CHAPTER 3

RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research methodology constitutes the blue print for the data collection, measurement and analysis of data. It is the overall operational pattern or framework, of the research that stipulates what information is to be collected from which sources by what procedures.

3.2 SELECTION OF STUDY AREA

Tamil Nadu is the seventh most populous state in India with a population of 72138958. It is the seventh most densely populated state in India with a population density of 555 persons per square kilometre as of 2011, having increased from 429 in 1991, significantly higher than the Indian average of 382 persons per square kilometre. About 44 per cent of the state's population lives in urban areas, the highest among large states in India. It is the third largest contributor to India's Gross Domestic Product (GDP) and ranks tenth in Human Development Index. Tamil Nadu is also the most urbanized state in India. The state has the highest number (10.56%) of business enterprises and stands second in total employment (9.97%) in India compared to the population share of about six per cent (Department of Economics and Statistics, 2011).

Tamil Nadu is the one of the most literate states in India. Tamil Nadu has performed reasonably well in terms of literacy growth during the decade 2001–2011. The state's literacy rate increased from 73.47% in 2001 to
80.30% in 2011 which is above the national average. Tamil Nadu has 37 universities, 454 engineering colleges and 566 arts and science colleges, 34335 elementary schools, 5167 high schools and 5054 higher secondary schools (Department of Economics and Statistics, 2011). The notable educational institutes present in Tamil Nadu are University of Madras, IIT Madras, PSG College of Technology, Anna University Chennai, Coimbatore Institute of Technology, NIT Tiruchi, Vellore Institute of Technology and Engineering. Tamil Nadu produces the highest number of engineering graduates in India (around 175000) every year which attracts many software companies to set up their shop in South India(Ministry of Higher Education, Government of Tamil Nadu, 2011).

3.3 DESIGN OF THE STUDY

The descriptive research design has been employed for the present study. The research design attempts to understand the functional relationship among the various leadership quality practices and performance measures.

3.4 SAMPLING PROCEDURE

The nine autonomous polytechnic colleges in Tamil Nadu purposively selected for the present study. The faculty members and students of autonomous polytechnic colleges in Tamil Nadu have been selected by adopting stratified random sampling technique through pre-tested, structured interview schedule through direct interview method.

3.5 SAMPLE SIZE

The data and information have been collected from 200 faculty members and 200 students of nine autonomous polytechnic colleges in Tamil Nadu, thus, the total sample size for the present study is 400.
3.6 **DATA COLLECTION**

3.6.1 **Primary Data**

The data and information is collected from the primary source of faculty members and students of autonomous polytechnic colleges in Tamil Nadu through pre-tested structured questionnaire.

3.6.2 **Secondary Data**

The data and information is collected from the secondary sources of journals, research papers, research reports, conference proceedings, magazines, newspapers and websites.

3.7 **TOOLS OF DATA COLLECTION**

The well structured questionnaire has developed for collection of data and information from the faculty members and students of autonomous polytechnic colleges separately. A five point likert scale (5=Strongly Agree; 4=Agree, 3=Neutral, 2= Disagree 1= Strongly Disagree) is used to measure the leadership quality practices and performance results of students of autonomous polytechnic colleges in Tamil Nadu.

3.8 **FRAMEWORK OF QUESTIONNAIRE**

The structured questionnaire for the present research is framed based on the conceptual framework based on MBNQA criteria, earlier research, expert’s opinion, and pilot study. The researcher has conducted a pilot study among 20 students and 20 faculty members of autonomous polytechnic colleges in Tamil Nadu. The research observed that the students and faculty members devoid of ambiguity and had abundant clarity of purpose
and it was easy to respond in minimum duration. The two separate questionnaires have been prepared for faculty members and students of autonomous polytechnic colleges in Tamil Nadu separately.

The questionnaire for faculty members of autonomous polytechnic colleges has three parts and consists of 41 statements and seven open ended questions. The part-I deals with the characteristics of faulty members, part-II deals with leadership quality practices of leadership direction, organizational governance, organizational performance review and social responsibility and ethics and part-III deals with performance results of faculty members focused results, governance and social responsibility results.


3.9 PERIOD OF STUDY

The data and information collected from the households pertain to the year 2010-2011.
3.10  STATISTICAL TECHNIQUES

3.10.1 Descriptive Statistics

In order to understand the characteristics of faculty members and students of autonomous polytechnic colleges in Tamil Nadu, the percentage analysis and frequency distribution are worked out.

3.10.2 Weighted Mean Score

The leadership direction, organizational governance, organizational performance review, social responsibility and ethics, students focused results, faculty member focused results, institutional effectiveness results and governance, social responsibility results and criteria for selection of autonomous polytechnic colleges in Tamil Nadu are analyzed by calculating weighted mean and the formula is presented below as:

\[
\text{Weighted Average} = \frac{\Sigma xf}{\Sigma f}
\]

Where,

\[
\Sigma = \text{Summation of}
\]
\[
x = \text{Score of attributes}
\]
\[
f = \text{Frequency}
\]

3.10.3 T-Test

In order to study difference between difference between leadership practices and difference between performance results of autonomous polytechnic colleges in Tamil Nadu, t-test has been applied and the formula is:
Where,

\[ T^2 = \frac{n_1 n_2}{n_1 + n_2} (x_1 - x_2)^T S_{pooled}^{-1} (x_1 - x_2) \]

