CHAPTER-III

OBJECTIVES AND RESEARCH METHODOLOGY

Design of the Study - Method and Procedure:

Methodology makes the most important contribution towards the enrichment of any study. By Methodology of any research, we mean the selection of the representative sample from out of the general population, collecting relevant data, applying appropriate research tools and techniques, analysis and interpretation of the same for scientific investigation of the problem.

Occupational stress is a multifaceted and complex phenomenon (Pestonjee, 1992), the understanding of which is critical for ensuring the well-being of employees and functioning of organizations (Pareek, 1993; Anton, 2009). It may be difficult to attribute occupational stress exclusively to organizations as individuals play a key part in determining the phenomenon (Chauhan & Chauhan, 2005). This makes it important to examine the dynamism of occupational stress at workplace. The present study aims at making a dent in the existing literature by comprehensively investigating the phenomenon of occupational stress. In this chapter, the specific objectives of the study and a detailed snapshot of the methodology followed to achieve the objectives have been presented. This Chapter throws light on the need for the study, the research questions and objectives followed by an exhaustive description of the sources of data used to commensurate the objectives of the study. A detailed discussion on the methodology followed for the purpose of the study is also presented in this section.

NEED FOR THE STUDY

The success of any organization is determined by the team of its people, their caliber and their attitude to succeed and perform. Employing and retaining skilled staff is a huge investment for an organization. Banks are considered to be the nerve centre of an economy and the barometer of its economic perspective. Human Resource Management is important for banks because banking is a service industry. Management of people and management of risk are two key challenges
facing banks. How you manage the people and how you manage the risks determines your success in the banking business. Efficient risk management may not be possible without efficient and skilled manpower. Banking has been and will always be a ‘People Business’. Though pricing is important, there may be other valid reasons why people select and stay with a particular bank. Banks must try to distinguish themselves by creating their own niches or images, especially in transparent situations with a high level of competitiveness. In coming times, the very survival of the banks would depend on customer satisfaction. Those who do not meet the customer expectations will find survival difficult. Banks must articulate and emphasize the core values to attract and retain certain customer segments. Values such as ‘sound’, ‘reliable’, ‘innovative’, ‘international’, ‘close’, ‘socially responsible’, ‘Indian’, etc. need to be emphasized through concrete actions on the ground and it would be the bank’s human resource that would deliver this.

In each and every organization, employees have to be kept fully satisfied, happy and motivated so that productivity, efficiency and performance will be at their peak level. One of the most significant ways to achieve organizational efficiency is to identify the reasons or causes of stress and the ways to cope with it. Frequent studies in this area would help to uncover the underlying causes of stress, its physical and psychological impact on branch managers including employees, and also to evolve new and effective coping strategies to withstand this menace. This study is an earnest attempt in this regard.

Considering the above, the present study has been undertaken to add to the existing literature and to explore the unknown or less explored areas of occupational stress phenomenon.

OBJECTIVES OF THE STUDY

1. To identify the level of Occupational Stress among the Branch Managers of Public Sector Banks in Northern Districts of Tamilnadu.

2. To explore the relative importance of Occupational Stress Dimensions among Branch Managers of Public Sector Bank Branches in Northern Districts of Tamilnadu.
3. To critically evaluate the role of an individual’s employee morale leading to occupational stress.

4. To identify the impact of occupational stressors on coping strategies of public sector Branch Managers.

5. To make a comparative study among the Branch Managers of different Bank centers

6. To identify the relationship between demographic variables and occupational stressors

**RESEARCH APPROACH**

Descriptive research study is used in this study. A descriptive study is one in which information is collected without changing the environment (i.e., nothing is manipulated). Sometimes these are referred to as “correlational” or “observational” studies. The Office of Human Research Protections (OHRP) defines a descriptive study as “Any study that is not truly experimental.” In human research, a descriptive study can provide information about the naturally occurring health status, behavior, attitudes or other characteristics of a particular group. Descriptive studies are also conducted to demonstrate associations or relationships between things in the world around you.

