CHAPTER IV
RESEARCH METHODOLOGY

In this chapter, the research methodology used for the present study has been explained. The methodology used was designed to fulfil the objectives of the study, as enumerated in this section.

The data collection procedure explains the universe of the study, the sampling frame, the sampling units, the sample size and the sampling procedure. The type of data used and the sources of data, both primary and secondary, have been explained. The research instruments used, viz. the questionnaires and interviews, have been explained after detailing the sources of data. The analysis of data has been done in Chapter V of the study.

Objectives of the Study

The objectives of the study are:

- To study the existing marketing strategies of the Indian Railways with reference to the transportation of cement.
- To determine and analyse the reasons for the fall in the share of cement traffic moving by rail over the past few years.
- To suggest the marketing strategies needed by the Indian Railways to improve their share in cement transportation.

4.1 Data Collection Procedure

The universe of study consists of all the cement-manufacturing units in the country. There were a total of 489 cement plants in the country as on 31st March 2002. These include 124 large cement plants, having an annual manufacturing capacity of 135.03 million tonnes. There were 365 mini cement plants also in addition to the large cement plants. The mini plants produced a total of four million tonnes in the year 2002 against an installed capacity of 11.10 million tonnes. The large cement plants produced 102.4 million tones in the year 2002 (Kamal Kishore 2002).
Sampling Frame

The mini cement plants produce less than four percent of the cement in the country. The cement thus produced is absorbed or utilised in the areas, which are close to the cement-manufacturing units. The movement of this quantity, of about 4 million tonnes, is only by road and there is little possibility of moving this traffic by rail.

Thus, our sampling frame consists of 124 large cement plants, as on 31st March, 2002. These cement plants transport cement using railways, roadways or waterways as modes of transport.

The sampling unit is a cement plant. It can be any one of the cement units in the sampling frame described above.

Sample Size

The optimum size of the sample has to fulfill the requirements of efficiency, representativeness, reliability and flexibility. The system of sampling has also to determine the desired precision as also the acceptable confidence level for the system. The magnitude of population variance also needs to be considered because, if the variance is large, a bigger sample would be required. The parameters of interest in the study have also to be kept in view while deciding the size of the sample.

Keeping the above guidelines in view, a sample size of 20 percent was selected. Thus 29 cement plants were selected out of a total of 124 large cement plants for the collection of data.

Sampling Procedure

Probability sampling method with restricted sampling as the element selection technique has been employed. Area sampling method was used as the cement manufacturing units form a number of geographic clusters in the country. The clusters of cement plants are in the following states:

- Andhra Pradesh: 21 Plants
- Rajasthan: 14 Plants
- Tamil Nadu: 13 Plants
- Gujarat: 10 Plants
- Madhya Pradesh: 10 Plants
An effort has been made to get samples from each State having a sizable number of cement manufacturing units located in it. While it was essential to draw samples from these States, the necessity of getting samples from the other States was also kept in mind so that the all India character of the study is maintained. Thus, samples have also been collected from plants situated in West Bengal, Bihar and Orissa to reduce the element of bias.

Data Collection

The data used for this study have quantitative as well as qualitative dimensions. To collect the relevant data, both primary as well as secondary sources have been utilised.

Primary Sources

The sources of primary data are the cement plants, the cement customers and members of the trade and industry.

Secondary Sources

Data from the secondary sources supplement the primary data relating to the manufacture and dispatch of cement by road/rail/waterways.

Secondary data have been collected from the publications of the Cement Manufacturers' Association, the origin-destination analysis done by the LRDSS (Long Range Decision Support System) and Statistical Directorates of the Railway Board. The studies conducted by the Ministry of Railways, either directly or through consultants like Rail India Technical and Economic Services (RITES) and A.F. Ferguson and Co. and other similar studies have also been used as sources of secondary data.

Research Instruments for Collection of Primary Data

The research instruments, used for the collection of primary data, are:

- Structured Questionnaire
- Interviews / Schedules
- Seminars

Structured Questionnaire

This has two types of dimensions; the qualitative and the quantitative dimensions. This was sent to all the large cement plants in the country. The
questionnaire was also given to some of the stockists, agents, liaison officers and Advisers of the cement companies. These included some retired railway officers also who are now working as consultants or Advisers to one or more of the cement companies.

