CHAPTER-III

RESEARCH METHODOLOGY

3.1: Introduction:

The present study was undertaken to assess the method of Performance Appraisal Systems in a few selected Industries of Mysore District. This chapter explains the purpose, design of the study, objectives, hypotheses, participants, instruments, procedure and statistical techniques used.

Research on performance appraisal system is of great relevance to modern society as it provides a new dimension to the understanding and dealing of social and organizational problems in industries. The psycho-social approach to the problem of performance appraisal of an employee in the organization has widened the scope of appraisal research as it calls for the study of the appraisal system in the organization from which the various variables originate. A substantial number of studies have been reported about performance appraisal under normal as well as isolated work environment. It is well established that the competency required for different occupation/ jobs vary not only in nature but in term of quantum of performance.

A review of performance appraisal research clearly reveals that most of the research in this area has concentrated only on industrial and commercial organizations especially under normal work environment. Performance appraisal is a global phenomenon affecting all professions and certain categories of employees. It is often assumed that employees in certain industries based on their nature of work require more amount of performance appraisal. Performance is one of the most deliberating personal and organizational problems of modern globe. Challenges posed by the changing business scenario have imposed employees to perform their task under a very compelling situation.

Performance has become an inevitable part of human life in recent times in whatever is the nature of job. It makes life more challenging and charming if it is excellent. However, when performance is below the ability of a person, it causes disturbances in his/her life sphere. Performance appraisal has its roots in the demands of
organizations. Thus it is clear that, performance as a concept, it is naturally occurring which may have beneficial or destructive consequences, depending upon how it is managed.

There have been many incidents, where poor performance has lead to destructive consequences and vice versa; especially among the employees in industries, it has been found necessary to carry out this study. This study aims at throwing light on the process of performance appraisal and how it can be effectively managed. Hence managing the process of performance appraisal has become a subject of prime importance. Better management related to performance leads to a happy and efficient work force.

3.2: Purpose of the study:

The purpose of the present research was to evaluate the qualitative and quantitative functioning of the Performance Appraisal System adopted in industries of Mysore District. This study is chosen for an in depth analysis and understanding of performance appraisal system. It is the most universally accepted system for sustained performance and for enhance performance in the organization which is essential not only for growth but even for survival. It was planned because performance appraisal is only the tool which guides management to provide training in the area of needs of employees and extend facilities for the optimum utilization of resources in the organization. The lack of information on performance appraisal system would increase the negative influence on understanding the objectives of the organization.

Before the advent of Liberalization, Privatization and Globalization (1990) virtually all research on performance appraisal system focused on the traditional method or conventional method of evaluating the subordinates by superiors in the organization. However that changed in the early 1990’s and now, performance appraisal system aims to mesh the industrial needs aspirations and goals to the organization’s objectives, demands and requirements. It develops the capabilities of each employee as an individual in relation to his / her present role and expected further roles. It aims to foster team spirit and functioning in every group or organizational unit.
Most of the performance appraisal adopted in India has its roots, and have evolved in western countries. The performance appraisal related researches in India have not focused much on the cultural aspects, which are different and perhaps this may be the reason for the performance appraisal system has not made the desired impact in Indian Industries.

Any performance appraisal must really be intended to assess the outcomes of an activity and to arrive at decisions regarding the steps to be taken to achieve higher targets rather than to judge the employees who have participated in the activity by itself may not result in desirable outcomes. The target of an effective appraisal must be the performance of the organizational system in the various tasks it has undertaken. The ultimate objective of the appraisal must be to enable the system to attain higher targets; it must identify the strengths and weakness of the employees, utilize the strengths, correct the weaknesses and assign them new roles so that they can give their best contribution to the endeavor of the system to actives its goals and objectives.

The Performance appraisal system has to bring a total harmony between the individual performance and the organizational objectives. The end goal of any performance appraisal system must be the improvement of the performance of the organization and a sense of achievement amongst employees. This purpose must be the most dominant feature in the design of the appraisal system. To achieve this performance an appraisal system must create an appropriate environment, adequate opportunities and suitable incentives which will provide the necessary encouragement to the individuals to feel involved in the work of the organization, which improves performance. Good performance of employees are required of the right type of managerial policies to have an impact on the organizational performance. Therefore, the researcher is trying to suggest some of the remedial measures based on his empirical study and provide insights in to the performance appraisal system that need to be brought out in the Industrial scenario.

