The methodology adopted in this study is presented in this chapter. The theoretical perspectives discussed in the first chapter, the review of relevant literature in the second chapter, the objectives and hypotheses developed, form the basis for the formulation of the research methodology adopted in this investigation. The major purpose of this investigation is to capture the emotional intelligence and the self-perceived managerial effectiveness of the administrative executives in multi-specialty hospitals in Coimbatore.

It was decided that a descriptive study using primary data would be appropriate to investigate the objectives and the hypotheses. The instrument that was used to collect the data was a questionnaire. The researcher has presented and interpreted the collected data supported by quantitative techniques. In the subsequent sections, the researcher elaborates the research design, method adopted to design and administer the questionnaire, the sampling technique used and the justification for choosing the samples.

**Hypothesis**

A hypothesis is a specific statement of prediction. A *hypothesis* is a proposed explanation for a phenomenon. It describes in concrete (rather than theoretical) terms what a researcher can expect from his or her study. In statistical hypothesis testing, two hypotheses are compared, which are called the null hypothesis and the alternative hypothesis. The *null hypothesis* is the hypothesis that states that there is no relation between the phenomena whose relation is under investigation, or at least not of the form given by the alternative hypothesis. The *alternative hypothesis*, as the name suggests, is the alternative to the null hypothesis: it states that there *is* some kind of relation. The alternative hypothesis may take several forms, depending on the nature of the hypothesized relation; in particular, it can be two-sided (for example: there is some effect, in a yet unknown direction) or one-sided (the direction of the hypothesized relation, positive or negative, is fixed in advance). The hypotheses tested in the
study has been discussed under development of hypotheses in chapter 2 on research reviews.

3.1 Research Design

A research design is the overall plan for obtaining answers to the questions being studied and for handling some of the difficulties encountered during the research process (Polit & Beck 2004:49). Research designs are developed to meet the unique requirements of the study. According to De Vos (1998:157) a research design is a blue print or a detailed plan for how a research study is to be conducted. (Polit & Beck 2004:209) & Wood and Habber (1998:157) indicated that selecting a good research design should be guided by an overarching consideration, namely whether the design does the best possible job of providing trustworthy answers to the research questions. To achieve the research objectives and to address the research problem, the researcher conducted a quantitative research.

A quantitative research generates quantifiable data. It is primarily concerned with observable and measurable phenomena involving people, events or things and establishing the strength of the relationship between variables, usually by statistical tests (Couchman & Dawson 1995: 40). A quantitative research lends itself to investigating phenomena that requires a precise measurement and quantification often involving a rigorous and controlled design (Polit & Beck 2004: 729). It tends to be fairly structured to enhance objectivity. A quantitative research primarily rests upon numbers aggregated into statistics, to enable the researcher to interpret obtained data and to reach conclusions (Cormack 1996:113).

The features of this study are in accordance with the quantitative research paradigm. Its focus was concise and narrow. A structured questionnaire was used by the researcher that enabled to quantify the responses and to conduct statistical analysis. Furthermore, an in depth reviews of literature, which served as the basis for the development of the data collection instrument, was performed. According
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to Wood & Haber (1998: 157), the objectivity in the conceptualization of the problem is derived from the review of literature and the development of theoretical framework. A literature review enables the researcher in assessing the depth and breadth of available knowledge concerning the research problem.

In the present study, the researcher considered the most suitable research design to be a non experimental, multivariate and descriptive survey design. The term survey can be used to designate any research activity in which the investigator gathers data from a portion of a population for the purpose of examining the characteristics, opinions or intentions of that population(Couchman & Dawson 1995: 70) , (Polit & Beck 2004: 234). A descriptive design is selected because of its high degree of representativeness and the ease in which a researcher could obtain the participants opinion ( Polit & Beck 2004: 50). When a little is known about a topic or to explore a research question, a descriptive research design is applied (Burns & Grove 2001: 201). In descriptive research, the variables are examined as they exist without investigator interference. Control over the research setting is limited ( Brink & Wood 1998: 289-291). In the present study the researcher obtained and described the views of the respondents related to emotional intelligence and self perceived managerial effectiveness. Within the context of the research, the views of administrative executives working with multi specialty hospitals on their performance of various dimensions of emotional intelligence and self perceived managerial effectiveness, which has not been studied by any researcher so far, were covered. In relation to the present study there are no manipulations of variables and the researcher has not made any attempt to control the research setting.