**Personal Interviews / Schedules**

The structured questionnaire provided the data on qualitative as well as quantitative dimensions for the study. These data were obtained from the cement manufacturing units. It was also necessary to have the views of the marketing officers and transport advisers of some of the cement companies on the various problems faced by them with the existing policies and strategies of the Indian Railways. The views of some of the retired and serving railway officers were also obtained to elicit their reaction to the problems faced by the cement industry, their marketing officers and the transport advisers on the various issues. It was necessary to have an overall view of the problems faced by the cement industry in transporting the cement traffic by rail. The views also highlighted some of the reasons why the cement traffic is getting diverted to other modes of transport.

**Seminars**

In these seminars, members of the trade, industry, road transporters, marketing managers of the Container Corporation of India, the railway operating and commercial officers, and the road transporters were present. The seminars were held with a view to discuss the existing marketing strategies of the Indian Railways and also to have suggestions for evolving new strategies to improve the share of the Railways in the transport sector.

**4.2 Description of Research Instrument**

The questionnaire was divided into two parts. The first part dealt with the data on the qualitative dimensions while the second part attempted to deal with the data on quantitative dimensions from the cement manufacturers. There are five questions for obtaining data on qualitative dimensions for cement dispatches. These questions were used to obtain data for the following dimensions:

- Relative importance of various parameters of the transport mode.
- Comparative attitudes of consumers towards various facets of rail and road transport.
- Preference of consumers towards mode of transport and reasons...
• Problem areas in rail transport.
• Relative importance and priorities of the measures to improve railway freight services.

The second part of the questionnaire consists of 7 questions which were used to obtain data on quantitative dimensions from the cement plants in the country. These questions relate to the following dimensions:
• Production/dispatches of cement for the period 1990-91 to 2001-02.
• Distribution channels used by the cement companies.
• Classification of customers on the basis of monthly dispatches.
• Relative use of distribution channels for cement dispatches.
• Zonewise pattern of cement dispatches.
• Comparison of road and rail dispatches of cement for the period 1991-92 to 2000-01.
• Components of landed price for three important destinations in each zone.

Relative Importance of the Various Parameters of the Transport Mode (Q.1)

This question relates to the importance of seven parameters for the Railway's cement customers on a scale of 1 to 5, based on their importance to them. The lower end of the scale i.e. "1" refers to "least important" while the upper end of the scale i.e. "5" refers to "most important". In other words, the higher the rating given by a customer to a particular parameter, the higher is its importance to the customer and the parameters are:

i) Faster Transit Time i.e. the time taken by the transport service to reach the cement from the manufacturing point to the destination. The manufacturing end is, generally, one of the cement plants while the destination would depend on the place where the customer wants delivery of the cement. Cement can be despatched by railways to a railhead, which is close to the place where the ultimate consumer of cement would be. If roadways are used, the cement may be sent to a place where one of the following is situated
   a) Company owned Stock/Dump Yard
   b) Dealer
   c) The customer or the ultimate consumer of cement.

ii) Shipment Tracking - This means that the customer should be able to find out the whereabouts of his cement consignment after it has been dispatched from the manufacturer's premises by any mode of transport.
He should have information about the date and the time, when the consignment is going to reach him after it has been dispatched. In case, there is any delay or hold up enroute, he should know the reasons for the same along with the likely duration of the delay.

iii) Loss/Damage Enroute – This refers to the loss as well as damage that can take place during the course of transportation of cement from the originating point to the destination. Loss can take place either due to theft or due to multiple handling of cement consignments, which are bagged, at the manufacturer's premises in 50 kilograms jute or polypropylene bags. During handling, the labourers use hooks to shift the bags from the truck or the wagon to the cement godown. This results in some loss of cement every time a cement bag gets handled.

Damage enroute refers to the damage to cement during its transit. This can happen due to rain or wet if the wagon or vehicle, in which it is being carried, is leaking or if the cement bags are not properly protected by tarpaulins. Cement is hygroscopic in nature and sets quickly after it absorbs water. If it sets, it becomes useless for construction purposes and results in a net loss equal to of the quantity that has set. Loss and damage enroute have been combined in the same category as the customer gets less cement at the destination than what was dispatched for him from the loading point.

iv) Wide Reach - This term refers to the number of points, which are served by a transporter in a particular area. It also refers to the number of marketing centres of any marketer even if these are situated over a very large area. For example, the Railways have a very wide reach as they handle the freight traffic at a number of terminals, which are situated close to one another. Similarly, the roadways may have a wide reach in a particular area as they can move the road vehicles carrying cement, to the individual godowns of company stockyards or to the dealers. Thus each customer would judge the reach of a particular mode of transport depending on how well that particular mode serves his area of interest.