The present study aims to draw the attention of various experts involved in the system to identify the areas of improvement in performance appraisal system.
3.3: **Formulation of the problem:**

A Performance appraisal system plays a pertinent role in the development of an organization together with the employee’s growth. The appraisal of the employee must be used as a means to achieve organizational development. The performance appraisal system must be conceived as a means to evolve and implement strategies that will enable the employee to acquire higher competencies, develop a creative attitude and achieve growth by contributing to the organizational growth. Having all these and also to gain more knowledge about the performance appraisal system, its utility and importance for organizational development, the present topic “*A Study on the Performance Appraisal System, in selected Industries of Mysore District*” has been formulated.

3.4: **Objectives of the study:**

In accordance with the study i.e., to study the role, functions and importance of Performance Appraisal System, the following objectives have been set:

1. To assess the performance appraisal system in selected industries of Mysore district
2. To assess whether private and public sector industries differ in performance appraisal systems
3. To study the performance appraisal system among supervisors and managers (appraisers)
4. To study the influence of secondary variables-gender, age, marital status, working department, experience, qualification on performance appraisal system
5. To study the inter relationship between components of performance appraisal system
6. To suggest various means to improve performance appraisal systems
3.5: Hypotheses

In the present study the following alternative hypotheses have been formulated:

H1: Performance appraisal in selected industries of Mysore district is high.

H2: Supervisors and managers differ significantly in their assessment of performance appraisal (Appraisers only)

H3: Employees from private and public sectors differ significantly in their assessment on performance appraisal (Appraisers and appraisees).

H4: There will be a significant relationship between components of performance appraisal (Appraisers and appraisees).

H5: Male and female respondents differ significantly in their assessment on performance appraisal (Appraisers and appraisees).

H6: Employees in different age groups differ significantly in their assessment on performance appraisal (Appraisers and appraisees).

H7: Marital status of the employees has significant influence over their assessment on performance appraisal (Appraisers and appraisees).

H8: Respondents working in different departments differ significantly in their assessment on performance appraisal (Appraisers and appraisees).

H9: Employees with different qualifications differ significantly in their assessment on performance appraisal (Appraisers and appraisees).

3.6: Research Design:

The research design adapted in the present study is a Descriptive as well as Diagnostic Research Design. This design is found suitable because the study deals with an area, in which only a small number of researches have been conducted. Yet there is a vast scope for further research. The proposed research is descriptive in nature rather than experimental. Descriptive research, according to Best (1981), can be distinguished from other forms of research on the basis of the following characteristics: Descriptive research is non-experimental in that it deals with relationships between non-
manipulated variables in a natural rather than artificial setting. Since the events or conditions have already occurred or exist, relevant variables are merely selected for an analysis of their relationships. Descriptive research involves hypothesis formulation and testing. All of the variables and procedures used in descriptive studies are described as completely and accurately as possible so as to permit future replication. Descriptive research often employs methods of randomization so that errors can be estimated when inferring population characteristics from observations of samples.

Descriptive research studies are those studies which are concerned with describing the characteristics of a particular individual, or of a group, whereas diagnostic research studies determine the frequency with which something occur or its association with something else. The studies concerning whether certain variables are associated are examples of diagnostic research studies. As against this, studies concerned with specific predictions, with narration of facts and characteristics concerning individual, group or situation are all examples of descriptive research studies. Most of the social research comes under this category. From the point of view of the research design, the descriptive as well as diagnostic studies share common requirements and as such we may group together these two types of research studies. In descriptive as well as in diagnostic studies, the researcher must be able to define clearly what he wants to measure and must find adequate methods for measuring it along with a clear cut definition of ‘population’ he wants to study. Since the aim is to obtain complete and accurate information in the said studies, the procedure to be used must be carefully planned. The research design must make enough provision for protection against bias and must maximize reliability, with due concern for the economical completion of the research study.

