CHAPTER – III

OBJECTIVES AND METHODOLOGY

Stress is a human problem which is noted for its physical, mental, economic, sociological, cultural and political dimensions. Hence, it is studied with avid interest by people in the field medicine, biology, psychology, economics and management sciences. It is essentially an interaction among organizational characteristics that appear threatening to human beings. The ramifications of stress are so complicated, intricate and delicate that a comprehensive study of them would generally require a wide range of variables. Most of them are far beyond the scope of empirical measures. Thus, the investigator is quite aware that stress is an ubiquitous phenomenon. No sector is an exception to it. However, he has chosen to focus on stress among software professionals, as the software sector has been identified as the nerve centre of all industrial and business activities in countries both developed and under developed.

3.1 Nature of the Study

As it is well known, most of the researches in the modern days could be divided into two major heads. They are the innovative researches and the explorative researches. This study on stress among software professionals conforms in principle to explorative researches. Generally speaking, explorative researches constitute the spring board of innovative research. True to its basic characteristic features, explorative researches are endowed with
three important phases. They are, an historic phase, a diagnostic phase and prognostic phase. In the historic phase, the origin of the research problem, the extent to which it has pervaded the software industry, would be subjected to a comprehensive study. The basic definitions of such stress, its various manifestations, the extent to which it has plagued the personal and social life of individuals and the horrendous dimensions it has threatened to assume in the software industry over the years will be subjected to a thread bare analysis in this phase. One can acquire a profound knowledge about the various concepts and theories pertaining to stress and the sciences dealing with the management of stress from a study related to this phase.

The second phase is known as the diagnostic phase. It involves an analytical study of the problem of stress in the software industry. The variables related to stress could be discovered from a statistical survey and they would be short listed for purposes of empirical measurement and qualitative ranking. What kind of a problem stress is and how it can hold the interest of mankind in jeopardy would be delved deep into, in the discussions related to this phase.

In the last phase which is usually called the prognostic phase, statistical, projections would be made to show how the future state of SW professional will be, if stress management systems are not put in place. This phase will provide enough opportunities for the researcher to come out with highly realistic solutions for the awe inspiring problems which emanate from stress.
Thus, it is obvious that it is going to be an indepth study basically intended to evolve a way out from the monstrous problems of stress. However, to carry the study along scientific lines the researcher intends confining himself to the following objectives.

3.2 Objectives

The major objectives of the study are:

1. to subject to an exhaustive study the multifaceted growth of the six sample software firms.
2. to examine in detail the various aspects of the problem of stress haunting the software professionals.
3. to make an age wise and gender wise classification of the software professionals taken as samples and to examine with statistical tools the impact of certain well known stressors on them.
4. to study in detail the problem of stress and work life balance among the software professionals with special reference to their organizational behaviours.
5. to undertake an empirical study of stress and productivity related issues.
6. to bring out in detail the use of on the job stress management programmes, for the software professionals in overcoming stress related issues.
7. to make fruitful and pragmatic suggestions to software firms and the
governments at various levels, to usher in a stress free era.

3.3 Hypotheses

Hypotheses occupy a place of predominant significance in both
explorative and innovative researches. In fact, they give a sense of direction to
researchers. Strictly speaking they constitute the ace point of all analytical
schemes included in any research report. Conceptualization and theorisation
will be practically impossible in the absence of endeavours such as hypothesis
setting, and hypothesis testing. As far as the present study is concerned, the
investigator feels that it is quite indispensable to have the following three
hypotheses verified by statistical means. They are:

1. The organizational culture and behaviours of the software professionals
   are solely responsible for stress.

2. On the job training programme will add to the skill and knowledge of
   the software professionals.

3. On the job stress management programmes can usher the software
   professionals into a stress free era.

The verification of these hypotheses by taking strict recourse to certain
well known and time honoured statistical tools would call for the use of a very
huge mass of both primary and secondary data. The methods of conducting
data collection sought to be adopted and the statistical tools of analysis
intended to be used need a comprehensive description.
3.4 Sampling Procedure

The respondents for the study consist of software professionals employed in high profiled companies dealing with high tech IT products. The questionnaires will be pre-tested initially, to obtain feed backs regarding the clarity of the instructions and questions in the instrument. The comments and suggestions obtained will be treated as the basis for fine tuning the questionnaires before they are distributed. A total of 300 questionnaires will be distributed among the respondents who will be picked up by applying the stratified random sampling technique, from six companies. To start with the population will be stratified into two strata on gender basis. Then a total of 180 samples will be picked up at random from the stratum consisting of male samples. Similarly from the female stratum 120 samples will be picked up at random.

