Chapter – V

SUMMARY OF FINDINGS, SUGGESTIONS AND CONCLUSION

Introduction

This study was undertaken to study the types of pollution caused by the growth of cement industries and its impact on the living conditions of the public and on the farming operations. The researcher analysed a sample of two blocks, namely, Ariyalur and Sendurai. The selected sample of Ariyalur block is a polluted area and Sendurai is an unpolluted area and 300 respondents were interviewed.

This chapter deals with the analysis and interpretation of the data collected. The interpretations were made from the data analysed, using statistical techniques. An attempt was made to present the analysed data through tables and figures. Statistical techniques were applied to analyse to test the research hypotheses of the present study.

Data were collected to study socio-economic profile such as the age, sex, marital status, education qualification, community, family status, religion, family occupation and income, etc., of the respondents and the extent of impact of cement industries on agriculture, on fertility of soil, quantity and quality of the output, land suitable for cultivation, cost of cultivation, agriculture income, and standard of living and etc., The data obtained, during the study, were tabulated, analyzed and interpreted, with the help of statistical tools like standard deviation, correlation co-efficient, t- test, F-test, chi-square test and weighted means analysis.
FINDINGS OF THE STUDY

The results of the analysis, already presented in respective chapters, are summarized as below.

- The new Ariyalur district started functioning from 23. 11. 2007, as the 31st district of Tamil Nadu.

- The total population of Ariyalur district is 752481. Out of the total, 51 percent (379162) of the population were females and 49 percent (373319) of the population were male population. Ariyalur district’s gender ratio has been nearly equal.

- Nearly 85 percent of the total population (11.4 lakhs) lives in villages and 15 percent (2.1 lakhs) lives in urban areas in Ariyalur district.

- The administrative units of Ariyalur district are 15 firkas, 195 revenue villages, 2 municipalities, 2 town panchayats and 201 village panchayats and Ariyalur, Andimadam and Jayankondam are assembly constituencies of Ariyalur district.

- In Ariyalur district, villages mainly depend upon agriculture and allied activities. The total cultivated area was 115121 hectares and the net area sown was 107608 hectares, in the period 2010-11.

- The major food crops of the district are Paddy, Coriander, Maize, Jowar, Varagu, Cumbu, Sugarcane, Mango, Lime, Tapioca, Pulses and Chillies. The non-food crops of the district are Cashenut, Cotton, Groundnut and Gingelly.

- The total agriculture production of Ariyalur district, in 2008-09, was 1866341 metric tonnes and in 2013-14, it was 645349 metric tonnes. It is
evident that the Ariyalur district was steadily declining due to industrialisation and land acquisition by real estate business.

➤ The District Industries Centre (DIC) of Ariyalur district, under the Ministry of MSME, Government of India, reported that the total number of industrial units of the district was 5265 and registered industrial units was 2145.

➤ Ariyalur district is rich in mineral deposits. Celeste, Lime Stone, Shale, Sand Stone, Canker and Phosphate nodules occur at various places in the district. Jayamkondam in Udayarpalayam Taluk is rich in Lignite, Oil and Gas reserves. The pre-dominant soil in the district is red sand, with scattered packets of black soil.

➤ There are 55 limestone mining leases, granted in Ariyalur district, in favour of M/s. Tamil Nadu Cements Limited, Tamil Nadu Minerals Limited, M/S. Madras Cements Ltd., M/s. India Cements Limited, M/s. Grasim Cements, M/s. Dalmia Cements (Bharat) Limited, and M/s. Chettinad Cements limited. Six major cement plants, five in private sectors and one in public sector, exploit the limestone deposits in the district.

➤ India is the second largest cement producer in the world, after China. The cement industry comprises of 130 large cement plants and more than 300 mini cement plants.

➤ India exported about 3.61 million tonnes cement valued at 955 crores (including 1.14 million tonnes of clinker and 0.17 million tonnes of white cement) in 2010-11 to Nepal, Sri Lanka, Iraq, UAE, Maldives, Egypt etc.
In 2010-11, the annual installed capacity of large cement plants went up by 19.71 million tpy, by making 290.48 million tpy from 270.77 million tpy in 2009-10.

Production of cement by large plants also rose to an estimated 210.28 million tonnes, from 200.95 million tonnes in 2009-10. The production from mini and white cement plants was estimated at 6 million tonnes in 2010-11.

