CHAPTER - V
RESEARCH METHODOLOGY
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5.0 Introduction

The review of literature on the factors enhancing the degree of employee empowerment and engagement and their impact on retention of people, presented in the previous chapters reveals the importance of strategic initiatives enhancing the overall management and organizational performance and capabilities within an organizational setup. The reviews also revealed that there are a limited number of studies directed towards development of a comprehensive model where integration of measures for empowerment, engagement and retention are properly reflected. A conceptual model has been prepared based on the literature studies. An attempt has been made to validate the formulated model by administering a structured questionnaire among the employees, union leaders, and executives of NALCO. The responses of the respondents are further deduced through application of various statistical tools. This is one of the concise and vital chapters of the thesis. This chapter is subdivided into four major subsections. An overview of research methodology has been discussed in section 5.1 which reflects about research design, the universe of the study, sampling method and determination of sample size, data sources and questionnaire design. It is followed by section 5.2 that summarizes the essential research tools and techniques that has been applied to make the pre-determined research objectives are to be achieved, which has been observed in the introductory chapter of this dissertation.

5.1 Research Setting

Research is an art of scientific investigation, which deals with the systematised effort to gain new knowledge and information. It comprises of numerous systematic activities such as; defining and redefining problems, formulation of hypotheses, collecting, organizing and evaluating data, making deductions and reaching a conclusion. The research design and methodologies for the research process needs to be pre-set before the real execution. In order to conduct the research in more systematic and structured way, this section has been subdivided into the following five sub-sections.
5.1.1 Research Design

Research design often seems to be something of a mystery to new researchers, and the proneness of research philosophers to engage in sophisticated debates using terminology that is inaccessible to the novice does not help. On the basis that it is necessary to grasp the basics, and undertake some research before arriving at the position where some of these debates start to have some meaning; this section takes a very practical approach to research design. It urges the definition of questions and propositions in advance of data collection. A research design is the logic that links the data to be collected and the conclusions to be drawn to the initial questions of a study; it ensures coherence. Another way of viewing a research design is to see it as an action plan for getting from the questions to conclusions. It should ensure that there is a clear view of what is to be achieved by the case study. This involves defining the basic components of the investigation, such as research questions and propositions, appreciating how the validity and reliability can be established, and selecting a case study design. Starting with clearly formulated questions is useful for all research projects. Formulating research questions is never easy. Theory as embodied in the literature of a discipline is important in pointing towards appropriate research questions. Both practitioners and other researchers can generate questions that are of general interest, and that therefore might be fully explored in the context of the proposed case study. Sometimes with exploratory research the questions may have yet to be formulated; in this case the purpose of the research still needs to be defined.

Descriptive and explanatory studies need propositions. Research questions need to be translated into propositions. The researcher has to make a speculation, on the basis of the literature and any other earlier evidence as to what they expect the findings of the research to be. The data collection and analysis can then be structured in order to support or refute the research propositions. To systematically investigate the research problem in the study; descriptive research design has been utilized. According to Auberbach and Silverstein (2003), "The descriptive research attempts to describe, explain and interpret conditions of the present i.e. 'what is'. The purpose of a descriptive research is to examine a phenomenon that is occurring at a specific place and time. A descriptive research is concerned with conditions, practices, structures, differences or relationships that exist, opinions held processes that are
going on or trends that are evident". The descriptive research consists of three main categories such as; observation, case studies, and surveys that have been used in this study as well as analyse the dimensions of the research problem adequately.

A research study that uses a survey to obtain a description of a particular group of individuals is called a survey research design. Simply because a study uses a survey does not mean that it is a survey research design. The defining element of the survey research design is that the survey is used only to describe the variables being studied Gravetter and Forzano (2003: 168). Moreover, descriptive studies make use of the survey technique to ascertain what is the normal or typical condition or practice at the present time. So the descriptive research studies are also named as survey or normative survey research. Here the term ‘normative” stands for exploring the normal or typical conditions or practices about the population or phenomenon being studied and survey implies a technique or method employed for knowing about these conditions or practices.

Case studies are those descriptive or normative survey type researches that are undertaken by the researchers to describe the characteristics of an existing individual unit (an individual, group, organization or system) designated as a case through its in-depth and intensive study (Mangal and Mangal, 2013). However, in the field of behavioural sciences research, the term case and its study are used somewhat in a different sense and meaning. The case study design involves the in-depth study and detailed description of a single individual. Case study research is an empirical inquiry that investigates a contemporary phenomenon within its real-life context, when the boundaries between phenomenon and context are not clearly evident and in which multiple sources of evidences are used (Yin, 1994).