3.7: Universe:

The study was conducted in the 16 selected Industries of Mysore District. They are 8 each from public sector and private sector industries.
They are as follows:

<table>
<thead>
<tr>
<th>Public sector</th>
<th>Private sector</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. BEML, Mysore</td>
<td>J.K. Tyres, Mysore</td>
</tr>
<tr>
<td>2. Mysore Lac &amp; Paints</td>
<td>Falcon Tyres, Mysore</td>
</tr>
<tr>
<td>3. BSNL Mysore</td>
<td>MYPOL, Mysore</td>
</tr>
<tr>
<td>4. RTTC, Mysore</td>
<td>L &amp; T Mysore Works</td>
</tr>
<tr>
<td>5. Railway Workshop</td>
<td>Rane Madras</td>
</tr>
<tr>
<td>6. Sandal Wood Oil factory</td>
<td>TVS Motor Co, Ltd.,</td>
</tr>
<tr>
<td>7. RMP (rare materials plant)</td>
<td>Brakes India Ltd</td>
</tr>
<tr>
<td>8. KSIC</td>
<td>Jubilant organosys</td>
</tr>
</tbody>
</table>

All the permanent employees of the above said industries covered under the performance appraisal system will constitute the universe of the study. They are classified as executives, and non-executives.

3.8: Sample:

The sample size for the study is three hundred

Simple Random sampling technique was employed for sample in the study.

<table>
<thead>
<tr>
<th>Industries</th>
<th>Executives</th>
<th>Non-executives</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public Sector Industries</td>
<td>75</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td>Private Sector Industries</td>
<td>75</td>
<td>75</td>
<td>150</td>
</tr>
<tr>
<td><strong>Grand Total:</strong></td>
<td><strong>300</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* Executives : Supervisory and above cadres.
** Non- Executives : Below Supervisory cadres.

3.9: Operational definitions of the variables used in the study:

**Performance:** Performance is what is expected to be delivered by an individual or a set of individuals within a time frame.

**Appraisal:** According to thinkexist.com appraisal is defined as ‘A valuation by an authorized person; an appraisement’.
**Performance appraisal:**

Performance appraisal is the process of obtaining, analyzing and recording information about the relative worth of an employee. The focus of the performance appraisal is measuring and improving the actual performance of the employee and also the future potential of the employee. Its aim is to measure what an employee does. It also does the evaluation of members’ performance backed up by useful feedback for improvement.

**Employer:**

According to answers.com employer can be defined as someone who hires and pays wages, thereby providing a livelihood to individuals who perform work. The employment relationship confers authority on the employer, who has the right to control and direct the work to be performed. An employer also has the right to engage or discharge and furnish the working location and supplies.

**Employee:**

According to investorwords.com A person who is hired to provide services to a company on a regular basis in exchange for compensation and who does not provide these services as part of an independent business.

**Appraiser:**

According to the free dictionary ‘one who estimates officially the worth or value or quality of things/ person/ employee. Appraiser is an employee, who conducts the process of performance appraisal in Industries. The role of the appraiser is to provide objective, impartial, and unbiased opinions about appraisee’s.

**Appraisee:**

According to Word web online ‘Someone who is appraised; Appraisee is an employee, who faces the process of performance appraisal in Industries. One who is appraised; one undergoing an appraisal. He is the subordinate to the managerial cadre, except in 360 degree Appraisal, where the appraisal is by all irrespective of ranks.
Public sector:

According to Answers.com The public sector, can be defined as the state sector and is a part of the state that deals with either the production, delivery and allocation of goods and services by and for the government or its citizens, whether national, regional or local/municipal. According to Wikipedia, In India, public sector undertaking (PSU) is a term used for a government-owned corporation (company in the public sector). The term is used to refer to companies in which the government (either the Union Government or state or territorial governments, or both) owned a majority (51 percent or more) of the company equity.

Private sector:

According to Answers.com Private sector can be defined as the part of an economy in which goods and services are produced and distributed by individuals and organizations that are not part of the government or state bureaucracy. It is part of a national economy which is not owned by the state and contrast with public sector.