Cement industry has contributed around 8 percent to the economic development of India. The cement sector is expected to witness growth in line with the economic growth because of the strong correlation with GDP.

Cement industry is one of the 17 most pollutant industries, listed by the Central Pollution Control Board (CPCB).

The typical gaseous emissions to air, from cement manufacturing plants, include nitrogen oxide (NOx), sulphur dioxide (SO2), carbon oxides (CO & CO2) and dust.

**Socio-Economic Profile of Respondents**

Age of the respondents was classified into groups. 39 percent of the respondents belonged to the age group of 36-40 years and 27 percent of the respondents belonged to the age group of 41-45 years old. 19.7 percent of the respondents belonged to the age group of upto 35 years. Remaining 8.6 percent and 5.7 percent were classified under 46 – 50 and above 51 years respectively.
The gender distribution of the respondents was that male respondents comprised of 77 percent of males compared to 23 percent of female respondents.

Out of 300 sample respondents, under study, in Ariyalur district, 196 respondents (65%) were from Backward Community, followed by 41 respondents (14%) from Most Backward Community, 57 respondents (19%) from SC/ST, and the rest (2%) from Forward Community and Other Community. In short, Backward Community dominated the sample.

In India, joint family system is slowly being replaced by nuclear family system. It is evident that out of 300 families, 231 respondents (77%) were under the nuclear family system and 69 respondents (23%) were under the joint family system.

58 percent of the sample respondents were from a family consisting of members 4 – 6 and 16 percent of the respondents were from size 7 – 9. Remaining 15 percent and 11 percent of respondents family were from size respectively below 3 members and above 10 members respectively.

Educational qualification and professional education are helpful in running the agriculture performance. The majority (33 percent) of respondents had reached only the primary level. 47 percent of the respondents had studied at high school and higher secondary level. Only 10 percent of the respondents recorded good educational qualification at the degree or technical level. Ten percent of the respondents were illiterate in the present study.
32 percent of the respondents were wage labourers in Ariyalur district. Those who were in Government service and private companies were 18 percent. Only 8 percent of respondents belonged to business background.

Income plays a significant role in the life of an individual. It is evidenced that 34 percent of the respondents earned between Rs. 5001 – 10,000 per month. 27 percent of the respondents earned a monthly income below Rs. 5000, 22 percent and 13 percent of respondents earned a monthly income of Rs. 10,001 – 15,000 and Rs. 15,001 – 20,000 respectively. Only 4 percent of respondents recorded an income above 20,001 per month.

The macro economic analysis insists on today’s savings being tomorrow’s investment. Majority (41.3 percent) of respondents used banks as a source of savings. 19.7 percent of respondents reported no saving from any sources and 19.4 percent of respondents saved through financial institutions and Self Help Groups. 10.3 percent of the respondents used the post office and 6 percent of respondents saved through local chit-funds.

The respondents borrowed from local banks and SHGs. In short, banks (64) and SHGs (97) were the main borrowing sources in the study areas.

**Association between Socio-Economic Profile Variables and Agricultural Yield**

The chi-square test was applied to find out whether there was any association between socio-economic profile and the agricultural yield. The chi-square value was greater than the table value except for community, family status and family size. Hence the null hypothesis is rejected at 5% level of significance. The researcher concludes that socio-economic profiles are important to determine the support for any forming operations, which any farmer
gets from the family. Such support influenced the growth of agriculture yield in Ariyalur district.

**Landholding Pattern**

- Majority (57 percent) of respondents owned land in polluted areas and 52 percent of owned land in the study areas. 5 percent of owned land and 6 percent of owned land leased in polluted and unpolluted areas respectively. The major part of areas leased out were 12 percent in polluted areas and only 2 percent in unpolluted areas. Remaining, the total operated areas were 14 percent of acres in polluted areas.

**Selection of Study Area**

- Out of 300 respondents, 200 respondents were selected from cement industry - polluted area in the Ariyalur block and 100 respondents of sample households were selected from unpolluted areas in the Sendurai block.

**Crops Cultivation in the study area**

- Paddy was cultivated in 313 acres in polluted and unpolluted areas. The second major crop was sugarcane (182 acres), followed by sunflower (168 acres) in polluted and unpolluted areas. Flowers, cotton, pulses, chillies and gingelly were cultivated in less than 50 acres in both polluted and unpolluted areas.

