha Atomic Research Centre carried out a survey in Chembur and Trombay areas, where the existence of Sulphur-di-oxide and Oxidates in the atmosphere was established.
Air pollution and illness were the areas taken up for research by Waller and Lawther in 1957 (Macabe, 1972). Burn and Pomberton (1963) studied the incidence of chronic bronchitics and lung cancer in Salford, England, a city with extremely high smoke pollution (Macabe 1972).

The air quality studies were carried out in India by NEERI during 1968-69 in some major cities (Agarwal, 1983). Reports on air pollution in industrial areas are available in the following documents. (Sindri 1983, Patherdih and Dugdha, 1983).

A study of the impact of thermal power station on the ambient air quality of Tuticorin carried out by A. Palanichamy brings out the pollution load from the Power Station and also the ambient air quality in Tuticorin area.

Pollution Control Handbook 1986, edited by P.L. Diwakar Rao, furnishes details regarding environmental degradation and pollution control, pollution through major industries, pollution control technology and catalysts in pollution control and environmental protection. Having this as a basis the researcher has proceeded her work.

1.4 SCOPE OF THE STUDY

This study has been undertaken to find out how the dust and flue gases emitted from the chimneys of the cement factory pollutes the environment. The environmental impact of cement
industry has been assessed from the point of view of the agriculturists and residents nearby.

The study also deals in general with the various types of pollution, their sources and their effect on the environment. The nature of pollution generated by the Madras Cements Limited and the measures taken by the management to combat pollution has also been covered, under this study.

1.5 OBJECTIVES OF THE STUDY

This study has been carried out with the following objectives.

i. To give a general framework of various types of environmental pollution, the sources of pollution and their effects on people, plants and animals.

ii. To study the growth profile of Madras Cements Limited in terms of certain factors like production, sales, fixed assets, profit and the like.

iii. To study the safeguards provided by Madras Cements Limited to bring down its impact on the environment.

iv. To study the impact of fumes and dust from the case unit on the living conditions of the public.

v. To find out the impact of fumes and dust from the Madras Cements Limited on the farming operations.

vi. To enumerate the summary of findings and the possible steps to bring down the effect of emissions from the cement factory on the environment.
1.6 HYPOTHESES

The study is based on the following hypotheses

i. The age of the respondents has significant association with the level of impact

ii. The marital status of the respondents has a significant contribution to the level of impact

iii. The size of the family of the residents has significant association with the impact level

iv. The educational qualification is another factor having a significant contribution to the impact level

v. The occupation of the respondents has a significant contribution to the level of impact

1.7 OPERATIONAL DEFINITION OF CONCEPTS

1.7.1 Environment

Environment includes water, air, land and the inter-relationship between them and the human beings, animals, plants, micro-organism and property

1.7.2 Environmental Impact Assessment

Environmental impact assessment is the analysis of the possible alterations in environmental conditions which may be adverse or beneficial caused by the actions under consideration.

1.7.3 ESP

ESP is the abbreviation of the term Electrostatic Precipitator. It may be defined as an apparatus or device which utilizes electric force to separate suspended particles from
gases. It is the widely-used modern equipment to control dust emission.

1.7.4 Bag Filters

Filter bags made up of special type of cloth is used to collect the dust emitted at various operations. The dust collected in the bags are removed by applying low pressure air in a reverse direction through the bags or by the use of short duration high pressure reverse air jets.

1.7.5 Ear Plugs

Ear plug is a small device which protects the workers from exposure to noise.

1.7.6 Farming Operations

Farming operations include ploughing, manuring, irrigation etc.,

1.7.7 Workers

Workers are the persons employed in the factory and the persons working inside the factory premises on contract basis.

1.7.8 Officers

The term officers include those persons other than the labourers working inside the office premises of Madras Cements Limited.
1.7.9 Residents

Residents denote the persons living in the quarters constructed by the cement factory, people living in the nearby villages and persons carrying on small business activities in the vicinity of the Madras Cements Limited.

1.8 METHODOLOGY AND TOOLS

Data relating to the growth of Madras Cements Limited are collected from the books and records maintained in the office and also through primary data.

Data concerning the measures taken by Madras Cements Limited to have dust control, has been collected through an interview with the Works Manager.

Data regarding the impact of dust generated by the cement factory on the living conditions of the public and the farming operations are gathered through the interview schedule.

1.9 SAMPLING DESIGN

In this study an attempt has been made to know the impact of dust emission from the cement factory on the living conditions of the public and also to observe the impact of cement dust on the farming operations.

To know the impact of cement dust on the living conditions of the public 40 workers of Madras Cements Limited who are
around the factory premises at Ramasamy Raja Nagar has been selected. Among the 40 respondents 5 are Officers, 5 are staffs and the remaining 20 are workers.

To study the impact of cement dust on farming operations, data were collected from the farmers with the help of an interview schedule (Appendix B). Villages which are situated within 3 kilometers in and around the factory premises have been chosen such as for conducting the survey. Since villages/Thulukkapatti, Ethilappanayakanpatti and Karuppanasarpatti are located near the factory and the farmers of these villages are known to the researcher, the three villages stated above have been selected for the study. Fifteen farmers each from Thulukkapatti and Ethilappanayakanpatti and ten farmers from Karuppanasarpatti have been selected as per the convenience of the researcher.