v) Claims Settlement - If the consignment of cement suffers some loss or damage enroute, the customer lodges a claim against the transport service provider to get compensated for the loss. The process of settlement of claims takes some time. However, in the case of railways, the time taken
is longer because of the procedure laid down for the verification and payment of claims. The claims settlement procedure by the road transporters is faster as they are, mostly, private organisations having more flexibility and take less time to settle the claims. Such claims against road transportation are not to be paid out of public money as in the case of the railways.

vi) Reliability - This term refers to the confidence that the customer has in the various modes of transport available to him. This would include the following services by the transporter.

- **Timely supply of transport** – This term refers to the supply of a road vehicle or a wagon in the case of railways or a water vessel in the case of waterways. In fact, a customer would like to have the availability of transport at a short notice.

- **Dependability** means that the customer should be able to plan a delivery schedule for the cement dispatched from the cement plant to its destination station with a fair degree of accuracy. This will also help the dealer or the stockist to plan for the minimum inventory level required to avoid stock outs.

vii) Flexibility - For cement transportation, the term flexibility refers to:

- Flexibility in dispatching cement to a large customer base located at different points. Sometimes, due to exigencies of the situation, the cement marketer may like to change the priority of dispatch to different destinations. The transport service is flexible if it permits this change to the required extent.

- Flexibility in dispatching only the desired quantity to a customer or a group of customers located at a destination. To the extent, the transport system does not allow this variation in quantity; it restricts the flexibility of the cement marketer.

*Comparative Attitudes of Consumers towards various facets of Rail and Road Transport (Q.2)*

The second question relates to the comparison of the modes of transport i.e. rail and road on the seven parameters as given in the first question. The purpose of this question is to find out the relative ranking of these parameters by the cement companies with regard to the two major modes of cement transport. Respondents were asked to rate these parameters, in respect of two mode of
transport, on a five point scale ranging from 1 to 5. 1 refers to least reliable and 5 indicates most reliable. In this question, an additional parameter on “Freight Charges” has been added for comparison between rail and road transport.

Freight Charge is the price of transporting cement from the manufacturers’ premises up to the godown of the dealer/stockist. This term includes handling and transhipment charges for cement traffic at the originating, terminating points and also at locations enroute.

Preferences of Consumers Towards Mode of Transport and Reasons (Q.3)

The third question deals with the preference of the respondent between roadways and railways if both the modes have the same freight charges for the same destination. The respondent is also expected to give reasons for preferring a particular mode of transport over the other.

Problem Areas in Rail Transport (Q.4)

The cement plants have been finding a number of areas of railway working as problematic in cement transportation. The problematic areas have been listed below:

- Taking allotments of indents/wagons on a day-to-day basis
- Flexibility in changing destinations and products.
- Not getting the right kind of wagons when required.
- No knowledge of consignments after dispatch.
- Marking wagons as sick after loading by the customer
- Wrong interpretation of rules for charging freight, so as to deny the benefit of ‘Train Load’ freight to the respondent.

The above six areas are to be rated on a scale of 1 to 5. A score of 1 of the scale is the ‘least problematic’ while a score of 5 would mean ‘highly problematic’ for the cement company / the respondent in question.

Relative Importance and Priorities of the Measures to Improve the Rail Freight Services (Q.5)

This question gives a list of eight different marketing strategies, which can be taken up by the Railways to improve their services to their customers. The respondents have been requested to give their views, separately, on the importance as well as priority, of the eight suggested strategies for the Indian Railways. The views have to be given on a five-point scale from 1 (Least Important) to 5 (Most Important). The suggested strategies are:

- Reduction in freight charges.
• Reduction in minimum quantity for dispatch.
• More number of two and three point combinations.
• Prompt claims settlement.
• Simplification of rules.
• Designing of special wagons.
• Reduction of special wagons.
• Any other (Please specify).

Quantitative Dimensions

The second part of the questionnaire was designed to collect quantitative dimensions of data on cement dispatches. The respondents are the cement manufacturers in various parts of the country. This questionnaire has seven questions. A discussion on each question follows.

Production/Dispatches of Cement and its Comparison with the Rail/Road Dispatches for Each Plant (Q.1)

The respondents were requested to give data for production and dispatches of cement for the period from 1990-91 to 2001-02. The figures of dispatches include the cement dispatched from the concerned cement plant by all modes of transport.

