CHAPTER -4

METHODOLOGY
CHAPTER -4

METHODOLOGY

Of all resources of a company, human resources have become the most valuable one and it acts as the pivot around which all other resources rests on. Treating human resources as the most valuable assets and I.T Sector in Kerala, emerging as a distinct field, a study on stress management has got its own importance since not many studies in detail has been conducted with specific focus on Technopark, Trivandrum.

Many scholars have done a number of studies pertaining to the various aspects of stress and stress management. A couple of books and journals are also found available today pertaining to the various studies in stress management. Detailed literature survey proves that study on the topic stress management with respect to I.T Industry is minimum. More than this, little detailed work on stress and stress management techniques with respect to the executives in Technopark and how these affect executive performance in the context of Techno Park in Trivandrum, Kerala has been done hitherto. The reason for selection of Techno park is that Techno park hosts over 150 IT and ITES companies employing over 13,000 IT professionals, including one PCMM level 5 company, 6 CMMI level 5 and four CMM Level 3 and over 15 ISO 9001 certified companies.

4.1 Objectives of the Study:-

Having the research problem in mind, the study was undertaken with the following objectives:-

Primary Objectives

- To study in detail about the factors causing stress in I.T Industry.
- To understand the various symptoms of stress as experienced by the executives in I.T industry in Kerala with special reference to Techno Park, Trivandrum.
- To study in detail about the stress coping methods as envisaged in I.T industry.
To assess if workplace stress being experienced by the executives is hierarchy specific.

To understand how stress affects performance of executives in I.T industry.

**Secondary Objectives:**

- To understand the basic concepts of stress and its management in general.
- To understand the various models of stress management.

**4.2 Research design** - "A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure." More precisely a research design is the conceptual structure with in which the research is conducted.

This study has been *exploratory research study* or *formulative research study*. Here the formulated problem has been investigated and hypothesis has been developed. Advantage of this design was that it has got inbuilt flexibility because the research problem, broadly defined in the beginning has been transformed into one with more precise meaning.

**When this design was applied the following methods were followed.**

**Survey of related literature** – This was the simplest method of formulating the research problem. Here the past studies and contributions relating to the field of study i.e Stress & Its Management at various organisations/industries were conducted.

**Conducting experience survey** – It involved survey of people who have had practical experience with the problem to be studied. This helped to define the problem more precisely and helped in the formulation of research hypothesis. It also helped to provide the practical possibilities of doing different types of research. This discussion with experienced people in the chosen field of research helped to avoid duplication. As a part of this study many I.T Consultants, People from academia especially from the Management Department & Psychology Department, Practising clinical psychologists Yoga Practitioners, Spiritual leaders etc were interviewed. The respondents were given complete freedom to raise their doubts regarding the topic of study. The contributions received from my research guides were too much valuable. Some good changes were suggested by them which have been incorporated in due course of the research study.
• Analysis of “insight stimulating” examples – The experience of people from academia and corporate was used as a guide to formulate the hypothesis.

The descriptive approach has helped to analyse the various aspects pertaining to the topic of study i.e stress and its management among the executives in I.T sector, through the surveys conducted. The opinion of various executives with respect to stress and its management in the I.T Industry in Kerala was ascertained. The use of historical approach has helped to ascertain various facts and figures pertaining to this study.

4.3 Sampling: The sample consisted of 10% of the total population of “executives” in Technopark, Trivandrum where almost all the I.T companies in Kerala has its presence. This was almost equal to 1300 executives. Since the sample consisted of a heterogeneous group, a stratified random sampling method was adopted as it gave a better representativeness. Here the executive population was divided further into different sub populations called as strata based on personal judgement and on the informal interactions with executives in the H.R Department. Moreover, the division of employees into various strata also gave accurate information and it helped for a better coverage of the executives that is at different levels of hierarchy.