**Number of Livestock**

- Livestock population of Ariyalur district, were numbers of 90 livestock in polluted areas and number of 516 livestock in unpolluted areas. The number of livestock population high in unpolluted areas to comparatively polluted areas. For the reason that the various diseases such as respiratory system, these causes lungs cough and phlegm production, chest tightness,
lung cancer, create many breathing problems, mucosal inflammation, loss of tooth surface, periodontal diseases, dental caries, dental abrasion, liver diffuse and etc.,

**Category of Cement Industrial Pollution and Agricultural Yield**

The Z - Test was applied to find out whether there was any relationship between mean of category of cement industrial pollution and agricultural yield in the sample. Calculated F - ratio was 8.533, which was higher than the table value of 5.621 at 1% level of significance. Calculated value was higher than the table value. Hence the hypothesis is rejected. The researcher concluded that there was significant difference between category of cement industrial pollution and agricultural yield.

**Growth of Cement Industries**

Majority (53 percent) of respondents agreed on the fast growth of cement industries in Ariyalur district and 38 percent of respondents opined that cement industries registered normal growth. Only nine percent of respondents believed that there was no growth of cement industries in the study area.

**Cement Industries provided better Employment in Your Family**

Majority (62 percent) of respondents believed that cement industries provided better employment opportunities while 38 percent of respondents felt that cement industries did not provide employment opportunities in the study area.

**Nature of the Work in Cement Industries**

Out of 300 respondents, 219 respondents worked as unskilled labourers in the cement industries and 34 respondents were doing supervisory work in the cement plant. Rest (38 respondents) was working in other category
like office assistant, driver, watchman, etc. Surprisingly, nine respondents performed professional work like technical work and managerial work.

**Correlation between Educational Qualification and Nature of Work in the Cement Industries**

Correlation and Fisher’s ‘F’ Test were applied to find out whether there was any relationship between the educational qualification and the professional work. The correlation coefficient indicated a negative relationship and the calculated ‘F’- value was 6.348, which was less than the table value of 5.826, at 5% level of significance. In other words, there was no relationship between the educational qualification and professional work. The researcher found that most of the cement industries required suitable educational qualification for any professional work.

**Assess the Level of Impact of Cement Industries on the Agricultural Operations**

Out of 300 respondents, 150 respondents were get 50 score for medium growth and 75 respondents were get 25 score for low growth level and high growth level of impact on cement industries respectively.

**Relationship between growth of cement industry and fall in the crop yield**

ANOVA was applied to find out whether there was any significant difference between the growth of cement industry and the fall in the crop yield. Calculated F - ratio value was 6.765, which was higher than the table value of 3.853, at 1% level of significance. Since the calculated value was higher than the table value, the hypothesis is rejected. There was significant relationship between the growth of cement industry and the fall in the crop yield. It is found that growth of cement industries,
resulted in more emission of dust, fly ash and etc. When the particulate matter from the cement factory, deposited on the yield, the hot dust burn up the leaves. Moreover, the holes on the surface of the leaves are blocked up by the dust. Due to this, the plant is not able to take up sunlight which is essential to the process of photosynthesis, which, in turn, results in the reduction of yield.

**Correlation between Growth of Cement Industries and Low Quality of Yield**

- Majority (61.34%) of respondents (184) agreed while 79 (26.33%) respondents strongly agreed and 37 (12.33%) persons disagreed that the cement dust emission affected the quality of crops and yield. A vast majority of respondents opined that cement industry dust caused the low quality of yield.
- ANOVA was applied to find out whether there was any significant difference among the growth of cement industry and low quality of yield. Calculated F - ratio value was 5.735, which was higher than the table value of 4.223, at 1% level of significance. Since the calculated value was higher than the table value, the hypothesis is rejected. There was significant relationship between the growth of cement industry and low quality of yield. It is found that growth of cement emission negatively affected the soil quality, and this in turn reduced the quality of yield.