The unit of analysis is the basis for the case. It may be an individual person (such as a business leader, or someone who has had an experience of interest), or an event, (such as a decision, a programme, an implementation process or organisational change), or an organisation or team or department within the organisation. It can sometimes be difficult to identify the boundaries of the unit of analysis. A key issue is that the case study should only ask questions about the unit of analysis, and any sub-units; sources of evidence and the evidence gathered are determined by the boundaries that define the unit of analysis. Selecting
the unit of analysis, or the case is crucial. Case selection must be determined by the research purpose, questions, propositions and theoretical context, but there will also be other constraints that impact on case selection. These include accessibility (whether the data needed can be collected from the case individual or organisation), resources (whether resources are available to support travel and other data collection and analysis costs), and time available (if time is limited, it may be easier to analyse a small business rather than a large business, or to identify a unit of analysis within a large organisation, rather than seek to study the organisation in its entirety.

Case studies as a research method or strategy have traditionally been viewed as lacking rigour and objectivity when compared with other social research methods. This is one of the major reasons for being extra careful to articulate research design, and implementation. On the other hand, despite this scepticism about case studies, they are widely used because they may offer insights that might not be achieved with other approaches. Case studies have often been viewed as a useful tool for the preliminary, exploratory stage of a research project, as a basis for the development of the ‘more structured’ tools that are necessary in surveys and experiments. Eisenhardt (1989:548-549) says that case studies are: Particularly well suited to new research areas or research areas in which existing theory seems inadequate. This type of work is highly complementary to the incremental theory building from normal scientific research. The former is useful in early stages of research on a topic or when a fresh perspective is needed, whilst the latter is useful in later stages of knowledge. This is, however a somewhat narrow conception of the application of case study research. As discussed below case studies are useful in providing answers to ‘How?’ and ‘Why?’ questions, and in this role can be used for exploratory, descriptive or explanatory research.

The present study also bends towards exploratory research for data collection process, as we are seeking to generate a posteriori hypothesis by examining a dataset and looking for potential relations between the tested variables. “When the purpose of research is to gain familiarity with a phenomenon or acquire new insight into it in order to formulate a more precise problem or develop hypothesis, the exploratory studies (also known as formulative research) come in handy. If the theory happens to be too general or too specific, a hypothesis cannot be formulated. Therefore, a need for an exploratory research is felt to gain experience
that will be helpful in formulating relevant hypotheses for more definite investigation” (Shields and Rangarjan, 2013).

5.1.2 Research Universe

The main objective of this empirical study is to examine the facilitators of employee empowerment, key drives of employee engagement and impact of empowerment and engagement drives on retention of employees of the manufacturing sector so as to enhance their overall performance within the organization. In order to get an in-depth insight on this aspect the single manufacturing unit National Aluminium Company Limited (NALCO), a public sector undertaking of Govt. of India was selected for the purpose of the study. The selected research unit has the strategic business units such as captive mine, refinery, captive power plant and smelter plant and both primary and secondary data were collected from these units.

5.1.3 Sampling Method

A sample is a finite part of a statistical population whose properties are studied to gain information about the whole (Webster, 1985). When dealing with people, it can be defined as a set of respondents (people) selected from a larger population for the purpose of a survey. A population is a group of individuals, objects, or items from which samples are taken for measurement, for example a population of presidents or professors, books or students. Selection of samples is the most essential factor of research as it is not possible to include everyone in the research population. Thus, it is vital to draw out samples that can interpret the population sufficiently. The stratified random sampling method has been utilized to conduct this study. It is a probabilistic sampling technique, which consists of two steps. The first step is to split the population comprising of middle and lower level executives into strata or segments; wherein the specific departments (strata) are chosen to draw the samples. The second step is to take a simple random sample within each stratum. The stratified random sampling technique is appropriate for this study as it undertakes to limit the possible samples to those which are “less extreme” by insuring that all sections of the population are represented in the sample in order to increase the efficiency, by decreasing the error of estimation (Agresti and Finlay, 2008). The respondents of the questionnaire were mainly the employees. Union leaders, and executives of the SBUs of NALCO.
Stratified random sampling is a technique which attempts to restrict the possible samples to those which are 'less extreme' by ensuring that all parts of the population are represented in the sample in order to increase the efficiency (that is to decrease the error in the estimation). In stratified sampling the population of $N$ units is first divided into disjoint groups of $N_1, N_2, ..., N_h, ... N_L$, units, respectively. These subgroups, called strata, together they compromise the whole population, so that $N_1 + N_2 + ... N_L = N$. From each stratum a sample, of pre-specified size, is drawn independently in different strata. Then the collection of these samples constitutes a stratified sample. If a simple random sample selection scheme is used in each stratum, then the corresponding sample is called a stratified random sample.