The strata were formed on the basis of considering the years of experience of the executives. A pilot study with employers and the senior employees revealed that experience and age are important variables causing stress. Most of the employees in the Technopark, Trivandrum, Kerala, belonged to a lower age group, this variable was removed and experience in the organisation was considered as an important variable to stratify the population. People with 1-5 years of experience were classified as Strata A (Junior Level Executives), more than 5 to 10 years of experience as Strata B (Middle Level Executives) and the third strata, Strata C (Senior Level Executives). The total sample size taken was 1300. The number of samples selected to each stratum is as follows.

\[ P \text{ represents the population included in each stratum, } N \text{ represents the total sample size} \]

Strata A (Junior Level Executives)

\[ JLE = 6000, P1( \text{Proportion of population selected}) = 6000/10000 \]

\[ JLE = n(\text{total sample size}) \]

[177] Sri Chandrasekharendra Saraswathi Viswa Mahavidyalaya, Kanchipuram
P1=(6000/ 10000) x 1300 = 780 junior level

Strata B (Middle Level Executives)

MLE = n(Total Sample Size),

P2=(3500/ 10000) x 1300 = 455 middle level, For Convenience the same is taken as 450

Strata C (Senior Level Executives)

SLE = n(Total Sample Size),

P3= (500/ 10000) x 1300 = 65 Senior level, For convenience the same is taken as 70

4.4 Data Collection

The relevant data has been collected from the primary sources and secondary sources. The primary data were collected from the employees directly. For this purpose of data collection, a questionnaire was designed and was circulated among the employees. A five point scale questionnaire was constructed after discussing with the research guide and HR Managers of Select companies. A pilot study was conducted in 20 organisations using the same. Suggestions came from different departmental heads, especially from the H.R.Managers. These suggestions were incorporated after discussing with the research guide. Then finally a new questionnaire was developed and administered.

1. Five point scale (Likert scale) questions
2. Dichotomous (i.e Yes /No) questions
3. Interviews with the Executives.

The secondary data were collected from printed books, periodicals, and journals related to the topic of study, newspapers, research thesis and dissertations, statistical data sources like statistical hand books, directories, year books and other sources of published information including various web sites.
4.5 Hypotheses for the study

Based on the available secondary sources and the objectives set, the following hypotheses are framed for analysis.

1. There is no significant difference between gender and job stress among various levels of executives in I.T industry.

2. There is no significant difference in the opinion that problems at home will affect work.

3. There is no significant difference in the opinion that project deadlines will reduce the time spend with family and kids.

4. There is no significant difference in the relationship between feelings of days work causing tension and executives quitting the job.

5. There is no significant difference between the frustration among various levels of executives and irritate customers.

6. Stress training and experience of executives are independent.

7. Symptoms of stress (sleeplessness, frustration, boredom and fatigue) and stress for junior executives in I.T industry are independent.

8. Symptoms of stress (ulcer, non balanced diet, anxiety, frustration) and stress for middle level executives in I.T industry are independent.

9. There is a relationship between stress management programmes adopted by the I.T Companies and reduction of stress.

10. The correlation between stress management programmes adopted by the I.T Companies and reduction of stress is not significant.

11. Mild level of stress and performance of executives are independent.

12. There is no significant difference in the opinion of introducing flexible working hours in IT company’s in Kerala.
4.6 Data Analysis:

Pictorial representations such as graphs, pie charts, tables, figures and the like are used to represent the information accurately, attractively and diagrammatically. The analysis of the data collected through questionnaire is done using the following three methods.

The data so collected was analysed using various statistical tools like Correlation analysis, Rank Correlation, ANOVA, Chi-square test, Weighted Average, and Z test. SPSS has been used as an aid to the researcher for analyzing the data. Graphics and figures have been used to supplement the statistical treatment of data and to draw a more meaningful inference from them.

1) Simple Percentage Analysis

In percentage analysis method, classification and tabulation of the result from the questionnaire is done first. Then the percentage of respondents’ responds for each question in the questionnaire is found. Then these results are shown by the use of diagram. The diagrams mainly include pie charts and bar diagrams. After the analysis the results are interpreted.