**Expansion of Cement Industry and Acquisition of agriculture land**

- Majority (77 percent) of respondents from polluted area and 63 percent of the respondents from unpolluted area affirmed that the cement industries encroached the agricultural land. Only 23 percent of respondent from polluted area and 37 percent of respondents from unpolluted area said that the cement industries did not occupy the agricultural land.
The Chi-Square Test was applied to find out whether there was any association between growth of cement industries and acquisition of agriculture land. The calculated value of chi-square was 13.507, which was higher than the table value of 17.643 at 1% level of significance. Hence the hypothesis is rejected. There was association between the growth of cement industries and acquisition of agriculture land. The researcher found that there was continuous growth of cement industrial production and it led to more acquisition of agricultural land in Ariyalur district.

Opinion of the respondents regarding Dust Impact on Irrigation Water

Out of 300 respondents, 98 (32%) respondents strongly agreed and 78 (26%) respondents agreed and 125 (42%) respondents disagreed that the dust emission affected the operation of the irrigation water.

Significant Difference between Growth of Cement Industries and Various Problems of Agriculture

The ‘F’ Test was used to find the significant difference between growth of cement industries and various problems of agriculture in Ariyalur district. Hence the Null Hypothesis where there is no significant difference between growth of cement industries and various problems of agriculture in the study area. The correlation coefficient and ‘F’ statistic were calculated for the overall problems of variables in the polluted areas. The result of ‘F’ Test value was less than the table value of the table. Hence the null hypothesis is accepted at 5% level of significance. There is no significant difference between growth of cement industries and various problems of agriculture in Ariyalur district.
Respondents based on Health Problem of Cement

Majority (47 percent) of the respondents felt that due to the impact of cement dust, there was damage to plant and vegetables. Rest (35 percent) of the respondents recorded human health problems such as skin cancer, respiratory problem and lungs problem, due to cement industry emissions in Ariyalur district. Remaining 18 percent of the respondents were aware of respiratory problems and stomach problems of animals.

POLICY RECOMMENDATIONS

For further development of agriculture farming in Ariyalur district, the following suggestions are made.

- The Pollution Control Board must be stringent in enforcing the installation of pollution abatement machineries. It should not discriminate between public and private sector. Permission to start a cement plant, in a particular locality, must be given after examining the adequacy of provision made to combat pollution.

- Central and State Governments should provide subsidies and incentives to cement industries for taking up pollution reduction activities.

- The Government should provide pollution-resistant crops to the farmers in pollution-affected areas in the Ariyalur district.

- Government and private institutions should be given environmental education training in Ariyalur district.

- In pollution affected areas the Central and State Government should create training on Entrepreneurship Development Programme (EDP) under the District Industries Centre (DIC).
Government should introduce medical research on human and animal beings in pollution affected areas.

The Central and State governments should provide high compensation for the farmers in the pollution-affected areas.

The polluting cement industries should assume Corporate Social Responsibility (CSR) and pay damages to the farmers in the Ariyalur district.

The Central and State (Prevention and Control of Pollution) Boards should include members from private sector also. The private sector has experience and expertise, in drawing up practicable measures, to bring down environmental degradation. It is imperative that private sector must be associated in the formulation of environmental protection, norms and standards. Hence they must be given membership in the pollution control boards.

Industries must have a Safety Engineer and Industrial Engineer. Environment Protection Department must be established in each unit and environment specialists must be employed.

**CONCLUSION**

Agriculture is the most predominant sector of the economy in India. 70 percent of the population is engaged in agriculture and allied activities for their livelihood. Environment is a major issue which confronts industry and business in today’s world on daily basis. In modern civilization era, the growths of different industrial activities are degrading various environmental components like water, air, soil and vegetation. Cement industry is one of the 17 most polluting industries listed by the central pollution control board. Air pollution of
cement dust causes numerous hazards to the biotic environment, which have adverse effects and toxicological risks for vegetation, animal, health and ecosystems.

The researcher has come to the conclusion from the above findings that in Ariyalur district, almost all the farming households are much affected by this cement industrial air pollution and they are highly dissatisfied with this. They are not able to prevent the air pollution. But at the same time some of the people are being much benefited through these industries, because they get employment and hospital and school facilities. Though it is difficult to control the air pollution, these industries have taken various steps to control it. Most of the households are very much aware of the pollution, and they are taking care of their land, livestock and other wealth and health. Only air pollution is the major problem in the agricultural area. The cement dust- fly ash easily spreads in the air. So the nearby households are always breathing the polluted air and their fields and cattle are very much affected. The cement industries have taken many steps to control the air pollution. But the agricultural land area and production of crops go on decreasing.