Participative planning and mutual goal setting:

According to Answer.com participative planning is an open form of performance appraisal where employees have a role in planning. Participative planning is developed by managers who actively seek a strong cooperative relationship with their employees. According to Business dictionary.com it is a step of performance appraisal in which employees at all levels are encouraged to contribute ideas towards identifying and setting organizational-goals, problem solving, and other decisions that may directly affect them. Appraisers and appraisees are the two classes of employees responsible for the process of performance appraisal in Industries. Both of them sit together discuss and understands the organization vision, mission and expectations. Goals and objectives are important vehicles for measuring organizational effectiveness.

Task and target orientation:

Task orientation can be defined as a psychological orientation in which an individual is concerned primarily with completing the job, solving the problem, and working persistently and doing the best job possible. Those with task orientation tend to compare their performances with personal standards. Target orientation can be
defined as an individual’s orientation towards accomplishing set of task in a given period of time

**Identification of training and development needs:**

Training is the act of increasing the knowledge and skills of an employee for performing the job assigned to him. Development is a long-term educational process utilizing an organized and systematic procedure by which managerial personnel learn conceptual and theoretical knowledge for general purpose. It covers not only those activities which improve job performance but also those activities which improve the personality of an employee. Training and Development (T&D) can be the most important HRM function to treat people well and increase the competitive power for the organizations. Training refers to improving competencies needed today or very soon. In comparison, development refers to activities intended to improve competencies over a long period of time (Jackson & Schuler, 2003, p350-351).

**Open communication:**

A communications policy intended to ensure that employees have full information about their organization. Open communication climates encourage employees by supporting them, allowing them to participate in decision-making, and by trusting them, which assures the integrity of information channels

**Organizational performance:**

Organizational Performance is a broad construct which captures what agencies do, produce, and accomplish for the various constituencies with which they interact. Organizational performance comprises the actual output or results of an organization as measured against its intended outputs (or goals and objectives).

**Opinion and attitude:**

Attitude can be defined as a state of mind or a feeling or it’s a hypothetical construct that represents an individual's degree of like or dislike for an item. Attitudes are generally positive or negative views of a person, place, thing, or events- this is often referred to as the attitude object. Opinion can be defined as a message expressing a
belief about something; the expression of a belief that is held with confidence but not substantiated by positive knowledge proof.

Rules and regulations:

Rules can be defined as the body of regulations prescribed by management in order to govern the conduct of its employees. According to Wikipedia regulation is controlling human or societal behaviour by rules or restrictions. Regulation can take many forms: legal restrictions promulgated by a government authority, self-regulation by an industry such as through a trade association, social regulation (e.g. norms), co-regulation and market regulation.

Interpersonal Relations:

According to Wikipedia ‘An interpersonal relationship is an association between two or more people/employees/employers that may range from fleeting to enduring. This association may be based on regular business interactions, social commitment, or liking between the employees and employers.

Roles and responsibilities:

Role can be defined as the characteristic and expected social behavior of an employee in an organization, the actions and activities assigned to or required or expected of a person or group. Responsibilities are defined as something for which one is responsible; a duty, obligation, or burden. The ability or authority to act or decide on one's own, without supervision the obligation to carry forward an assigned task to a successful conclusion.

3.10: Tools used in the study:

1. An interview schedule was prepared to gather the general information about employees and employers in the organization.

2. A modified questionnaire based on Mr. T.V. Rao (2000) Indian Institute of Management (IIM) – Ahmadabad, who developed questionnaire to measure performance appraisal system for industries
Questionnaire by T.V. Rao (2000) aims at assessing the effectiveness of performance appraisal system in the organization. This questionnaire comprises of 33 questions and they are classified into two parts. First part of the questionnaire investigates participative planning of performance leading to the identification of factors facilitating and hindering performance, performance review discussions, relatively more objective-assessment through task and target orientation, identification of developmental needs, more communication, openness, mutuality and trust between appraisers and appraisees. The second part assesses how well the development oriented appraisal system is being implemented in the organization. This questionnaire can be administered to managers as well as employees covered by the appraisal system. The responses will be tabulated and analyzed item wise. Items with low scores may be identified for discussion by HRD staff or top management or performance appraisal task force or performance review committee or any other appropriate body that has the responsibility to improve the appraisal system.