Simple percentage method = No. of Respondents / Sample Size x 100

2) Chi Square Test

A chi-square test is any statistical hypothesis test in which the test statistic has a chi-square distribution when the null hypothesis is true, or any in which the probability distribution of the test statistic (assuming the null hypothesis is true) can be made to approximate a chi-square distribution as closely as desired by making the sample size large enough. A chi-square test can be used for testing goodness of fit, testing independence of two attributes.

There are eight steps in chi-square test for testing independence of attributes.

Write the null and alternative hypothesis

For this part we must write two hypotheses which related to situation. We can write whether there are independents or equally distributed. First, \( H_0 \) = which is always independents or equally distributed. Then, \( H_1 \) = which is always dependents or not equally distributed. These hypotheses must be our decision after we done that chi-square test.
State the level of significance
Decide a level of significance
= 0.01 or
= 0.05 which is usually determined before conducting the test of hypothesis. This will be used to refer tables.

Determine the sampling distribution
For this part, calculate degree of freedom. It is defined as the number of observations.
Degree of freedom equals (c-1)(r-1).

Find the critical value
The value of the test statistic which separates the rejection region from the acceptance region is called critical value. It depends on the level of significance and the alternate hypothesis.

Find the rejection region
Using that critical value, Decide acceptance and rejection region. The region left hand side of critical value accept region and right hand side is reject region.

Find the test statistic
Use the given formulae for find the test statistic

\[ \chi^2 = \sum \frac{(O - E)^2}{E} \]

Here, \( O \) = Observed frequencies, \( E \) = Expected frequencies.

Make your decision
A statistical decision is a decision either to reject or to accept the null hypothesis. The decision will depend on whether the computed value of the test criterion falls in the acceptance or rejection region. If the test statistic falls in acceptance region, accept \( H_0 \). If it is in the rejection region, accept \( H_1 \).
Interpret your decision
In this part explain the decision by using those hypotheses which has been written before doing the test.

Analysis Of Variance (ANOVA )
In statistics, Analysis of Variance (ANOVA) is a collection of statistical models, and their associated procedures, in which the observed variance is partitioned into components due to different explanatory variables. In its simplest form ANOVA gives a statistical test of whether the means of several groups are all equal, and therefore generalizes Student's two-sample t-test to more than two groups.
The variance is calculated in two different ways and the ratio of the two values is formed.

MSB, Mean Square Between, the variance between samples, measures the differences related to the treatment given to each sample.
MSW, Mean Square Within, the variance within samples, measures the differences related to entries within the same sample. The variance within samples is due to sampling error.

There are eight steps for in ANOVA.

Write the null and alternative hypothesis
For this part, write two hypotheses which is related to the situation. Write whether the entire mean or standard deviation are same or not. First, $H_0 = \mu_1 = \mu_2 = \mu_3 = \mu_4$. Then, $H_1$ = At least one of the means is different from the others. These hypotheses must be the decision after ANOVA test has been done.

State the level of significance
Decide a level of significance
$\alpha = 0.05$ (5%)
It is used to refer tables.

Determine the sampling distribution
For this part calculate the degree of freedom. The degree of freedom is $(K-1), (N-K)$
$N$= Total of items , $K$= Total of Groups.
Find the critical value

By using level of significance and degree of freedom for numerator and denominator refer to table for find critical value.

Find the rejection region

With using that critical value we must decided accept and reject region. The region left hand side of critical value accept region and right hand side is reject region.

Find the test statistic

We use formulae for find the test statistic.

\[
MSB > MSW, \quad F = \frac{MSB}{MSW}
\]

\[
MSB < MSW, \quad F = \frac{MSW}{MSB}
\]

Calculate the mean and variance for each sample.

Make your decision

A statistical decision is a decision either to reject or to accept the null hypothesis. The decision will depend on whether the computed value of the test criterion falls in the acceptance or rejection region. If the test statistic falls in acceptance region, accept \( H_0 \). If it is in the rejection region, accept \( H_1 \).