3.2 Nature of Research

Sampling frame, Sampling Techniques, Instrumentation, Data collection, and Data Analysis has been discussed under this part.
3.2.1 Sampling frame

Polit and Beck (2004;289) define population as the entire aggregation of cases that meet the designated set of criteria. The target population is the aggregation of cases about which the researcher would like to make the generalizations. The target population for this study includes all the executives engaged in the administrative work excluding the medical practitioners working with 400 bedded multi specialty hospitals in Coimbatore. The geographical area of Coimbatore city was chosen, as the city is fast growing due to the climatic and geographical location, which is strategically conducive for the inception and growth of MSMEs with more number of Multi-Specialty hospitals such as PSG IMSR, Ganga Hospitals, KMCH, Ramakrishna and GKNM hospitals. The above said are 400 and above bedded hospitals located in the Coimbatore city. The city which already is an educational hub, with the available modern facilities and other resources has the distinction of increasingly becoming an active area for medical tourism.

Polit and Beck (2004; 290) define eligibility criteria as the criteria that specifies the characters that the population has to possess to become a sampling unit of the study. The eligibility criteria for the respondents to be included as a sample in this study under discussion were

- They have to be working as administrative executives at the middle level management, managing and supervising people reporting to them.
- Nurses are excluded from being included in the study as already considerable research has been undertaken to understand the work experiences of nurses, particularly related to nurse satisfaction, emotional intelligence, stress management etc., .
- They have to have a minimum of 5 years of total working experience as middle level executives.
- They are not to be medical practitioners.
3.2.2 Sampling technique
A list of multi-specialty hospitals situated in Coimbatore district was prepared. From this list, only those hospitals which have been in existence for more than 15 years and have a minimum of 400 beds were selected. A total of 5 hospitals were identified. The population from the five 400 and above bedded hospitals comprise of 186 executives from middle level management with subordinates reporting to them. The sampling technique used for the collection of data is census sampling. The data was collected from 154 samples as the researcher could not get back the rest of the issued questionnaires. The sample size is 82.79% of the total population.

3.2.3 Administration of Questionnaire and Collection of Data
The researcher has discussed the data collection approach, instrumentation and administration of the questionnaire.

3.2.3.1 Approach and Method
Polit & Beck (2004:716) define data collection as the gathering of information needed to address a research problem. Structured data collection is applied in quantitative research. Structured data collection entails asking a fixed set of predefined questions that are generally answered in a specified sequence. Respondents chose between well designed response options. Structured data collection enhances objectivity. Objectivity refers to the degree to which two independent researchers can arrive at similar scores or make similar observations regarding the concepts of interest. It also yields data that are easy to analyze.

3.2.3.2 Instrumentation
For the purpose of studying the objectives and testing the hypotheses, a questionnaire (see Annexure – 6.2) was used as an instrument to collect the data.
The questionnaire has three parts:

- The first part measures the emotional intelligence factors,
- The second part the self-perceived managerial effectiveness and
- The third part the background information of the respondents.

The variables chosen for this study, as discussed earlier in the introduction chapter are

1) Emotional intelligence measured as a construct with 11 factors:
   - Ability to deal with one’s own emotions
   - Others’ emotional appraisal
   - Ability to regulate felt emotions
   - Ability to display emotions
   - Understanding emotion
   - Facilitating thinking with emotions
   - Ability to recognize the emotions of others
   - Ability to manage the emotions of others
   - Ability to use emotions to facilitate thinking
   - Empathy and
   - Regulation and management of emotion.

2) Self-Perceived Managerial Effectiveness.

The items capturing each factor were adopted from standardized questionnaires developed or used by earlier researchers. However, they were subjected to validity and reliability tests. Hence, the items that constituted adequate coverage of the factors under study were decided and agreed upon by the researcher.