Determination of sample size is an important element of an empirical research and the objective is to make inferences about a population from a selected sample. The statistical power of a study is defined by the number of samples for the conduction. The formula taken (Charan and Biswas, 2013), for calculation of necessary sample size is:

$$ N = (Z\text{-score})^2 \times \frac{\text{Std. Dev.} \times (1 - \text{Std.Dev.})}{(\text{margin of error})^2} $$

In this study, 95 percent confidence level is taken for which the $Z$ value is 1.96 according to the standard normal distribution table. We have assumed the standard deviation to be .5, and the margin of error of +/- 5%. Therefore, to calculate $N$, we have assumed $(Z\text{-score} = 1.96, \text{StdDev} = .5$ and the margin of error $= +/- .5$.

$$ N = \{(1.96)^2 \times .5(.5)\} / (.05)^2 = (3.8416 \times .25) / .0025 = .9604 / .0025 = 384.16. $$

Therefore, a minimum sample size of 385 would enable the estimation of the influence of executive competencies on performance on a 5 point scale, with 95 percent confidence level, and error level maintained within +/- 0.5 of the actual value. However, increasing the sample size could reduce the sampling error.

Another method for determination of sample size:

1. \( SS = \frac{Z^2 \times p(1-p)}{C^2} \) (Determination of sample size for infinite population)
2. \( SS = \frac{SS}{\left(\frac{1}{\text{Population}}\right)(\Delta - 5)} \) (Determination of sample size for finite population)
Where SS – sample size, Z – standardized value corresponding to a confidence level (95 percent level), p – percentage of population picking a choice, and C – confidence interval. If \( Z = 1.96, p = 60\% = .60, 1-p = .40, c = 4\% = .04 \), then \( SS = 576 \) (for infinite population) by using equation (1) and \( SS = 516 \) (for finite population) by using equation (2). To avoid the sampling error the 585 samples are taken for the purpose of this study.

5.1.4 Data Sources

To ensure adequate representation of data in this thesis, both primary and secondary sources were taken into consideration. The primary data are the first hand information that is collected directly from the research unit. In order to collect primary data from the selected research units, a structured questionnaire has been distributed among the respondents. The secondary data are the second hand information which is gathered from the existing records and published data sources. Secondary data from the selected research units was collected through the methods of case studies, annual reports, performance appraisals, periodicals, journals, yearbooks and other departmental documents from which the prevailing trends and practices on empowerment and engagement measures has been visualized.

5.1.5 Questionnaire Design

The aim of conducting opinion surveys through a structured questionnaire is to examine the hypothesized model developed in this work. A systematic effort is made to catch the essential parts of empowerment and engagement drives and their significant impact on retention of employees that would enhance the degree of operation in an organizational setup. The questionnaire was systematically prepared based on the extensive literature reviews and personal interviews with the respondents of this study. The questionnaire consists of 120 items and five point Likert scale (1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree and 5 = strongly agree) was used to rate the responses of the participants. In order to test the reliability and validity of the questionnaire, a pilot study was conducted initially. According to Baker (1994), the purpose of the pilot study is to test the questionnaire and to ensure that the data collected are coherent and comprehensible which can be carried out subsequently. The pre-testing was very useful, as it focused on the difficulties faced by the respondents during the period of the survey. The difficulty that the respondents faced during the pre-testing was rectified accordingly. The feedbacks during the pre-testing process were also taken into
consideration at the time of the actual data collection process. About 780 questionnaires were distributed among the executives of three research units, out of which 585 useful responses have been considered for this study.

The questionnaire which was administered among the respondents has four sections. The first section will reflect the demographic profile of the respondent’s identification particulars which would include age, sex, marital status, level of education and experience. The second section will indicate about the facilitators of empowering, people management strategy, job characteristics, self-managed teams, employee involvement, and sharing of information. The third section reflects about the key drivers of employee engagement such as safe work environment, challenging work, workplace relationships, teamwork, career development, compensation and benefits, recognition and rewards, and organizational culture and climate. The last section has the questions relating to the impact of empowerment and engagement of employees on retention of people.

5.2 Data Analysis Tools

To validate and quantify the data collected, some multivariate techniques have been taken into consideration. The following is a brief discussion with respect to those tools and techniques utilized for this purpose and is subdivided into three sub-sections.

5.2.1 Descriptive statistics

Descriptive statistics are used simply to describe the basic features of the data that one is concerned with. It is beneficial for describing data, summarizing data and for data cleaning. According to Dodge (2003), “descriptive statistics aims to summarize a data set quantitatively without employing a probabilistic formulation, rather than taking inferences regarding the population as a whole”. It is essential to monitor the ‘N’ (number of valid cases) for each variable as variations in ‘N’ is considered a problem, that may arise when the variables are examined together during data analysis. In descriptive statistics three major characteristics of a single variable are examined such as: the distribution, the central tendency, and the dispersion. The distribution refers to the summary of frequency of individual values or ranges of values for a variable. The frequency distribution is basically used to describe a single variable in a
study. All the data values for a particular variable are grouped together to form categories so as to identify the frequencies of the data appropriately.