Interpret your decision

In this part explain the decision by using those hypotheses which has been written before doing the test.

3) Z-Test

Z-test is based on the Normal Probability Distribution. It is used with large sample sizes (exceeding 30 for both independent samples) or with smaller samples when the data are normally distributed and population variances are known. For Z test, degree of freedom is infinity.
Calculation

The Z measure is calculated as

\[ Z = \frac{p - P}{SE} \]

\[ SE = \sqrt{pq/n} \]

\[ p = \text{Sample proportion} \]
\[ q = 1 - p \]
\[ n = \text{Sample size} \]

Then the interval calculations are done to find out the lower limit and upper limit.

Lower limit = \( p - z \sigma \)

Upper limit = \( p + z \sigma \)

Here the value of level of significance is 5%. Then the corresponding value of Z is 1.96. Standard Error (SE) is hypothesized value of the population of successes.

Using these data, normal distribution graph is drawn. If the value of sample proportion complying \( (p_0) \) lies in the acceptance region, the null hypothesis is accepted and if it is lies in the rejection region, the null hypothesis is rejected.

4) Weighted Arithmetic Average

Need for weighting an average

In the calculation of simple average each item of the series is considered equally important but there may be cases where all item may not have equal importance and, and some of them be comparatively more important than others. The fundamental purpose of finding out an average is that it shall "fairly" represent, so for as a single figure can, the central tendency of the many varying figures from which it has been calculated. This being so, it is necessary that if some item of a series are more important than others, this fact may not be overlooked altogether in the calculation of an average. If we have to find out the average
income of the employees of a certain mill and if we simply add the figures of the income of the manager, an accountant a clerk, a labourer and a watchman and divide the total by five, the average so obtained cannot be a fair representative of the income of these people. The reason is that in a mill there may be one manager two accountant’s six clerks’ one thousand labourers and one dozen watchmen and if it is so the relative important of the figures of their income is not same. Similarly if we are finding out the change in the cost of living of a certain group of people and if we merely find the simple arithmetic average of the prices of the commodities consumed by them, the average would be unrepresentative. All the items of consumption are not equally important. The price of salt may increase by 500 per cent but this will not affect the cost of living to the extent to which it would be affected, if the price of wheat goes up only by 50%. In such cases if an average has to maintain its representative character, it should taken in to account the relative importance of the different item from which it is being calculated. The simple average gives equal importance to all the items of a series. Formula for calculation of weighted arithmetic mean:

\[
\text{weighted average} = \frac{\SigmaWX}{\Sigma W}
\]

Where \( \Sigma Wx \) stands for the sum of the products of the values and their respective weights, and \( \Sigma W \) for the sum of the weights.

5) Correlation Coefficient

Coefficient of Correlation is a mathematical measure of how much one number (such as a share price) can expected to be influenced by changes in another (such as an index). It is closely related to covariance. A correlation coefficient of 1 means that the two numbers are perfectly correlated: if one grows so does the other, and the change in one is a multiple of the change in the other. A correlation coefficient of -1 means that the numbers are perfectly inversely correlated. If one grows the other falls. The growth in one is a negative multiple of the growth in the other. A correlation coefficient of zero means that the two numbers are not related. A non-zero correlation coefficient means that the numbers are related, but unless the coefficient is either 1 or -1 there are other influences and the relationship between the two numbers is not fixed. So if you know one number you can estimate the other, but not with certainty. The closer the correlation coefficient is to zero the greater the
uncertainty, and low correlation coefficients means that the relationship is not certain enough to be useful. The description above is of is a relationship between two variables. It is also possible to calculate correlations between many variables. Adding more variables should increase the correlation; any variables that do not significantly improve the correlation should be excluded.