Questionnaires will be mailed to the samples through the human resource managers of the six software companies selected for the study. As the respondents wish to be ensured secrecy about their names, they will be given code numbers. The investigator has duly informed the CEOs of WIPRO, Cognizant, TCS, HCL, Infosys and Microsoft that his study about their companies and their professionals is meant purely for academic purposes only. They will be assured that findings of the study will be used for the further growth of the software companies.
3.4 Data Collection

As it has been alluded to earlier the investigator would require a lot of primary and secondary data.

3.4.1 Primary Data

The primary data required are sought to be collected by applying the sampling technique. The type of sampling which would perfectly suit the present study is the oft used stratified random sampling which has been spelled out in detail above.

3.4.2 Secondary Data

The secondary data required are intended to be collected from journals of national and international repute and research monographs published in leading journals and web sites. Further, efforts would also be made to get in to touch with the annual reports of companies published periodically. These data would be carefully used in the course of the discussions on various aspects of the research problem on hand.

3.5 Statistical Tests

There is a broad variety of statistical tests. The decision on which statistical test to use depends on the research design, the distribution of the data, and the type of variable. In general, if the data is normally distributed, parametric tests will be chosen. If the data is non-normal, then non-parametric
tests are preferred. The table gives the some widely used types of statistical
tests.

<table>
<thead>
<tr>
<th>Statistical Test</th>
<th>Application</th>
</tr>
</thead>
<tbody>
<tr>
<td>Correlation</td>
<td>These tests look for an association between variables</td>
</tr>
<tr>
<td>Pearson correlation</td>
<td>Tests for the strength of the association between two continuous variables</td>
</tr>
<tr>
<td>Spearman correlation</td>
<td>Tests for the strength of the association between two ordinal variables (does not rely on the assumption of normally distributed data)</td>
</tr>
</tbody>
</table>
| **Chi-square**      | **Tests for the strength of the association between two categorical variables** |%
| Paired T-test        | Tests for the difference between two related variables                      |
| Independent T-test   | Tests for the difference between two independent variables                  |
| ANOVA                | Tests the difference between group means after any other variance in the outcome variable is accounted for |
| Simple regression    | Tests how change in the predictor variable predicts the level of change in the outcome variable |
| Multiple regression  | Tests how change in the combination of two or more predictor variables predict the level of change in the outcome variable |

The **Chi-Square** statistic is commonly used for testing relationships between categorical variables.

The Chi-Square measurement is normally used to assess Tests of Independence when utilizing a cross tabulation called as bivariate table. Cross tabulation exhibits the appropriations of two clear cut factors all the while, with the converging point of the classes or categories of the factors appearing in the cells of the table. The Test of Independence assesses whether an association
exists between the two variables by comparing the observed pattern of responses in the cells to the pattern that would be expected if the variables were truly independent of each other. Calculating the Chi-Square statistic and comparing it against a critical value from the Chi-Square distribution allows the researcher to assess whether the observed cell counts are significantly different from the expected cell. A Chi-square test for independence shows how variables are related to one another. It also depends on how the hypothesis has been framed.

The null hypothesis of the Chi-Square test is that there is no relationship existing on the categorical variables in the population and they are independent.

The alternate hypothesis is that there exists a strong relationship among the variables.

The chi square test is based on the difference between the observed and the expected values for each category. The Chi square statistic is defined as

\[
\chi^2 = \sum \frac{(O_i - E_i)^2}{E_i}
\]

where \(O_i\) is the observed number of cases in category \(i\), and \(E_i\) is the expected number of cases in category \(i\). This Chi square statistic is obtained by calculating the difference between the observed number of cases and the expected number of cases in each category. This difference is squared and
divided by the expected number of cases in that category. These values are then added for all the categories, and the total is referred to as the chi squared value.

The null hypothesis is a particular claim concerning how the data is distributed. More will be said about the construction of the null hypothesis later. The null and alternative hypotheses for each chi square test can be stated as

H0: Oi is equal to Ei

H1: Oi is not equal to Ei

If the claim made in the null hypothesis is true, the observed and the expected values are close to each other and Oi – Ei is small for each category. When the observed data does not conform to what has been expected on the basis of the null hypothesis, the difference between the observed and expected values, Oi – Ei, is large. The chi square statistic is thus small when the null hypothesis is true, and large when the null hypothesis is not true.

**Degrees of Freedom**

The number of independent varieties which make up the statistic (eg chi-square) is known as degree of freedom of that statistic. In general, the number of degrees of freedom is the total number of observations - number of constraints imposed on observations. In a set of n observations usually, the degree of freedom for chi-square are (n-1).
Significance Level

The significance level, also denoted as alpha or $\alpha$, is the probability of rejecting the null hypothesis when it is true. For example, a significance level of 0.05 indicates a 5% risk of concluding that a difference exists when there is no actual difference.