Accordingly, The first part of the instrument consisted of the variables that captured the Emotional Intelligence. Awareness of own emotions was measured using five sub scales, others’ emotional appraisal consisting of 3 items, ability to
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regulate felt emotions with 4 items, ability to display emotions with 3 items, facilitating thinking with emotions with 6 items, understanding emotions with 6 items, ability to recognize the emotions of others with 5 items, ability to manage the emotions of others with 3 items, empathy with 3 items, ability to use emotions to facilitate thinking with 5 items and regulation and management of emotions with 6 items. The items were measured on a 5 point scale with 5 coded for strongly agree, 4 for agree, 3 for neither agree nor disagree, 2 for disagree and 1 for strongly disagree. These factors and subsequently the items were quoted in Mok, W., Tsarenko, Y and Gabbott, M. (2008).

The second part consisted of the items covering the Self-Perceived Managerial Effectiveness. This was measured using 12 item scale captured on a 5 point scale with 5 coded for strongly agree, 4 agree, 3 neither agree nor disagree, 2 disagree and 1 for strongly disagree.

The third part consists of the background information that included the age of the administrative executives, sex, experience of the executives, experience in current management position, marital status, status of spouse, income, educational qualification and number of children of the administrative executives.

3.2.3.3 Coding of responses

- The age of the executives was captured in categories of upto 30 years coded 1, above 30 and 35 years coded 2, above 35 and upto 40 years coded 3, above 40 and upto 45 years coded 4, and above 45 years coded 5.
- The sex of the executives was captured in categories of male coded 1 and females coded 2.
- The experience of the executives was captured as a direct measure however, categorized into groups to minimize the size of the tables. The experience was reported in categories of upto 10 years coded 1,
above 10 and upto 20 years coded 2, above 20 and upto 30 years coded 3 and above 30 and upto 40 years coded 4.

Experience in current management position is captured as a direct measure however, categorized into groups of less than 5 years coded 1, above 5 and upto 10 years coded 2, above 10 and upto 15 years coded 3, above 15 and upto 20 years coded 4, above 20 and upto 25 years coded 5.

The marital status was reported as married coded 1 and unmarried coded 2. The working / non working status of the spouse was reported as employed coded 1 and housewife coded 2.

The income is reported as a direct measure however, categorized into groups of less than Rs. 10,000 coded 1, above Rs. 10,000 and upto 20,000 coded 2, above Rs. 20,000 and upto 30,000 coded 3, above Rs. 30,000 and 40,000 coded 4, above Rs. 40,000 and upto 50,000 coded 5, above Rs. 50,000 and upto 60,000 coded 6 and above Rs. 70,000 coded 7.

The educational qualification of the executives was reported as SSLC coded 1, HSC coded 2, Diploma coded 3, UG coded 4 and PG coded 5. The number of children the executives have is reported as a direct measured as 1, 2, and 3.

3.2.3.4 Validity test

The questionnaire was subjected to face and content validity whose determination was judgmental. There are two schools of thought on the distinctiveness of face and content validity. The first one saw face validity as just an indirect approach to the measurement of content validity (Carmines, & Zeller, 1979; Nunnally, 1967) whereas the second one treated them as separate and different tests (DeVellis, 1991; Kerlinger, 1973). In this study, the researcher has subscribed to the second perspective where quantitative assessment of the content validity has been followed.
Validity refers to the degree to which an instrument measures what it is supposed to measuring (Polit & Beck 2004: 422). In the present study the researcher has pre tested the questionnaire subjecting it to both face and content validity prior to data collection to ensure its validity. Face validity refers to whether the instrument appears as though it is measuring the appropriate construct. Content validity is defined as the sampling adequacy of items for the construct that is measured (Polit & Beck 2004: 423).

The face and content validity was conducted with 8 experts. The experts scrutinized the items, according to the definition generated against the constructs of emotional intelligence and subsequently the definitions of the subscales such as awareness of own emotions, others’ emotional appraisal, ability to regulate felt emotions, facilitating thinking with emotions, understanding emotions, ability to recognize the emotions of others, ability to manage the emotions of others, empathy, ability to use emotions to facilitate thinking, regulation and management of emotions and self-perceived managerial effectiveness. Before they offered their opinion on the items, the researcher informed them of the objectives and the need for the study and then encouraged to express the validity of each item in capturing the adequate information required. The content validity ratio (CVR) was applied to each item, using the formula developed by Lawsche (1975). Based on this, a few redundant statements were removed.

\[
\text{Content Validity Ratio} = \frac{\text{Ne} - \frac{N}{2}}{\frac{N}{2}}
\]

Where Ne = number of panelists indicating “essential” and N = total number of panelists.