The central tendency of a distribution is an estimate of the "center" of a distribution of data's collected. The central tendency of a distribution consists of three major estimates such as; mean, median and mode. The mean or average of the distribution is one of the common methods used in central tendency. The values collected are added up and divide by the number of values to commute the mean of the central tendency. The median of the central tendency is the score that is found in the exact middle of the set of values collected. To compute the median of the central tendency, all the values are listed in a numerical order and then the value in the center of the sample is located and is taken as the median value. The mode of the central tendency is the most frequently occurring value in the set of samples listed. These measures of central tendency help in simplifying the values collected from the samples. The dispersion refers to the spread of the values around the central tendency. There are two common measures of dispersion used for analysis that is the range and the standard deviation. The range is simply the highest value minus the lowest value. The most accurate and detailed form of dispersion is the standard deviation, as it shows the relation that the set of values have with that of the mean of the sample. To compute the standard deviation, we first find the distance between each value and the mean. The "squares of the value" are taken and are summed up to get the sum of squares (SS) value. Next, we divide this sum by the number of scores minus 1, which is known as the variance. To commute the standard deviation, we take the square root of the variance. In this study the descriptive statistics are used to summarize and simplify the data collected through the questionnaire survey.

5.2.2 Analysis of Variance

Analysis of variance (ANOVA) is a collection of statistical models used to analyse the differences between group means and their variations among and between groups which was developed by R. A. Fisher in early 1920's. In its simplest form, ANOVA is equivalent to the t-test in which only two variables are involved, whereas in ANOVA more than two exploratory variables are involved. The exploratory variables in ANOVA are categorical in nature; hence they are referred to as factors (Hinkelmann and Kempthorne, 2008). The fundamental technique of ANOVA is to partition the total sum of squares (SS) into components related to
the effects involved in the model. There are various methods of applying ANOVA but is typically dependent on the number of factors and the number of dependent variables involved. The one-way ANOVA is the simplest form of application, as only one single factor is involved. It is commonly used to test the differences between independent variables and its effects that can be estimated for the population as a whole. Primarily, one-way ANOVA is used to test the differences among at least three groups of observations, as two groups of observation can be easily tested through a t-test or F-test (as \( F = t^2 \)). When there is a case of two or more factors, then two-way ANOVA and three-way ANOVA is a significant method of measurement. ANOVA is a useful procedure to test for significant differences between means. However, three assumptions have to be achieved to conduct this test. First is the assumption of independence, which states that observations are random and independent samples from the population. Second is the assumption of normality, which states that distributions of the population from which the samples are selected are normal. Third is the assumption of homogeneity of variance, which states that, the variances of the distribution in a population are equal.

5.2.3 Multiple Regression Analysis

Regression analysis is a statistical procedure for estimating the relationships among predictor and predicted variables. The primary purpose of this technique is focused on the relationship between a dependent variable and one or more independent variables. It is a way of predicting an outcome variable from one independent variable or several independent variables (Field, 2009). When one independent variable is involved, it is known as simple regression, whereas in the case of more than one independent variable it is known as multiple regressions. Multiple regressions are a statistical technique used to analyse the relationship between a single dependent variable and several independent variables, wherein each independent variable is weighted by the regression analysis procedure to ensure maximal prediction from the set of independent variable (Hair et al., 2009).

According to Hair et al., (2009), multiple regressions fulfil two objectives of the research. Firstly, to maximize the overall predictive power of the independent variables as represented in the variate and secondly, to compare two or more sets of independent variables to ascertain the predictive power of each variate. The size of the sample has a direct impact on
the appropriateness and the statistical power of the multiple regression analysis, therefore the researcher must ensure that the criterion of practical significance is met along with statistical significance. As a rule of thumb the minimum ratio of observations to variable is 5:1, but the preferred ratio is 15:1 or 20:1, which increases with stepwise estimation. Likewise, maximizing the degree of freedom improves the generalisability of the model parsimony and the concerns regarding the sample size.

5.3 Conclusion

This chapter outlines the various research methods that have been implemented for the purpose of the research work carried out in a more systematic and meaningful way. Both primary and secondary data had been collected from the selected manufacturing unit. The selection of samples for this study was based on stratified random sampling method and an attempt was made for reciprocal representation of respondents from employees, union leaders, and executives of the SBUS of the selected manufacturing unit. The succeeding chapters would examine the research methodologies and the rationale for selection of research techniques in detail for data analysis.
References:


Webster, M. (1985), Webster’s ninth new collegiate dictionary. Meriam – Webster Inc.