**DATA BASE**

Occupational stress is a psychological state and it differs from individual to individual. On account of this, the study relies on questionnaire responses of Branch Managers on the various measures used. Questionnaire method is the most popular tool not only in organizational research but also in social and behavioural sciences (Harrison et al., 1996). Accordingly, to meet the objectives of the study, the information has been collected from primary sources.
LOCALE OF THE STUDY

The locale for the Study was Restricted to the Northern Districts of Tamilnadu. The Indian Meteorological Department classified Tamilnadu state into four zones namely, Delta, Kongu, North and South. Out of these zones, the North Zone has been taken up for this research. This zone comprises of 7 districts namely Chennai, Kancheepuram, Tiruvallur, Cuddalore, Thiruvannamalai, Vellore and Villupuram. There are totally 26 public sector banks. These 26 banks spread their branches extensively all over Northern Districts of Tamilnadu, totaling 1952 Branches. The Branch heads of each of these 1952 branches form part of this study.

PRIMARY SOURCES

Stress is a multidimensional phenomenon emanating from various facets of life encompassing family, work and role demands. However, the present study is narrowed to the occupational related stress only.

In order to prepare a micro level and an empirical case for occupational stress, the present study has been confined to a particular part of the country of India. Specifically, the Branch Managers of public sector banks of Northern part of Tamilnadu State of India have been contacted at their workplace to identify the various aspects of their occupational stress. The anonymous responses of the Branch Managers of public sector banks have been taken through a well-constructed questionnaire during the period of May 2013 – November 2013.

SAMPLE DESIGN

Branch Managers have been considered as the sampling unit for the study. Participants comprise of Branch Managers who are caught in the storm of multiple tasks in their respective branches. The underlying reason for focusing on this set of people is that one of the major challenges faced by the banks is meeting the ever increasing cut throat competition from all direction which is forcing the Branch
Managers to routinely engage in highly demanding interactions with all the stakeholders. Such interactions with them are demanding stressful work roles. An attempt to meet such demands at work often leads to occupational stress (Wetzels et al., 2000), the responsibility load creates severe stress among workers and managers.” If the individual manager cannot cope with the increased responsibilities it may lead to several physical and psychological disorders among them (Cobb et al., 1975).


Based on the size of the population, a center is classified either into rural, semi-urban, urban, or metropolitan as under:

i) Rural: population less than 10,000

ii) Semi-Urban: 10,000 and above and less than 1 lakh

iii) Urban: 1 lakh and above and less than 10 lakh

iv) Metropolitan: 10 lakh and above
TABLE 3.1
NUMBER OF RESPONSES RECEIVED FROM BANK MANAGERS

<table>
<thead>
<tr>
<th>S. No</th>
<th>Name of the Bank</th>
<th>No of branches (1952)</th>
<th>Sample size (321)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Allahabad Bank</td>
<td>31</td>
<td>3</td>
</tr>
<tr>
<td>2.</td>
<td>Andhra Bank</td>
<td>55</td>
<td>12</td>
</tr>
<tr>
<td>3.</td>
<td>Bank of Baroda</td>
<td>57</td>
<td>8</td>
</tr>
<tr>
<td>4.</td>
<td>Bank of India</td>
<td>65</td>
<td>14</td>
</tr>
<tr>
<td>5.</td>
<td>Bank of Maharashtra</td>
<td>11</td>
<td>3</td>
</tr>
<tr>
<td>6.</td>
<td>Canara Bank</td>
<td>188</td>
<td>43</td>
</tr>
<tr>
<td>7.</td>
<td>Central Bank of India</td>
<td>87</td>
<td>22</td>
</tr>
<tr>
<td>8.</td>
<td>Corporation Bank</td>
<td>64</td>
<td>17</td>
</tr>
<tr>
<td>9.</td>
<td>Dena Bank</td>
<td>18</td>
<td>3</td>
</tr>
<tr>
<td>10.</td>
<td>Indian Bank</td>
<td>356</td>
<td>69</td>
</tr>
<tr>
<td>11.</td>
<td>Indian Overseas Bank</td>
<td>270</td>
<td>21</td>
</tr>
<tr>
<td>12.</td>
<td>Oriental Bank of Commerce</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>13.</td>
<td>Punjab &amp; Sind Bank</td>
<td>4</td>
<td>0</td>
</tr>
<tr>
<td>14.</td>
<td>Punjab National Bank</td>
<td>66</td>
<td>16</td>
</tr>
<tr>
<td>15.</td>
<td>Syndicate Bank</td>
<td>70</td>
<td>13</td>
</tr>
<tr>
<td>16.</td>
<td>UCO Bank</td>
<td>39</td>
<td>3</td>
</tr>
<tr>
<td>17.</td>
<td>Union Bank of India</td>
<td>74</td>
<td>4</td>
</tr>
<tr>
<td>18.</td>
<td>United Bank Of India (UBI)</td>
<td>13</td>
<td>1</td>
</tr>
<tr>
<td>19.</td>
<td>Vijaya Bank</td>
<td>44</td>
<td>13</td>
</tr>
<tr>
<td>20.</td>
<td>IDBI Bank Limited</td>
<td>30</td>
<td>2</td>
</tr>
<tr>
<td>21.</td>
<td>State Bank of India</td>
<td>321</td>
<td>35</td>
</tr>
<tr>
<td>22.</td>
<td>State Bank Of Bikaner &amp; Jaipur</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>23.</td>
<td>State Bank of Hyderabad</td>
<td>10</td>
<td>2</td>
</tr>
<tr>
<td>24.</td>
<td>State Bank of Mysore</td>
<td>21</td>
<td>7</td>
</tr>
<tr>
<td>25.</td>
<td>State Bank of Patiala</td>
<td>8</td>
<td>2</td>
</tr>
<tr>
<td>26.</td>
<td>State Bank of Travancore</td>
<td>27</td>
<td>6</td>
</tr>
</tbody>
</table>