All those items which have scored less than 0.50 on the content validity ratio (Annexure – 6.4) have been removed from the study. Based on the face validity and content validity ratio, the final number of items in each of the factors taking
part in this study was decided. Accordingly, the number of items included in each of the factors is as follows:

**Table. 1 showing the number of items in each dimension of emotional intelligence and self perceived managerial effectiveness**

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Factors</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ability to deal with one’s own emotions</td>
<td>5</td>
</tr>
<tr>
<td>2.</td>
<td>Others’ emotional appraisal</td>
<td>3</td>
</tr>
<tr>
<td>3.</td>
<td>Ability to regulate felt emotions</td>
<td>4</td>
</tr>
<tr>
<td>4.</td>
<td>Ability to display emotions</td>
<td>3</td>
</tr>
<tr>
<td>5.</td>
<td>Facilitating thinking with emotions</td>
<td>6</td>
</tr>
<tr>
<td>6.</td>
<td>Understanding emotion</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Ability to recognize the emotions of others</td>
<td>5</td>
</tr>
<tr>
<td>8.</td>
<td>Ability to manage the emotions of others</td>
<td>3</td>
</tr>
<tr>
<td>9.</td>
<td>Empathy</td>
<td>3</td>
</tr>
<tr>
<td>10.</td>
<td>Ability to use emotions to facilitate thinking</td>
<td>5</td>
</tr>
<tr>
<td>11.</td>
<td>Regulation and management of emotion</td>
<td>6</td>
</tr>
<tr>
<td>12.</td>
<td>Self – perceived managerial effectiveness</td>
<td>12</td>
</tr>
</tbody>
</table>

As mentioned earlier, these items were made on a 5-point scale anchored by 1 = strongly disagree; 2 = disagree; 3 = neither agree nor disagree; 4 = agree and 5 = strongly agree and the mean of the items under each factor was used as a composite measure of the respective factors.

### 3.2.3.5 Administration of the Questionnaire

The questionnaire was administered to all the 186 executives identified from the five 400 bedded hospitals identified in the Coimbatore city. The survey was conducted in five phases starting from the month of April – October in 2010. Almost one fourth of the questionnaires were administered in person and the remaining through a contact person from the Human Resources department in each
hospital, through whom the questionnaires were distributed. However, the researcher had attached a covering letter requesting the respondents to solicit their kind cooperation in filling up the questionnaire. To instill confidence in the minds of the respondents, the covering letter, attached with the questionnaire (See Annexure – 6.2) educated them about the purpose for which the data was collected. They were ensured that their responses would be used only for academic purpose and were assured absolute confidentiality and anonymity on the information sought. This was done based on the suggestions given by the respondents in the pilot study, in order to encourage and solicit the kind cooperation of the respondents, in giving complete and accurate information. A thorough follow-up was done in person and over telephone to expedite the process of filling up the questionnaire. Yet few questionnaires were not returned and few were unusable and incomplete, yielding a response rate of 84.44% (152 usable questionnaires).

3.2.3.6 The Pilot study
After finalizing the number of items in the research instrument using face and content validity tests, a pilot study was undertaken for the following reasons:

a) To assess the reliability of the research instrument constructed.
b) To ascertain the time taken to complete the questionnaire by the respondents.

To conduct the pilot study, it was decided to select 30 executives who had worked in the same hospital for at least 2 years. Such executives were identified with the help of the hospital managers / superintendents who are in charge of the hospital.

Results of the pilot study
The verbatim record of the transaction that took place while administering the questionnaire was noted. The discussion with the executives during the pilot study revealed that the instrument has adequate stimulus value to gather authentic
responses from the respondents. The transaction also suggested that the procedures adopted in administering the instruments are practicable. Hence it was concluded that the instrument used in the study would elicit the necessary data required from the respondents. It has been found that the respondents took invariably between 20 – 25 minutes to completely fill the questionnaire.