Answers will be rated on a five points scale:

a. 1 - To those items that you think are totally false for the organization.

b. 2 - To those items that are slightly true or true to a little extent (25% true, 75% false).

c. 3 - To those items that are somewhat true (50% true and 50% false).

d. 4 - To those items that are mostly true (75% true and 25% false)

e. 5 - To those items that are completely true.

Based on the principles followed by Rao, the present researcher developed 2 questionnaires separately to measure performance appraisal system for appraisers and appraisees separately.
The questionnaire on appraisers included 45 questions which measured Performance appraisal system in following 7 components

<table>
<thead>
<tr>
<th>Components of performance appraisal</th>
<th>No of statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  Participative planning &amp; mutual goal setting</td>
<td>2</td>
</tr>
<tr>
<td>B  Identification of factors-facilitating and hindrance of employees</td>
<td>8</td>
</tr>
<tr>
<td>C  Task and target orientation</td>
<td>11</td>
</tr>
<tr>
<td>D  Identification of training and development needs</td>
<td>10</td>
</tr>
<tr>
<td>E  Open communication, mutuality between appraisers and appraisees</td>
<td>6</td>
</tr>
<tr>
<td>F  Measuring improved organizational performance</td>
<td>3</td>
</tr>
<tr>
<td>G  Opinion and attitude of employees and employers</td>
<td>5</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>45</strong></td>
</tr>
</tbody>
</table>

**Psychometric properties (present investigation):**

**Reliability:** Spilt half reliability technique was employed in the present investigation and they were varied from 0.76 to 0.81 in different dimensions.

**Validity:** Established through face validity and content validity.

The questionnaire on appraisee included 33 questions which measured Performance appraisal system in following 6 components

<table>
<thead>
<tr>
<th>Components of performance appraisal</th>
<th>No of statements</th>
</tr>
</thead>
<tbody>
<tr>
<td>A  Rules and regulations</td>
<td>3</td>
</tr>
<tr>
<td>B  Inter personal relations</td>
<td>5</td>
</tr>
<tr>
<td>C  Identification of training and development needs</td>
<td>8</td>
</tr>
<tr>
<td>D  Roles and responsibilities</td>
<td>9</td>
</tr>
<tr>
<td>E  Target and task orientation</td>
<td>5</td>
</tr>
<tr>
<td>F  Open communication</td>
<td>3</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>33</strong></td>
</tr>
</tbody>
</table>
**Psychometric properties (present investigation):**

**Reliability:** Spilt half reliability technique was employed in the present investigation and they were varied from 0.699 to 0.86 in different dimensions.

**Validity:** Established through face validity and content validity.

Data collection for the main study was carried out in two sessions. In the first session the participants were informed about the purpose of the study and their oral consent was obtained. In the second session questionnaire on performance appraisal was administered. An attempt was also made to maintain interest and cooperation throughout the testing session. The participants were given assurance about the confidentiality of obtained information. A consent letter was taken from each participant before the study. They were informed to cooperate throughout the study and if at all they felt discomfort during the sessions or in answering questions they had option to opt out from the investigation. Following are the details

**3.11: Pilot Study**

A pilot study was conducted on a small sample of 30 respondents among them 15 were appraisers and remaining 15 were appraisees. This was conducted to test the feasibility of the tools used. The purpose of the pilot study was

a. To check the clarity of the items enlisted in the selected questionnaires.

b. To get an approximation of time required to complete the questionnaire.

c. To ensure the feasibility of the tools selected for the study.

d. To get a fair idea of the respondents reaction towards research study and questionnaires.

The following observations were made during the pilot study

1. Most of the subjects in appraisee category expressed their desire to respond to the various test in the local language i.e., in Kannada. Hence the investigator decided to translate all the items on the tests into Kannada items.
2. Since the data collection was done on a small sample the instructions were given to each individual separately.