**Calculation of Coefficient of Correlation. (Karl Pearson’s Formula)**

Karl Pearson, the great biologist and statistician, has given a formula for the calculation of co-efficient of correlation. According to it the coefficient of correlation of two variables is obtained by dividing the sum of the products of the corresponding deviations of the various items of the two series from their respective means by the product of their standard deviations and the number of pairs of observations.

Thus, if \(x_1, x_2, x_3, \ldots, x_n\) are the deviations of various items of the first variable from mean value and \(y_1, y_2, y_3, \ldots, y_n\) are the corresponding deviations of the second variable from its mean value, the sum of the products of these corresponding deviations would be \(\Sigma xy\). If further, the standard deviations of the two variables are respectively \(\sigma_1, \sigma_2\) and if \(n\) is the number of pairs of observation, Karl Pearson’s co-efficient of correlation represented by \(r\) would be

\[
Correlation \ co-efficient \ (r) = \frac{N\Sigma xy - \Sigma x \Sigma y}{\sqrt{(N\Sigma x^2 - (\Sigma x)^2)(N\Sigma y^2 - (\Sigma y)^2)}}
\]

It is clear from the above formula that if \(\Sigma xy\) is positive, the coefficient of correlation would also be a positive figure indicating positive correlation between the two series. If on the other hand, \(\Sigma xy\) is negative; coefficient of correlation would also be negative, indicating that the correlation between the two series is negative. \(\Sigma xy\) would be positive, if generally, positive and negative deviation in one serious are associated with positive and negative deviation in the other serious also. The value of \(\Sigma xy\) would be negative, if generally the positive deviation of one variable are associated with the negative deviations in the other variables and vice versa. If positive and negative deviations of one variable are indifferent associated with the deviations of the other variable the value of \(\Sigma xy\) would be 0 or near it, indicating absence of correlation between the two series. The value of this coefficient of correlation is always between +1 and -1. It cannot exceed unity.

The above formula of Karl Pearson is based on the study of co-variance between two series. The co-variance between two series is written as follows.
Covariance of the Two Series

\[ R = \frac{\text{Covariance}}{\sqrt{(\text{Variance of series 1})(\text{Variance of series 2})}} \]

\[ = \frac{\Sigma xy}{\sigma_1 \times \sigma_2} \]

Calculation of the Pearson’s Coefficient of Correlation

The steps involved are as follows:

1) Find the mean of two series \((x_1 \text{ and } y_1)\)
2) Take the deviations of each item of a series from its mean (x and y).
   Here \(x = (X - \bar{X})\) and \(y = (Y - \bar{Y})\)
3) Square these deviations and obtain the total i.e. \((\Sigma x^2 \text{ and } \Sigma y^2)\).
4) Multiply the respective deviations of the two series and total them \((\Sigma xy)\)
5) Substitute the values in the formula.

Testing the significance of an observed correlation coefficient

To test the hypothesis that the correlation coefficient of the population is zero, i.e., the variables in the population are uncorrelated, we have to apply the following test:

\[ t = \frac{r}{\sqrt{1-r^2}} \times \sqrt{n-2} \]

Here \(t\) is based on \((n-2)\) degrees of freedom. If the calculated value of \(t\) exceeds \(t_{0.05}\) for \((n-2)\), d.f., we say that the value of \(r\) is significant.
If \( t < t_{0.05} \) the data are consistent with the hypothesis of an uncorrelated population.

**Uniqueness of this study**

Not many studies have been conducted in a comprehensive manner in Technopark, Trivandrum, Kerala with respect to stress management. This study assesses stress among executives at different levels in the organizational hierarchy. A model of stress management is also proposed.

**Limitations of the Study**

- There could be yet many other factors that describe stress directly or indirectly.
- Unwillingness on the part of some respondents to spare time due to work pressure.
- Uneasiness in explaining the feelings. The researcher had to convince the respondents by telling them in detail about the academic value and importance of this study.
Reference


xiii) Gupta and Santhosh, “Research Methodology and Statistical Technique” Deepa and Deepa publishers, 2007