3.2.3.7 Reliability test.

The data collected from the pilot study was subjected to reliability test using Cronbach Alpha. The final alpha values for the various dimensions are shown in table below. All the dimensions other than ‘facilitating thinking with emotions’ captured with 6 items stood the test for reliability with coefficients more than 0.60. On removal of the third item, ‘I often use how I feel about a problem to define the attention I give to it’ and ‘I listen to the feeling of other people in establishing priorities’ the reliability coefficient improved to .60. From the table, it has been found that the reliability coefficients for the variables chosen for this study are more than 0.76, which is an acceptable value. So, the items constituting each variable under study have reasonable internal consistency.

Table 2. Reliability coefficients using Cronbach Alpha

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Factors</th>
<th>Cronbach Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Ability to deal with one’s own emotions</td>
<td>.72</td>
</tr>
<tr>
<td>2.</td>
<td>Others’ emotional appraisal</td>
<td>.77</td>
</tr>
<tr>
<td>3.</td>
<td>Ability to regulate felt emotions</td>
<td>.87</td>
</tr>
<tr>
<td>4.</td>
<td>Ability to display emotions</td>
<td>.80</td>
</tr>
<tr>
<td>5.</td>
<td>Facilitating thinking with emotions</td>
<td>.64</td>
</tr>
<tr>
<td>6.</td>
<td>Understanding emotion</td>
<td>.70</td>
</tr>
<tr>
<td>7.</td>
<td>Ability to recognize the emotions of others</td>
<td>.84</td>
</tr>
<tr>
<td>8.</td>
<td>Ability to manage the emotions of others</td>
<td>.67</td>
</tr>
<tr>
<td>9.</td>
<td>Empathy</td>
<td>.82</td>
</tr>
</tbody>
</table>
Influence of Emotional Intelligence on Self Perceived Managerial Effectiveness

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<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Factors</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>Ability to use emotions to facilitate thinking</td>
<td>.81</td>
</tr>
<tr>
<td>11</td>
<td>Regulation and management of emotion</td>
<td>.78</td>
</tr>
<tr>
<td>12</td>
<td>Self – perceived managerial effectiveness</td>
<td>.70</td>
</tr>
</tbody>
</table>

Accordingly, the number of items included in each of the factors is as follows:

### Table 3. showing the final number of items under each factor after reliability test

<table>
<thead>
<tr>
<th>Sl.No</th>
<th>Factors</th>
<th>No. of items</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Ability to deal with one’s own emotions</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Others’ emotional appraisal</td>
<td>3</td>
</tr>
<tr>
<td>3</td>
<td>Ability to regulate felt emotions</td>
<td>4</td>
</tr>
<tr>
<td>4</td>
<td>Ability to display emotions</td>
<td>3</td>
</tr>
<tr>
<td>5</td>
<td>Facilitating thinking with emotions</td>
<td>4</td>
</tr>
<tr>
<td>6</td>
<td>Understanding emotion</td>
<td>6</td>
</tr>
<tr>
<td>7</td>
<td>Ability to recognize the emotions of others</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>Ability to manage the emotions of others</td>
<td>3</td>
</tr>
<tr>
<td>9</td>
<td>Empathy</td>
<td>3</td>
</tr>
<tr>
<td>10</td>
<td>Ability to use emotions to facilitate thinking</td>
<td>5</td>
</tr>
<tr>
<td>11</td>
<td>Regulation and management of emotion</td>
<td>6</td>
</tr>
<tr>
<td>12</td>
<td>Self – perceived managerial effectiveness</td>
<td>12</td>
</tr>
</tbody>
</table>

3.3 Frame Work of Analysis and Statistical Tools Employed

The section of the report deals with the techniques used for analyzing the data using statistical tools. The sample units were classified based on the age and gender of the respondents to find out the influence of emotional intelligence on self perceived managerial effectiveness.
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Descriptive Statistics
Descriptive statistics are used to describe the basic features of the data in a study. They provide simple summaries about the sample and the measures. Together with simple graphics analysis, they form the basis of virtually every quantitative analysis of data. Descriptive statistics simply describes what is or what the data shows. Descriptive Statistics are used to present quantitative descriptions in a manageable form. In a research study, when there are lots of measures or a large number of people on any measure descriptive statistics help us to represent the large amounts of data in a sensible way. Each descriptive statistic reduces lots of data into a simpler summary.