3. Some respondents wanted some feedback about the test results and some guidelines which were incorporated in the main study.

3.12: Main study

Phase I:

The permission from the concerned authorities of industries was obtained by the researcher in advance. The researcher introduced himself to each employee individually and briefed the need for the study and also explained about the performance appraisal scale. They were assured about the confidentiality of their responses. They were given consent form to fill up so that they were made clear that they are voluntarily participating in the study and not by force. The employees were requested to fill up the demographic data sheet with the appropriate instructions. They were informed that the information given by them will be used only for research purpose and strictly confidential. So they were requested to give frank and honest answers and not to omit any item, as it is important to respond to every item. Further they were instructed to seek clarifications. Sufficient rapport was established with the respondents during this session.

Phase II:

In the second phase, performance appraisal questionnaire was given to the respondents and they were indicated that the tool is meant for assessment of performance appraisal. The questionnaire consists of some statements that employees say or feel about various components of performance appraisal. The researcher administered performance appraisal questionnaire with these instructions “This is a questionnaire to understand the various aspects of your organization and work. Each statement contains situations describing the conditions of performance appraisal. Please read each statement and decide to what extent it describes the extent of appraisal in your organization. You are required to select any one of the following responses to indicate the extent to which you agree or disagree with each statement. Give your responses frankly; your responses will be kept strictly confidential. There
are no ‘right’ or ‘wrong’ answers. Please answer honestly as possible. Do not spend too much time on one item only”. The researcher clarifies the doubts if any. The respondent is asked not to leave any statement unanswered. “Answer the following questions using the key below. They are totally false = 1, 25% true, 75% false =2, 50% true and 50% false =3, 75% true and 25% false =4, completely true =5. Please answer all the questions”. When the researcher is sure that the respondent has understood the mode of recording his responses he /she are permitted to record his responses. The respondent is asked to return the answer sheet after he completes giving responses. The researcher clarifies the doubts if any, for the employees while answering the questionnaire / inventory.

3.13: Statistical Analysis
Following statistical techniques were employed in the present investigation.

1. Descriptive statistics
2. Pearson’s product moment correlation
3. MANOVA (Multi-variate analysis of variance)
4. Scheffe’s Post hoc test

A brief description of each statistical method is given below

**Descriptive statistics:** The descriptive procedure displays uni-variate summary statistics for several variables in a single table and calculates standardized values. Descriptive statistics provides general description of the sample in the form of central tendencies and measures of variability. In the present study mean values were calculated for each of the component of performance appraisal for appraisers and appraisees along with standard deviation values to get an idea regarding measures of central location and scatteredness of scores. Descriptive statistics are used to describe the main features of a collection of data in quantitative terms. Descriptive statistics are distinguished from inferential statistics (or inductive statistics), in that descriptive statistics aim to quantitatively summarize a data set, rather than being used to support inferential statements about the population that the data are thought to represent. Even when a data analysis draws its main conclusions using inductive statistical analysis, descriptive statistics are generally presented along with more formal analyses, to give the audience an overall sense of the data being analyzed.
**Pearson’s product moment correlation:**

The most familiar measure of dependence between two quantities is the Pearson product-moment correlation coefficient, or "Pearson's correlation." It is obtained by dividing the covariance of the two variables by the product of their standard deviations. Karl Pearson developed the coefficient from a similar but slightly different idea by Francis Galton.

The population correlation coefficient $\rho_{X,Y}$ between two random variables $X$ and $Y$ with expected values $\mu_X$ and $\mu_Y$ and standard deviations $\sigma_X$ and $\sigma_Y$ is defined as:

$$\rho_{X,Y} = \frac{\text{cov}(X, Y)}{\sigma_X \sigma_Y} = \frac{E[(X - \mu_X)(Y - \mu_Y)]}{\sigma_X \sigma_Y},$$

where $E$ is the expected value operator and cov means covariance. A widely used alternative notation for Pearson's correlation is $\text{corr}(X,Y)$.