Source: Unpublished Records of Banks
MEASUREMENT

A combination of approaches including questionnaire, interviews and observation have been used in order to collect the primary data.

Principally, the primary data has been collected from the Branch Managers of sample units with the help of well-structured and pre-tested questionnaire. The sectoral requirements of the commercial banks have been taken into consideration while preparing the questionnaire covering a number of facets of occupational stress, its correlates and other information. Considerable time and effort has been devoted to the preparation of questionnaire for sample units for which previous studies on stress, in general, and occupational stress, in particular, have been reviewed exhaustively.

Further, in order to make the questionnaire more relevant to the Branch Managers of public sector banks of northern Tamilnadu state, face-to-face meetings with the Branch Managers of the banks have also been undertaken. During the preparation of draft of questionnaire, online discussions and telephonic interactions with researchers and academicians on the topic of the study have also taken place which has helped in refining the instrument. Various aspects and segments of the questionnaire have also been discussed with various experts.

After giving due consideration to the various comments, suggestions and view-points of the Branch Managers and the experts, a draft questionnaire after self-review was later sent to a few managers and the experts, to ensure its validity. Based upon their observations, a few additions and deletions were made. In order to ascertain the reliability of the questionnaire, a pilot survey of 25 managers of public sector banks was conducted. A few changes in some portions of questionnaire were recommended and with those changes, the final questionnaire was developed which is given in Annexure I.

Demographic profile of the Respondents

Various variables underlying the dynamics of occupational stress namely, organizational variables (managing people, decision making, persistent and result oriented, personal psychology, Inter role distance, role expectation conflict, Role
overload, personal inadequacy, career growth, customer focused), socio-economic variables (age, work experience, gender, marital status, family type, no of companions), personality dispositions (religious attitude, coping style) have been assessed in the study. Employee morale was also measured using the same scale and coping strategies of Branch Managers was measured using three point scales ranging from never to always.

Sources of occupational stress

The development of the research instrument for assessing occupational stress in the present empirical work is inspired by the Organizational Role Stress (ORS) Scale developed by Pareek (1983) and Role Stress Scale by Rizzo et al. (1970) because of their wider acceptability (Aziz, 2004; Dubinsky et al., 1990). However, to take into consideration the sectorial requirements of public sector banks, a 70-item scale has been designed to tap the occupational stress of the branch managers in the commercial banks.

The consideration for sectorial requirements has been made after interviewing a total of 25 Branch Managers before the final designing of questionnaire. Responses on the scale have been collected via the use of five-point likert type scale ranging from ‘strongly disagree’ to ‘strongly agree’. Codes 1, 2, 3, 4, 5 have been assigned to all the positive statements whereas the negative statements have been coded reversely.