Univariate Analysis
Univariate analysis involves the examination across cases of one variable at a time. The two major characteristics of a single variable that has been looked in to in this study are Central Tendency and Dispersion. The central tendency of a distribution is an estimate of the "center" of a distribution of values. There are three major types of estimates of central tendency. The Mean or average is probably the most commonly used method of describing central tendency. To compute the mean all you do is add up all the values and divide by the number of values.

Dispersion refers to the spread of the values around the central tendency. There are two common measures of dispersion, the range and the standard deviation. The Standard Deviation is a more accurate and detailed estimate of dispersion. The Standard Deviation shows the relation that set of scores has to the mean of the sample.

The formula for computing the standard deviation is
Thus the standard deviation is the square root of the sum of the squared deviations from the mean divided by the number of scores minus one.

**Multivariate analysis of variance (MANOVA)** is a statistical test procedure for comparing multivariate (population) means of several groups. Unlike ANOVA, it uses the variance-covariance between variables in testing the statistical significance of the mean differences.

Multivariate analysis of variance (MANOVA) is simply an ANOVA with several dependent variables. The MANOVA is a type of multivariate analysis used to analyze data that involves more than one dependent variable at a time. Like ANOVA, MANOVA has variations. The one-way MANOVA contains a single factor (independent variable) distinguishing participants into groups and two or more quantitative dependent variables for which three separate one-way ANOVAs has to be done; however, using MANOVA, how the combination of the three variables distinguishes the groups, in one analysis can be computed. There is a two-way or two-factor MANOVA that has two independent variables and two or more quantitative dependent variables.

MANOVA allows us to test hypotheses regarding the effect of one or more independent variables on two or more dependent variables. A MANOVA analysis generates a p-value that is used to determine whether or not the null hypothesis can be rejected. The independent variables for a MANOVA are factors, and each factor has two or more levels. MANOVA includes multiple dependent variables rather than...
a single dependent variable. MANOVA evaluates whether the population means on a set of dependent variables vary across the levels of a factor or factors. That is, a one-way MANOVA tests the hypothesis that the population means for the dependent variables are the same for all levels of a factor (across all groups). If the population means of the dependent variables are equal for all groups, the population means for any linear combination of these dependent variables are also equal for all groups. Consequently, a one-way MANOVA evaluates a hypothesis that includes not only equality among groups on the dependent variable, but also equality among groups on linear combinations of these dependent variables. Thus multivariate analysis of variance (MANOVA) is a complex statistic similar to ANOVA but with multiple dependent variables analyzed together. The dependent variables should be related conceptually, and they should be correlated with one another at a low to moderate level. If they are highly correlated, one runs the risk of multicollinearity. If they are uncorrelated, there is usually no reason to analyze them together. The following is a short list of some of the popularly reported test statistics for MANOVA:

- Wilk’s lambda: pooled ratio of error variances to effect variance plus error variance
- Pillai’s trace: pooled effect variances
- Lawley–Hotelling trace: pooled ratio of effect variance to error variance
- Roy’s largest root: largest eigen value

The most widely used of the available test statistics is Wilk’s lambda that has been used in this research work. Wilk’s lambda is based on three matrices \( W \) (the within group matrix of sums of squares and products), \( T \) (the total matrix of sums of squares and cross-products) and \( B \) (the between group matrix of sums of squares and cross-products), defined as follows:

Where \( X_{ij} \), \( i=1,\ldots,g \), \( j=1,\ldots,ni \) represent the jth multivariate observation in the ith group, \( g \) is the number of groups and \( ni \) is the number of observations in the ith group.
group. The mean vector of the ith group is represented by and the mean vector of all the observations by. These matrices satisfy the equation \( T = W + B \). Wilk’s lambda is given by the ratio of the determinants of W and T, i.e.