The Pearson correlation is 1 in the case of an increasing linear relationship, $-1$ in the case of a decreasing linear relationship, and some value between -1 and 1 in all other cases, indicating the degree of linear dependence between the variables. The closer the coefficient is to either $-1$ or 1, the stronger the correlation between the variables.

In the present study Pearson correlation coefficient was employed to find out the mutual relationship between components of performance appraisal scale both for appraisers and appraisees.

**Multivariate analysis of variance (MANOVA)** is a generalized form of univariate analysis of variance (ANOVA). Multivariate procedure provides analysis of variance for multiple dependent variables by one or more factor variables or covariates. The factor variables divide the population into groups. Using this general linear model procedure, one can test null hypotheses about the effects of factor variables on the means of various groupings of a joint distribution of dependent variables. One can investigate interactions between factors as well as the effects of individual factors. In addition, the effects of covariates and covariate interactions with factors can be included. In this procedure, several independents and dependent variables can be considered to get main effects and interaction effects.
MANOVA is used in cases where there are two or more dependent variables. As well as identifying whether changes in the independent variable(s) have significant effects on the dependent variables, MANOVA is also used to identify interactions among the dependent variables and among the independent variables. Where sums of squares appear in univariate analysis of variance, in multivariate analysis of variance certain positive-definite matrices appear. The diagonal entries are the same kinds of sums of squares that appear in univariate ANOVA. The off-diagonal entries are corresponding sums of products. Under normality assumptions about error distributions, the counterpart of the sum of squares due to error has a Wishart distribution. Analogous to ANOVA, MANOVA is based on the product of model variance matrix and error variance matrix inverse. Invariance considerations imply the MANOVA statistic should be a measure of magnitude of the singular value decomposition of this matrix product, but there is no unique choice owing to the multi-dimensional nature of the alternative hypothesis.

In the present study MANOVA was employed to find out the significance of different independent variables like levels (supervisors and managers), sectors (public and private), gender (male and female), age groups, marital status and qualification over components of performance appraisal questionnaire separately for appraisers and appraisees.

**Scheffe’s Post hoc test**

Scheffe’s post hoc test is one of the multiple range tests to see which of the means are different from other means. Post hoc comparisons are generally performed only after obtaining a significant omnibus F. Then we look at all possible pair-wise or all possible pair-wise and otherwise comparisons. Here, we are focusing on the largest difference between levels of the Independent variable, but the researcher is still shifting through the data in hopes of finding something significant. Because of this, there is a very real problem that researcher will be capitalizing on chance findings; One probably would not look at or care about comparisons that do not differ. The largest differences, whatever they may be, are the most likely to be significant due to chance.
The formula for Scheffe’s post hoc test is:

\[
CD_{\text{Scheffe}} = q \sqrt{\frac{MS_{\text{error}}}{n}}
\]

where

\[
q = \sqrt{\frac{2(a-1)F_{(a-1, a-1)}}{(a-1)}}
\]

different cells have different CDs.

Least Stringent  Most Stringent

Most Powerful  ----------------> Least Powerful

Most Likely to Make a Type I Error  Least Likely to Make a Type I Error

\[
R = q \sqrt{n(MS_{\text{error}})} \quad q = \sqrt{\frac{2(a-1)F_{(a-1)}}{(a-1)}}
\]

Critical \( F \) is determined by \( \text{df} - (a, 1, N-a) \)

All the statistical operations were done through SPSS for windows (version 16.0).

3.14: Chapterization:

The thesis had been divided into 5 chapters and they are as follows:

<table>
<thead>
<tr>
<th>Chapter</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>Introduction</td>
</tr>
<tr>
<td>II</td>
<td>Review of Related Literature</td>
</tr>
<tr>
<td>III</td>
<td>Research Methodology</td>
</tr>
<tr>
<td>IV</td>
<td>Analysis and interpretation of Results</td>
</tr>
<tr>
<td>V</td>
<td>Discussion, Summary and Conclusion</td>
</tr>
<tr>
<td></td>
<td>References</td>
</tr>
<tr>
<td></td>
<td>Appendices</td>
</tr>
</tbody>
</table>