1.10 GEOGRAPHICAL COVERAGE

The study covers the area of Ramasamy Raja Nagar and the villages situated within 3 kilometers from the factory premises.

1.11 COVERAGE OF PERIOD

The growth profile of the organisation has been assessed by taking into account its gradual growth over 5 years from 1981-1985. The impact of cement dust on farming operations has been found out by comparing the agricultural activities before the commencement of the cement factory and the farming operations at present.
1.12 FIELD WORK AND COLLECTION OF DATA

The field work has been undertaken by the researcher herself. It was carried on from February 1987 to March 1987.

The researcher has used interview schedule for collecting information regarding the impact of cement dust on the living conditions of the public (vide Appendix A).

For collecting data from the farmers with regard to the impact of cement dust on the farming operations an interview schedule has been used. (Vide appendix B)

1.13 DATA PROCESSING

After completing the schedules, a thorough check up of the data has been made. The missing data were collected by revisits. The editing of the data was done later. For the purpose of analysis, the data were transcribed on transcription cards.

1.14 MEASUREMENT OF VARIABLES AND CONSTRUCTION OF SCALE

The main purpose of the study is to highlight the environmental impact of Madras Cements Limited.

At the time of analysis carried out to study the existence of impact of cement dust on the living conditions of the public, certain statistical methods such as chi-square test and t-test have been used. With a view to apply the above tests, a scale
has been used for measuring the variables. There are two types of variables in the study—dependent and independent variables.

The dependent variable of the study is the "Environmental Impact". This has been measured through a scale namely "Impact scale". The scale has been constructed with the help of eighteen components such as frequency in sweeping, need for closed almirah, difficulty in the drying process of clothes, decrease in the durability of clothes, increase in the consumption of soap, difficulty in washing process, effect of dust on drinking water, increase in maintenance expenditure, distant situation of residence, increase in conveyance expenditure, frequent exposure to disease, nature of disease, increase in medical expenditure, decrease in the capacity of workers, stress in the peaceful atmosphere of the house, change in the nature of the soil, effect on plant growth and reduction in yield (vide Appendix C).

The independent variables which influence the dependent variable are as follows.  

i. Age of the residents  
ii. Marital status of the residents  
iii. Size of the family  
iv. Educational qualification of the residents  
v. Occupation of the residents
The impact of cement dust on the farming operation has been measured with another impact scale, constructed with fourteen components such as reduction in the fertility of the soil, change in the nature of the soil, fall in crop-yield, reduction in the quality of yield, reduction the area of cultivation, sale of land, increase in cost of cultivation, dust impact on pumpsets, dust impact on cattle-breeding, change in the pattern of manure, reduction in agricultural income, low standard of living and difficult ploughing operation.

1.15 FRAMEWORK OF ANALYSIS

First, the extent of impact on the living conditions of the public has been measured through the scale namely "Impact scale" constructed on the basis of eighteen components given in (Appendix C). These eighteen components have been qualified with the help of a scoring scheme (Appendix C).

Secondly, five factors promoting the impact level have been catagorised. The influence of independent variables (factors) on dependent variables (components) has been analysed with the help of t-test and chi-square test.

The extent of impact of dust emission on the farming operation has been measured through fourteen components given in Appendix D. The contribution of each component to the impact level has been measured by framing a scoring scheme.
based on the significance of each component. The method of applying total scores has been adopted to see which component is contributing much to the impact level.

1.16 SCHEME OF REPORT

The dissertation consists of seven chapters;

The first chapter deals with introduction and design of the study. In this chapter various components such as introduction, statement of the problem, review of literature, scope of the study, objectives of the study, hypotheses, operational definition of concepts, methodology and tools, construction of tools, sampling design, geographical coverage, coverage of period, field work and collection of data, data processing, measurement of variables, construction of scales, framework of analysis and the scheme of report are included.

The second chapter discusses the various types of pollution and their environmental impact. A detailed discussion on various issues connected with air, water and noise pollution, environmental impact assessment and fiscal incentives given by the government to combat pollution have been dealt with.

The third chapter gives the growth profile of the case unit from the date of inception in terms of some variables like production, sales, personnel, fixed assets, working capital and networth.
The fourth chapter explains the environmental safeguards provided by Madras Cements Limited. In this chapter, an attempt has been made to give the details of the installations made to reduce the ill-effects of the emission from the factory and the commitment of the case unit towards clean environment.

The fifth chapter analyses the environmental impact of cement factory on the living conditions of the public.

The sixth chapter deals with the environmental impact of cement industry on the farming operations.

The final chapter discusses the summary of findings and suggestions for keeping the environment clean and tidy.

REFERENCES

1. Dr. V.K. Agarwal, "Indian Cement Industries Problems and Products" Indian Journal of Marketing, Vol.XV. No.1. 1984, p.21

2. Ibid., pp. 22-23