\[
\Lambda = \frac{[W]}{[T]} = \frac{[W]}{[W+B]}
\]

The statistic \( \Lambda \) can be transformed to give an F-test to assess the null hypothesis of the equality of the population mean vectors. Wilks lambda ranges from 0 – 1 and the lower the Wilks lambda, the larger the between group dispersion. A small (close to 0) value of Wilks' lambda means that the groups are well separated. A large (close to 1) value of Wilks' lambda means that the groups are poorly separated. Wilks' lambda statistic can be transformed (mathematically adjusted) to a statistic which has approximately F distribution. This makes it easier to calculate the P-value. Often authors will present the F-value and degrees of freedom rather than giving the actual value of Wilks' lambda. Wilks Lambda has the virtue of being convenient and related to the likelihood ratio criterion.

MANOVA was used in this study the differences across the age groups and gender on awareness of own emotions, others’ emotional appraisal, ability to regulate felt emotions, facilitating thinking with emotions, understanding emotions, ability to recognize the emotions of others, ability to manage the emotions of others, empathy, ability to use emotions to facilitate thinking, regulation and management of emotions and self-perceived managerial effectiveness.

CORRELATION OF DEPENDENT VARIABLES - MANOVA is most effective when dependent variables are moderately correlated (.4 - .7). If dependent variables are too highly correlated it could be assumed that they may be measuring the same variable. It is also recommended to not include dependent variables that are supposedly measuring the same construct in MANOVA.
Analysis of variance (ANOVA) is a collection of statistical models used to analyze the differences between group means and their associated procedures (such as "variation" among and between groups). In ANOVA setting, the observed variance in a particular variable is partitioned into components attributable to different sources of variation. In its simplest form, ANOVA provides a statistical test of whether or not the means of several groups are equal, and therefore generalizes t-test to more than two groups. Doing multiple two-sample t-tests would result in an increased chance of committing a type I error. For this reason, ANOVAs are useful in comparing (testing) three or more means (groups or variables) for statistical significance.

ANOVA is a particular form of statistical hypothesis testing heavily used in the analysis of experimental data. A statistical hypothesis test is a method of making decisions using data. A test result (calculated from the null hypothesis and the sample) is called statistically significant if it is deemed unlikely to have occurred by chance, assuming the truth of the null hypothesis. A statistically significant result (when a probability (p-value) is less than a threshold (significance level)) justifies the rejection of the null hypothesis. The definitional equation of sample variance is

\[ s^2 = \frac{1}{n-1} \sum (y_i - \bar{y})^2, \]

where the divisor is called the degrees of freedom (DF), the summation is called the sum of squares (SS), the result is called the mean square (MS) and the squared terms are deviations from the sample mean. ANOVA estimates 3 sample variances:

- A total variance based on all the observation deviations from the grand mean,
- An error variance based on all the observation deviations from their appropriate treatment means and
- A treatment variance.
The treatment variance is based on the deviations of treatment means from the grand mean, the result being multiplied by the number of observations in each treatment to account for the difference between the variance of observations and the variance of means. If the null hypothesis is true, all three variance estimates are equal (within sampling error). The following are the sequential steps in calculating

\[ \text{First step is to find out } \sum_{j=1}^{c} \sum_{i=1}^{r} \chi_{ij} \text{ i.e., the sum of all the observations in all the samples. This sum is denoted by } T. \]

\[ T^2 \]

\[ \text{The correction factor (CF) is calculated as } \text{CF} = \frac{T^2}{N} \]

\[ \text{For each sample (or column or Treatment), find out the sum of the square of the elements (T}_j). \text{ This sum is divided by the number of elements in that sample. The column sum of squares is then given by} \]

\[ \text{CSS} = \sum_{j=1}^{c} \frac{T_{j}^2}{n} - \frac{T^2}{n} \]

\[ \text{The sum of squares is given by subtracting the correction factor from the sum of squares of all the elements. Thus} \]

\[ \text{TSS} = \sum_{j=1}^{c} \sum_{i=1}^{r} \chi_{ij}^2 - \text{---} \]

\[ \text{n} \]
The residual sum of squares (or the sum of squares within the sample) is found out by subtracting the column sum of squares from the total sum of squares

\[ R_{\text{res SS}} = \sum_{i=1}^{n} \sum_{j=1}^{n} \chi_{ij}^2 - \sum_{j=1}^{n} \sum_{i=1}^{n} \]