If the $p$-value is less than 0.05, the null hypothesis is rejected and the alternate hypothesis can be accepted.

If the $p$-value is greater than 0.05, the null hypothesis should be accepted.

Chi-square statistic

If the statistic value is greater than the critical value (for particular degrees of freedom), the null hypothesis can be rejected.

Matlab code used for chi square test

```matlab
h = chi2gof(x)

h = chi2gof(x,Name,Value)

[h,p] = chi2gof(__)

[h,p,stats] = chi2gof(__)

h = chi2gof(x) returns a test decision for the null hypothesis that the data in vector x comes from a normal distribution with a mean and variance estimated from x, using the chi-square goodness-of-fit test. The alternative hypothesis is that the data does not come from such a distribution. The
result h is 1 if the test rejects the null hypothesis at the 5% significance level, and 0 otherwise.

\[ h = \text{chi2gof}(x, \text{Name}, \text{Value}) \]

test decision for the chi-square goodness-of-fit test with additional options specified by one or more name-value pair arguments.

\[ [h,p] = \text{chi2gof}(__) \]
also returns the \( p \)-value \( p \) of the hypothesis test, using any of the input arguments from the previous syntaxes.

\[ [h,p,stats] = \text{chi2gof}(__) \]
also returns the structure \( \text{stats} \), containing information about the test statistic.

Here the test value is 29.809 which is very much greater than critical value for 4 degrees of freedom i.e.7.45. Thus it is very clear to reject the null hypothesis. Also it is statistically significant because the \( p \)-value is 0.0000 which is less than 0.05. Hence the null hypothesis is rejected and the alternate hypothesis is accepted.
3.6 Statistical Tools

Statistical tools are absolutely essential to render any analysis scientific. In the present study the investigator is interested in using the following tools:

1. Chi-square test to check whether there is any relationship between age and stress due to work overload among women software professionals.

2. Chi-square test to check if there is any relationship between age stresses due to frequent client intervention among female software professionals.

3. Chi-square test to see if there exists any relationship between age and stress due to poor work life balance among female software professionals.

4. Chi-square test to find out the relationship existing between age and stress brought about by frequent ill-health among female software professionals.

5. Chi-square test to see if there exists any relationship between age and stress due to work culture among female software professionals in the software field.

6. Chi-square test to find out the relationship between age and stress due to stretched working hours among female software professionals.

7. Chi-square test to see if there exists any relationship between age and stress due to technology changes among women software professionals.
8. Chi-square test to see if there exists any relationship between age and stress due to the assignment of managerial and technical roles simultaneously to women software professionals.

9. Chi-square test to find out to see the relationship between age and stress due to combination of family and workload problems among the female software professionals.

10. Chi-square test to find out the relationship between age and stress due to the eruption of a negative mind set among the female software professionals.

11. Chi-square test to check if there is any relationship between age and stress due to work overload among male software professionals.

12. Chi-square test to find out if there is any relationship between age and stress due to frequent client intervention among male software professionals.

13. Chi-square test to find out if there is any relationship between age and stress due to poor work life balance among male software professionals.

14. Chi-square test to check if there exists any relationship between age and stress due to stretched working hours among male software professionals.

15. Chi-square test to find out the relationship between age and stress due to work culture among male software professionals.
16. Chi-square test to see if there is any relationship between age and stress due to frequent change of technology among male software professionals.

17. Chi-square test to find out the relationship between age and stress due to the assignment of both the managerial and technical roles to male software professionals.

18. Chi-square test to check if there is any relationship between age and stress due to the simultaneous attack of family and work load problems among male software professionals.

3.7 The Conceptual Frame Work of the Thesis

As it is quite obvious from the title, the studies quite undeniably inter disciplinary and it cause for a conceptual frame work with conceptual probes gleamed from the fields of medicine, psychology, economics, sociology, and political science. These concepts need a vivid description to facilitate the problem of stress in the proper perspective.

1. **Work Stress:** Work stress refers to an individual response to a disturbing factor in the environment and the consequences of such reaction. It is mostly understood as negative but it has a positive dimension also.

2. **Stressors:** Physical or psychological demands from the environment that causes stress are called stressors.
3. **Eustress:** Eustress is often a motivator since in its absence the individual lacks the ‘edge’ necessary for peak performance.

4. **Group Level Stressors:** Group level stressors is caused by group dynamics and managerial behaviour. Managers create stressors to employees by exhibiting inconsistent behaviours, failing to provide support, showing lack of concern, providing inadequate directions, creating high productivity environment and focusing on negative while ignoring good performance. Sexual harassment is yet other group level stressor. Sexual harassment refers to unwelcome conduct of a sexual nature that affects the job related performance of an employee adversely.