3.10.4 Analysis of Variance (ANOVA)

In order to study the age of the faculty members and students, leadership direction, organizational governance, organizational performance review, social responsibility and ethics, criteria for selection of colleges, students focused results, faculty member focused results, institutional effectives results and governance, social responsibility results, the analysis of variance (ANOVA) has been employed and the formula is:

\[ F = \frac{\text{Variance between Samples}}{\text{Variance within Samples}} \]

i.e. \[ F = \frac{\text{Greater variance}}{\text{Smaller variance}} \]

3.10.5 Chi Square Test

In order to study the differences in characteristics of gender, educational qualification, department and designation of faculty members, gender, branches and reasons for choosing a branch by the student of
autonomous polytechnic colleges in Tamil Nadu, the Chi-Square Test has been employed and the formula is:

\[ x^2 = \sum \left( \frac{(O - E)^2}{E} \right) \]

Where,

- \( O \) = Observed Frequency in each category
- \( E \) = Expected Frequency in the corresponding category
- \( \chi^2 \) = Chi Square
- \( \Sigma \) = Summation of

3.10.6 Correlation Analysis

In order to study the relationship between characteristics of faculty member and leadership quality practices, relationship between characteristics of students and performance results and relationship between leadership quality practices and performance results of autonomous polytechnic colleges in Tamil Nadu, the Person’s correlation coefficient is worked out. The formula for Person’s Correlation Co-efficient (r) is:

\[
r = \frac{\sum X Y - \left( \frac{\sum X}{N} \right) \left( \frac{\sum Y}{N} \right)}{\sqrt{\left( \frac{\sum X^2}{N} - \left( \frac{\sum X}{N} \right)^2 \right) \left( \frac{\sum Y^2}{N} - \left( \frac{\sum Y}{N} \right)^2 \right)}}
\]

Where,

- \( r \) represents correlation co-efficient
- \( N \) represents the number of pairs of data
∑ denotes the summation of the items indicated

∑X denotes the sum of all X scores

∑X² indicates that each X score should be squared and then those squares summed

(∑X)² indicates that the X scores should be summed and the total squared. [avoid confusing ∑X² (the sum of the X squared scores) and (∑X)² (the square of the sum of the X scores)]

∑Y denotes the sum of all y-scores

∑Y² indicates that each Y score should be squared and then those squares summed

(∑Y)² indicates that the Y scores should be summed and the total squared

∑XY indicates that each X score should be first multiplied by its corresponding Y score and the product (XY) summed

3.10.7 Confirmatory Factor Analysis

In order to identify dimensions affecting the leadership quality practices in autonomous polytechnic colleges in Tamil Nadu, the confirmatory factor analysis has been employed.

3.10.8 Exploratory Factor Analysis

In order to study factors affecting the selection criteria for autonomous polytechnic colleges by the students, the exploratory factor analysis has been employed with principal component extraction with varimax rotation. To assess the internal consistency of scale “Coefficient of Internal Consistency (Cronbach alpha) has also been computed.
The factor analysis can be expressed as:

\[ Z_{ij} = a_1 f_{1j} + a_2 f_{2j} + ... + a_m f_{mj} + e_{ij} \]

Where,

- \( Z \) = Selection Criteria
- \( a \) = Factor Loadings
- \( f \) = Factor Score
- \( e \) = Residual term accounting for Errors or other Source of Variation.
- \( i \) = Variable
- \( j \) = individual

To assess the internal consistency of scale “Coefficient of Internal Consistency (Cronbach’s alpha) has been computed. The formula is:

\[
\alpha = \frac{K}{K-1} \left( 1 - \frac{\sum_{i=1}^{K} \sigma_{yi}^2}{\sigma_x^2} \right)
\]

Where

- \( \alpha \) = Cronbach alpha
- \( K \) = Number of components (K-items or test lets)
- \( \sigma_x^2 \) = Variance of the Observed Total Test Scores for the Current Sample
- \( \sigma_{yi}^2 \) = Variance of Component i for the Current Sample
3.10.9 **Discriminant Analysis**

In order to discriminate the designation of the faculty members in autonomous polytechnic colleges based on the leadership quality practices and in order to discriminate the branches of the students in autonomous polytechnic colleges in Tamil Nadu based on the performance results, the discriminant analysis has been employed and the functional form of discriminant function is:

\[ D = b_1 X_1 + b_2 X_2 + ... + b_n X_n + c \]

Where,

\[ D \] = Discriminant (dependent) Variable (Designation/ Branches)

\[ X_i \] = Discriminating (independent) Variables (Leadership Quality Practices/ Performance Results)

\[ b_i \] = Discriminant coefficients;

\[ c \] = Constant

3.10.10 **Path Analysis**

In order to study the inter-relationship between leadership quality practices and performance results of autonomous polytechnic colleges in Tamil Nadu, the path analysis has been applied. The proposed hypothesised path model is presented in Figure 3.1.
3.11 CONCLUSION

In this chapter, selection of study area, design of the study, sampling procedure, sample size, data collection, tools of data collection, framework of questionnaire, statistical techniques have been presented. In the next chapter, the leadership quality practices in autonomous polytechnic colleges in Tamil Nadu were analysed through appropriate statistical techniques and the results are presented.