**Multiple Regression** is a statistical technique that allows us to predict someone’s score on one variable on the basis of their scores on several other variables. Basically, simple regression analysis computes a statistical expression relating one or more predictor variables to the dependant variable (Brightman & Schneider, 1994). The term multiple regression was first used by Pearson and Lee (1908) and employed to learn more about the relationship between independent and dependent variables. Multiple regression allows researchers to explore the question, “what is the best predictor of… “ and implies there is more than one predictor variable (Aczel & Sounderpdian, 2006). This research explores what is the best predictor of Managerial Effectiveness when compared to the factors of emotional intelligence.

Thus, in this research work gender and age emerge as significant predictor variables, which allowed to estimate the criterion variable – the self perceived managerial effectiveness. As widely known, human behaviour is inherently noisy and therefore it is not possible to produce totally accurate predictions, but multiple regression allows us to identify a set of predictor variables (independent variable) which together provide a useful estimate of a participant’s likely score on a criterion variable (dependent variable).
Multiple regression is simply an extension of this principle, where we predict one variable on the basis of several other variables. Having more than one predictor variable is useful when predicting human behaviour, as our actions, thoughts and emotions are all likely to be influenced by some combination of several factors. Using through multiple regression we can test theories (or models) about precisely which set of variables is influencing our behaviour.

Multiple regression is seeking to account for the variance in the scores observed. Thus, people might vary greatly in exhibiting their managerial effectiveness. Some of this variance will be accounted for by the variables that have been identified. For example, awareness on one’s own emotions might account for exhibition of a better managerial effectiveness, and hence it is very useful to know that someone’s awareness on their own emotion helps while trying to predict their managerial effectiveness. In multiple regression we simply measure the naturally occurring scores on a number of predictor variables and try to establish which set of the observed variables gives rise to the best prediction of the criterion variable.

R, R SQUARE, ADJUSTED R SQUARE - R is a measure of the correlation between the observed value and the predicted value of the criterion variable. Here it would be the correlation between the criterion variable (self perceived managerial effectiveness) reported by the respondents and the levels predicted for them by the predictor(emotional intelligence) variables. R Square (R2) is the square of this measure of correlation and indicates the proportion of the variance in the criterion variable which is accounted for by the model – in our example the proportion of the variance in the managerial effectiveness scores accounted for by the set of predictor variables (emotional intelligence). In essence, this is a measure of how good a prediction of the criterion variable can be made by knowing the predictor variables. However, R square tends to somewhat over-estimate the success of the model when applied to the real world, so an Adjusted R Square value is calculated which takes into account the number of variables in the model and the number of
observations (participants) the model is based on. This Adjusted R Square value gives the most useful measure of the success of the model. If, for example we have an Adjusted R Square value of 0.75 we can say that the model has accounted for 75% of the variance in the criterion variable. In this research multiple regression was used to study the influence of emotional intelligence variables on self-perceived managerial effectiveness. More precisely, multiple regression analysis helps us to predict the value of Y for given values of X₁, X₂, ..., Xₖ. In general, the multiple regression equation of Y on X₁, X₂, ..., Xₖ is given by:

\[ Y = b_0 + b_1 X_1 + b_2 X_2 + \ldots + b_k X_k \]

Here \( b_0 \) is the intercept and \( b_1, b_2, \ldots, b_k \) are analogous to the slope in linear regression equation and are also called regression coefficients. They can be interpreted the same way as slope. Thus if \( b_i = 2.5 \), it would indicates that Y will increase by 2.5 units if \( X_i \) increased by 1 unit.

Multicollinearity

When choosing a predictor variable care has to be taken to select one that might be correlated with the criterion variable, but that is not strongly correlated with the other predictor variables. However, correlations amongst the predictor variables are not unusual. The term multicollinearity (or collinearity) is used to describe the situation when a high correlation is detected between two or more predictor variables. Such high correlations cause problems when trying to draw inferences about the relative contribution of each predictor variable to the success of the model.