Distribution Channels used by the Cement Companies (Q.2)

This question deals with the type of distribution channels used by the respondents. The types of channels are:

- Company owned Stock/Dump Yards
- Dealerships
- Direct Sale to Customers
- Any other channel (to be specified by the respondent)

Classification of Customers on the Basis of Monthly Dispatches (Q.3)

The respondents were asked to give preferred mode of dispatch of cement for various groups of customers. These groups were formed on the basis of the tonnage lifted per month by each customer from a particular cement plant (Respondent). The groups were:

- Less Than 200 Tonnes/Month
- 200-500 “
- 500-1000 “
- 1000-1500 “
- 1500-3000 “
3000- Above.

Relative use of Distribution Channels for Total Cement Dispatches (Q.4) In this question, the respondents were requested to give yearwise dispatches to each of their distribution channels for the past ten years.

Zonewise Pattern of Cement Dispatches (Q.5)

The respondents were asked to give yearwise dispatches for the past ten years for each of the zones. The zones were classified, direction wise, into four directions namely North, South, West and East zones. The replies to this question give us the directionwise / zonewise dispatches for each respondent cement manufacturing plant.

Production/Dispatches of Cement and its Comparison with the Rail/Road Dispatches for Each Plant (Q.6)

In a reply to this question, the respondents were asked to give a break up of their yearwise dispatches by road and rail for the last ten years. This would help in knowing the trend of increase/decrease in dispatches by a cement manufacturer by a particular mode of transport.

Components of Landed Price for Three Important Destinations in Each Zone (Q.7)

In this question, the respondents were asked to give a break up of their landed price of transporting cement to three of their most important destinations in each zone both by road and by rail. The details would show the comparative economics of the transport of cement for important destinations. An analysis of the details led us to the areas where the railways are at a disadvantage as compared to the roadways. The components of the landed price, are:

- Freight.
- Handling charges at Destination.
- Demurrage and Shunting charges.
- Transhipment Charges.
- Secondary freight i.e. freight charges incurred for moving cement from the destination station to the dealer's/stockist's premises.

4.3 Secondary Data Collection

Sources

Secondary data has been collected from a number of sources. These include:

- Publications of Ministry of Railways (Railway Board) regarding data on Railways and their share in the transportation of cement over the years.
Articles and Papers on relevant topics published in management journals and magazines.


Reports on Railways published by RITES and other consultants appointed by Railways.

Reports of Committees appointed by the Central Government and the Ministry of Railways for studying the working and management of the Indian Railways.

Proceedings of seminars and discussions held at various fora on the issues of transportation of cement by the cement industry.

Research work of scholars on the transportation of similar commodities by Rail.

A detailed list of the secondary sources is given in the bibliography.

4.4 Data Analysis Procedure

Qualitative Dimensions

Relative Importance of Various Parameters of the Transport Role (Q.1)

The ratings given by each respondent for each of the seven parameters in response to Question 1 were added and their arithmetic mean was worked out to get the mean rating of each parameter. This gave the rating of the parameter. The higher the rating, greater is the importance of that parameter for the respondent cement-manufacturing unit. The seven parameters were thus ranked in order of importance.

Comparative Attitudes of Consumers Towards Various Facets of Rail and Road Transport (Q.2)

The data, obtained from Question 2, gave the relative importance of rail and road for each of the parameters given in Question 1. Another comparative parameter is the "Freight Charge" between rail and road. In this question also, mean ratings for each parameter for rail and road were worked out.

The importance of each of the parameters, multiplied by the rating of each mode of transport, gave the comparative ranking of the two modes of transport in the eyes of the respondents for each parameter. The Railways can, therefore, not only come to know the parameters in which they are lagging behind the roadways but also they can know the extent to which they lag in each parameter. The priority of the cement marketers was also available as a result of the above
analysis. The existing strategies of the Railways for each of the parameters, with the rating that they have got from the respondents as a result of pursuing the present strategies were compared. Where the rankings for the Railways are lesser than the same for the roadways, they may need to review the strategies to improve their market share in cement transportation.

Preferences of Consumers Towards Mode of Transport and Reasons (Q.3)

Even if the freight charges are the same for railways and roadways, a number of respondents would like to transport their cement by road. The percentage of such respondents was worked out. The reasons given by them for preferring roadways over railways were also listed. These reasons were correlated to the rankings for the seven parameters obtained from an analysis of data from Questions 1 and 2. The correlation was done to see the extent of dissatisfaction of the respondents with the service provided by the Railways.