Validity test:

The designed occupational stress scale has been subjected to further review by inviting comments from researchers in the area of stress and managers of the banks. On the basis of suggestions given, the scale items were rephrased and few vague and ambiguous items were deleted. This helped in ensuring the face validity of the scale. Construct validity refers to the degree to which the items on an instrument relate to the relevant theoretical construct (Kane 2001; DeVon et al. 2007). Construct validity is a quantitative value rather than a qualitative distinction between ‘valid’ and ‘invalid’. It refers to the degree to which the intended independent variable (construct) relates to the proxy independent variable
(indicator) (Hunter & Schmidt 1990). When an indicator consists of multiple items, factor analysis is used to determine construct validity. Kaiser (1974) recommended accepting values > 0.5 and described values between 0.5 and 0.7 as mediocre; 0.7 and 0.8 as good, 0.8 and 0.9 as great, and > 0.9 as superb. Therefore, using Kaiser’s scale, the sampling adequacy value of 0.7 for the questionnaire was good.

**Reliability test:**

An assessment of the reliability of the scale, using inter-item Cronbach Alpha, resulted into the retention of 70 statements assessing the occupational stress. The estimated value of Cronbach Alpha of the scale is found to be 0.817 which is far above the desired prescribed limit of 0.6 (Nunnally and Bernstein, 1994; ) and establishes its reliability. The evaluation of questionnaire reliability- internal consistency is possible by Cronbach’s α (Cronbach, 1984), which is considered to be the most important reliability index and is based on the number of the variables/items of the questionnaire, as well as on the correlations between the variables (Nunnally, 1994).

**Twenty coping strategies are incorporated in this study to identify the coping strategy used by the respondents. They are:**

1. I will ignore the problem
2. Set priorities and stick to them as much as possible.
3. I give myself a break.
4. I will become emotional and loose temper.
5. Express my anger in constructive ways that do not hurt me or others.
6. I will delay solving the problem.
7. I will simply give up the problem.
8. I will gather more information about the problem.
9. I will leave the office early and go home.
10. Express irritability to self.
11. Talk things over with family and spouse.
12. Try to solve the problem after consulting with friends.
13. Start meditating.
14. Listen to my favorite music.
15. Exercise on a regular basis.
17. I will talk to a counselor.
18. I look for the humor in situations.
19. Plan each day’s activities ahead of time.
20. I try to sleep well

The above said 20 items were regrouped into seven coping strategies developed by Deve and Guest (1989) is incorporated in this study to identify the coping strategy used by the respondents they are;

- Relaxation Technique (RT),
- Strategies for preparation (SOP),
- Utilization of Home resources (UHR),
- Distraction techniques (DT),
- Rational task Oriented Behaviour (RTOB),
- Passive Attempts (PA),
- Emotional relief (ER)

Although there are many coping strategies suggested by researchers, most approaches distinguish between strategies that are active in native and oriented towards confronting the problem and strategies that entail an effort to reduce tension by avoid dealing with the problem. The present study made an attempt to discover the major coping styles adopted by bank Branch Managers to manage their occupational stress.
Responses on the scale are measured via the use of three-point scale ranging from ‘Never’ to ‘always’. The estimated value of Cronbach Alpha is found to be 0.705 which establishes the reliability of the scale.

Srivastava’s (1978) and Brayfield & Roath’s (1951) employee morale scale (comprising twenty questions) were used for measuring the variables of this study. Responses on the scale have been collected via the use of five-point likert type scale ranging from ‘strongly disagree’ to ‘strongly agree’. Codes 1, 2, 3, 4, 5 have been assigned to all the positive statements whereas the negative statements have been coded reversely. The estimated value of Cronbach Alpha of the scale is found to be 0.768 which is far above the desired prescribed limit of 0.6 (Nunnally and Bernstein, 1994; Donio et al., 2006) and establishes its reliability.

1. I would not recommend this job to any of my close friends.
2. The job I’m doing is not important at all, but someone has to do it.
3. This job is so challenging that money does not matter. (R)
4. This job is so interesting that time just flies. (R)
5. We are proud of our organization. (R)
6. We do our best to build up an excellent image before the public. (R)
7. In dealing with the public you just have to get rid of some of them somehow or you will never get your work done.
8. Maintaining the reputation of the organization is not my job, but that of my superiors.
9. My immediate superior is so good that I would like to work for him forever. (R)
10. I have learned a great deal from my boss as far as human skills or managing my work effectively is concerned. (R)
11. Generally, it is true that the superiors understand our problems only when they are snubbed.
12. I do not know, but it appears that many of us would like to be transferred to some other section.

13. I can look forward to a rewarding career if I put in my best in this organization. (R)

14. There are hardly any avenues of promotion open to me.

15. There is no need to prove you by working extra in this organization because promotions are based on seniority and take their own sweet time.

16. I can lead a decent standard of life with the salary I get. (R)

17. People doing comparable work in other organizations are getting more money than us.

18. There are hardly any decision making opportunities for me.

19. This job does not give me a feeling of mental satisfaction.

20. My status within the organization is not high.

The statements in the questionnaires were qualitative and they were quantified on a point scale using Likert scoring system. For taking definite decisions, a grand mean (N=321) and standard deviation were calculated for occupational stress, employee morale and coping strategies. All respondents were then divided into three categories on the basis of mean and standard deviation scores as:

<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of occupational stress</td>
<td>More than 285</td>
</tr>
<tr>
<td>Moderate level of occupational stress</td>
<td>215 to 285</td>
</tr>
<tr>
<td>Low level of occupational stress</td>
<td>Less than 215</td>
</tr>
</tbody>
</table>

Higher score implying higher level of occupational stress and lower score implying lower level of occupational stress.
<table>
<thead>
<tr>
<th>Category</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>High level of employee morale</td>
<td>Less than 60</td>
</tr>
<tr>
<td>Moderate level of employee morale</td>
<td>61 to 80</td>
</tr>
<tr>
<td>Low level of employee morale</td>
<td>More than 81</td>
</tr>
</tbody>
</table>

Higher score implying lower level of employee morale and lower score implying higher level of employee morale.

**HYPOTHESIS**

This work being a pioneering effort continues to be an exploratory one. It has been undertaken with the aim of understanding concepts, relationships, and problems to make suitable suggestions.

On the basis of Review of Literature the following hypotheses have been formulated:

1. The Branch Managers of metropolitan, urban, semi-urban and rural central bank Branch Managers have different levels of occupational stress.
2. There is no significant difference between male and female respondents with respect to different stress levels.
3. There is no significant difference between the ages of the respondents with respect to different stress levels.
4. There is no significant difference between the marital statuses of the respondents with respect to different stress levels.
5. There is no significant difference between the family structures of the respondents with respect to different stress levels.
6. There is no significant difference between the numbers of earning members in the family of the respondents with respect to different stress levels.
7. There is no significant difference between the respondents on the basis of working experience with respect to different stress levels.
8. There is no significant difference between the frequencies of smoking among the respondents with respect to different stress levels.
9. There is no significant difference between the frequencies of consuming alcohol among the respondents with respect to different stress levels.

10. There is no significant difference between the numbers of companions of the respondents with respect to different stress levels.

11. There is no significant difference between the extents of consultations of respondents with their family members with respect to different stress levels.

12. There is no significant difference between the numbers of hours respondents used to sleep well with respect to different stress levels.

13. The Branch Managers of metropolitan, urban, semi urban and rural central banks have different levels of employee morale.

14. Occupational stress has a relationship with employee morale.

15. Occupational stressors and coping strategies are independent.

16. There is no impact of occupational stressors on coping styles.

**STATISTICAL TOOLS**

The statistical tools used for this research work are explained as under:

(1) **For Presentation of Data:** The scores obtained with the help of three scales and their keys have been presented in a pictorial form. The presentation of data has been carried out with the help of pie charts and clustered column charts. These tools of presenting the data have been discussed as under:

**Pie Charts**

A pie chart (or a circle graph) is a circular chart divided into sectors, illustrating proportion. In a pie chart, the arc length of each sector (and consequently its central angle and area) is proportional to the quantity it represents. Together, the sectors create a full disk. It is named for its resemblance to a pie which has been sliced. The pie chart is perhaps the most ubiquitous statistical chart which can be an effective way of displaying information particularly if the intent is to compare the size of a slice with the whole pie. Pie charts are most useful when:
Only one data series is to be plotted.

None of the values to be plotted are negative.

Data to be plotted does not have more than seven categories.

The categories represent parts of the whole pie.

**Clustered Column Charts**

A column chart is a chart with rectangular bars with lengths proportional to the values that they represent. The bars can be plotted vertically or horizontally. Bar charts are used for plotting data which has discrete values and is not continuous. In column charts, categories are typically organized along the horizontal axis and values along the vertical axis. Clustered column charts compare values across categories. These charts are most useful when there are categories that represent:

- Ranges of values.
- Specific scale arrangements (for example, a Likert scale with entries, such as strongly agree, agree, neutral, disagree, strongly disagree).
- Names that are not in any specific order (for example, item names, geographic names, or the names of people).

**2. For Analysis of Data:** The statistical tools used for data analysis in this research work include:

**Mean:**

The mean (or average) is the most popular and well known measure of central tendency. It can be used with both discrete and continuous data, although its use is most often with continuous data. The mean is equal to the sum of all the values in the data set divided by the number of values in the data set.

**Standard Deviation:**

The standard deviation is a measure of the spread of scores within a set of data. Usually, we are interested in the standard deviation of a population. However,
as we are often presented with data from a sample only, we can estimate the population standard deviation from a sample standard deviation. These two standard deviations - sample and population standard deviations - are calculated differently. In statistics, we are usually presented with having to calculate sample standard deviations, and so this is what this article will focus on, although the formula for a population standard deviation will also be shown.

**One way ANOVA**

Anova is a statistical test which analyzes variance. It is helpful in making comparison of two or more means which enables a researcher to draw various results and predictions about two or more sets of data. Anova test includes one-way anova, two-way anova or multiple anova depending upon the type and arrangement of the data.

**Independent (Unpaired) Samples:**

A *t*-test is any statistical hypothesis test in which the test statistic follows a Student's *t* distribution if the null hypothesis is supported. It can be used to determine if two sets of data are significantly different from each other, and is most commonly applied when the test statistic would follow a normal distribution if the value of a scaling term in the test statistic were known. When the scaling term is unknown and is replaced by an estimate based on the data, the test statistic (under certain conditions) follows a Student's *t* distribution.

The independent samples *t*-test is used when two separate sets of independent and identically distributed samples are obtained, one from each of the two populations being compared.

**Pearson product-moment correlation coefficient:**

In statistics, the Pearson product-moment correlation coefficient (sometimes referred to as the PPMCC or PCC, or Pearson's *r*) is a measure of the linear correlation (dependence) between two variables *X* and *Y*, giving a value between +1 and −1 inclusive, where 1 is total positive correlation, 0 is no correlation, and −1 is total negative correlation. It is widely used in the sciences as a measure of the
degree of linear dependence between two variables. It was developed by Karl Pearson from a related idea introduced by Francis Galton in the 1880s.

Pearson's correlation coefficient between two variables is defined as the covariance of the two variables divided by the product of their standard deviations. The form of the definition involves a "product moment", that is, the mean (the first moment about the origin) of the product of the mean-adjusted random variables; hence the modifier *product-moment* in the name.

**Regression Analysis**

Regression analysis is a statistical process for estimating the relationships among variables. It includes many techniques for modeling and analyzing several variables, when the focus is on the relationship between a dependent variable and one or more independent variables. More specifically, regression analysis helps one understand how the typical value of the dependent variable (or 'Criterion Variable') changes when any one of the independent variables is varied, while the other independent variables are held fixed. Most commonly, regression analysis estimates the conditional expectation of the dependent variable given the independent variables – that is, the average value of the dependent variable when the independent variables are fixed. Less commonly, the focus is on a quintile, or other location parameter of the conditional distribution of the dependent variable given the independent variables. In all cases, the estimation target is a function of the independent variables called the regression function. In regression analysis, it is also of interest to characterize the variation of the dependent variable around the regression function, which can be described by a probability distribution.

**Factor analysis**

Factor analysis is a statistical method used to describe variability among observed, correlated variables in terms of a potentially lower number of unobserved variables called factors. For example, it is possible that variations in four observed variables mainly reflect the variations in two unobserved variables. Factor analysis searches for such joint variations in response to unobserved latent variables. The observed variables are modeled as linear combinations of the potential factors, plus
"error" terms. The information gained about the interdependencies between observed variables can be used later to reduce the set of variables in a dataset. Computationally this technique is equivalent to low rank approximation of the matrix of observed variables. Factor analysis originated in psychometrics, and is used in behavioral sciences, social sciences, marketing, product management, operations research, and other applied sciences that deal with large quantities of data.

Factor analysis is related to principal component analysis (PCA), but the two are not identical. Latent variable models, including factor analysis, use regression modeling techniques to test hypotheses producing error terms, while PCA is a descriptive statistical technique.