5. **Organisational Stressors:** Organisational stressors affect a large number of employees. Organizational climate is a prime example. A high pressure environment that places chronic work demands on employees fuels the stress response.

6. **Extra Organisational Stressors.** Extra organizational stressors are caused by factors outside the organization. For example conflicts associated with ones career and family life are stressful.

7. **Burn out:** Stress, when prolonged results in burn out. A burn out person is hypertensive, encounters chronic exhaustion, faces mental depression and is cynical about everything.

8. **Outcomes:** Behavioural scientists hold that out come of stress is behavioural, cognitive and psychological in nature. It signifies the
negative impact of stress on job satisfaction organisational commitment and performance.

9. **Constructive Stress and Destructive Stress:** Constructive stress is otherwise known as eustress. It acts in a positive way for the individuals and organization. Distress is not healthy for the individual or organization. It may lead to a break down in ones’ physical and mental system.

10. **Personality Traits:** Factors determining personality traits are neuroticism extra version consciousness and agreeableness. Neurotism is characterized by worry, insecurity, defensiveness, tension and self-conscientiousness. Extra version signifies sociability, affection, friendliness and talkativeness. Conscientiousness is associated with self control, ambition, achievement, orientation orderliness, efficiency, organization, plan fullness, responsibility, thoroughness, hardworking ness, and perseverance. Agreeableness has been characterised as trusting, straightforwardness, altruism, compliance, modesty and tender mindedness.

11. **Work Life Balance:** It refers to the balance between ones personal life and professional life. This expression was first used in the middle of 1970s. A balance between work and life is supposed to exist when there is a proper functioning at work and at home with a minimum role of conflict.
12. **Technology Induced Stress and Human Performance:** Stress related to computer aided technology has three effects: It overloads intentional capacity, disrupts executive control over selective attention and disrupts adoptive mobilization.

13. **Work Life Balance Theory:** There are three such theories. These theories derive their explanatory powers from the organizational theory such as institutional theory, resource dependence theory, high commitment theory and situational theory. The institutional theory approaches are made to link management decisions to conform to normative pressures such as organization size, ownership, industry, unionization levels and other factors. Organizational adaptation theory connects the responsiveness of organizations to environmental factors such as proportion of female staff, skill levels. Work processes and senior management values. Higher commitment theory treats work life balance practices as strategic human resource management initiatives taken up in order to generate increased employee commitment to the organization. Situational theory explains the adoption in terms of pressures to increase profitability and productivity and to deal with problems of employee recruitment and retention.

3.8 **Need for the Study**

Though this study is purely explorative in nature the investigator feels that there is every reason to believe that it is the need of the hour, as far as the
SW industry is concerned. Once the SW industry ceases to be stress ridden the growth of the industry will be phenomenal and the material, and the social well being of the SW professionals will grow by leaps and bounds. As stress is a psychological problem, it has to be handled with the utmost dexterity. This study will bring to the fore the factors contributing to the stress factor. Once these factors are understood in the proper perspective, innovations for eradicating stress related problems will emerge thick and fast.

3.9 Limitations of the Study

This study is quite challenging indeed. It would keep the investigator battling against the following three problems throughout this study. They are

a. Paucity of adequate primary and secondary data.

b. Exaggerated accounts from the respondents.

c. Certain unavoidable sampling errors.

However, every possible effort will be made to over come the inadequacies and render the study scientific, pragmatic and unique in every respect.

3.10 Plan of the Study

The entire study will be carried out in keeping with the following plan.

The first chapter is the introductory chapter. Enshrined in it is a comprehensive account about stress and the reasons why the software industry is frequented by it.
A comprehensive review of all available related studies is contained in the second chapter.

Contained in the Third chapter are the objectives and the hypotheses of the study and an elaborate discussion on the methods by which the whole study is proposed to be undertaken.

Chapter four will contain a detailed discussion on the major achievements of six major software companies chosen for the study.

Stress related matters like level of occupational stress and the factors that cause occupational stress amongst software professionals will be subjected to an analytical study in chapter five.

In chapter six an analytical study will be undertaken on the categories of software jobs and the factors inducing stress.

Chapter seven will deal with stress and work life balance problems among software professionals and their bearing on their organizational behaviour.

Chapter eight will contain a discussion on stress and productivity related issues among software professionals.

Chapter nine will contain an illuminating discussion on the stress management programmes launched by software companies and their uses.

A summary of the discussions held and the conclusions arrived at will be enshrined in the last chapter.