Problem Areas in Rail Transport (Q.4)

This question gives six areas of railway working in which the respondents face difficulties on a day-to-day basis. These areas are of great concern to them. The respondents were asked to rate each area on a scale of 1 to 5. The responses show the areas that, the customers think, are the most difficult areas, in dealing with the Railways. The mean score of the respondents, for each area, was worked out. The results were tabulated and were also plotted on a bar chart. The Railways will, therefore, need to review their rules and procedures in the most problematic areas.

Relative Importance and Priorities of Measures to Improve the Railway Freight Services (Q.5)

This question gives a list of seven strategies, which can be adopted by the Railways to improve their service to the customers. The respondents’ replies to the question cover two aspects of each strategy i.e. its importance as well as its priority. The scores were tabulated and then plotted on a bar chart for the two ratings.

Quantitative Dimensions

Production / Dispatches of Cement for the Period 1990-91 to 2001-02 (Q.1)

This gives the data of production and dispatch of cement, by each respondent, for the period of from 1990-91 to 2001-2002. The data were analysed were follows: -
a) To see the trend of production and dispatch of cement, over the period in question, for each respondent.
b) The percentage growth of dispatch of cement was worked out for each respondent taking 1990-91 as the base year.
c) The average growth rate of cement dispatches was worked out. This gives the trend of growth rate of cement transportation for the period 1990-91 to 2001-02.
d) The trend of growth of cement dispatches by rail was compared with the same for road dispatches.

Distribution Channels Used by the Cement Companies (Q.2)

The data provided details on how many of the respondents had more than one or more than two distribution channels. An analysis gave the number of respondents distributing through company owned stock/dump yards or directly to customers.

Classification of Customers on the Basis of Monthly Dispatches (Q.3)
The data obtained from the respondents were analysed to show the minimum off-take of cement (in tonnes per month) at which the Railways become the preferred mode of dispatch. The analysis helped us in identifying the target group of customers of the cement manufacturers who preferred railways as the mode of dispatch.

Relative use of Distribution Channels for Cement Dispatches (Q.4)

A break up of the type of distribution channels used by the individual respondents over the period of twelve years showed if there has been any marked change in the proportion of cement dispatches through various channels with the increase in total dispatches over the years.

Zonewise Pattern of Cement Dispatches (Q.5)
The replies to this question gave the zone-wise/direction-wise dispatches of cement for each respondent. The data were used to identify the cement plants, which dispatch cement over long leads. In other words, whether, the railway is the preferred mode of dispatch even over long leads.

Comparison of Road and Rail Dispatches of Cement for the Period 1991-92 to 2000-2001 (Q.6)

This data give the dispatches by rail and road for each respondent for the period from 1990-91 to 2001-02. The trend of increase or decrease in road/rail share of each respondent over this period was thus available. The respondents,
who had switched over from rail to road over the years, were identified. The data also gave us the respondents who are dispatching all their cement by road and do not like to dispatch any cement by rail.

Components of Landed Price for Three Important Destinations in Each Zone (Q.7)

The replies to this question gave the data on the comparative price of transport by road and rail for the three most important destinations of each respondent in each zone of dispatch. The analysis identified locations where rail transport is costlier and the extent to which it is so. The components of landed price, which make rail a costlier option for each such destination, were identified.

4.5 Limitations of the Study

The study has been confined to the collection and analysis of data available from the cement manufacturers for a period of twelve years only. Data of mode share of cement transportation were also not easily available with the cement manufactures for the period prior to 1990-91. Some cement plants have recently come up. These plants supplied data only for the period starting from the year of commenced of their dispatches. They did not have data even for ten years as they were not yet ten years old.

Another limitation of the study is its scope which is confined only to the transportation of cement. The findings of the study will lead to the suggestions of marketing strategies for the Indian Railways. These strategies may not be fully applicable to the transportation of other commodities like steel, petroleum, coal, food grains, fertilizers etc. by the Railways. The suggested strategies may, therefore, not be fully implemented as the Railways follow uniform rules and procedures for transporting the various commodities offered for transportation.

The Railways are a bureaucratic organization. They are a Government Department also. The feedback from the customers suggests that certain organisational changes may be necessary to make the organisation more customers friendly. Making any changes in the organisational set up, it requires an in-depth analysis. This study has not attempted to go into this area, as it would need to be studied, separately, in detail.
References: