METHOD AND PROCEDURE

Research methodology is a way to systematically solve the research problem where one studies the various steps that are generally adopted by a researcher in studying the research problem along with the logic behind them. The basic purpose of research is to find out solution to certain questions by making use of the scientific and systematic techniques. Before finding an appropriate solution to a problem, one has to design a way in which he wants to proceed in future, known as development of research design. Research design is concerned with the methods and ways in which the investigator manages the situation to study the selected problem. 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. In simple words, research design is a process of deliberate application of research methods directed towards bringing an expected situation under control. The problem adopted for the research was Job Satisfaction of College Teachers of Punjab with respect to their Personal, Professional and Organizational Characteristics.

SAMPLING FRAME

The universe of the study was college teachers of Punjab. Keeping in view the limitation of time and other factors, it was not possible to cover the entire population of the region. The sampling method used here was stratified non-probability convenience sampling. The sampling frame for the present study was General Degree Courses Colleges affiliated to Guru Nanak Dev University (GNDU), Amritsar. There were eight universities in Punjab—three general, namely, Guru Nanak Dev University, Amritsar (GNDU), Punjabi University, Patiala (Pbi.U), Punjab University, Chandigarh (PU) and five professional universities, namely, Punjab Technical University, Jalandhar (PTU), Rajiv Gandhi National Law University, Patiala (RGNLU), Baba Farid University of Health Sciences, Faridkot (BFUHS), Guru Angad Dev Veterinary and Animal Sciences University, Ludhiana (GADVASU) and Punjab Agricultural University, Ludhiana (PAU). Keeping in view, the familiarity of the location of college and easy accessibility of the investigator – GNDU was selected for the present investigation. There were two types of colleges, namely, Professional and General Degree courses colleges. Majority of the Professional colleges were of the recent origin and hence not included in the present study. There were 87 Degree Courses colleges affiliated to GNDU managed by three different types of
management, namely, Government Owned Colleges (GOC), Government Aided Colleges (GAC) and Self-Financed Colleges (SFC) situated in both the rural and urban areas of the state.

For classification of different colleges according to location, definition used in 2001 census by the Census Commission of India had been taken into consideration. According to this criterion, rural area was defined as an area having less than one lakh of population i.e. rural and semi-urban area. On the other hand, area having more than one lakh of population was considered as an urban area. There were only 14 towns (Ludhiana, Patiala, Amritsar, Bathinda, Jalandhar, Pathankot, Hoshiarpur, Batala, Moga, Abohar, Sahibzada Ajit Singh Nagar, Malerkotla, Khanna, and Phagwara) which were considered under urban area (Source: Statistical Abstract of Punjab, 2008, an annual publication of Economic and Statistical Organization, Government of Punjab, Chandigarh). The distribution of selected colleges according to location of college and type of management (presented in Table 3.1 and Fig 3.1) revealed that one-half of the total colleges affiliated to GNDU were under Self-Financed management. There were only 13 Government Owned colleges (GOC), majority of which were situated in rural area. Since, the number of Government Owned colleges affiliated to GNDU was very small, coupled with lower number of teachers, all the GOC were selected for this study. Among the Government Aided Colleges (GAC) and Self Financed Colleges (SFC), 50 per cent of the colleges were selected randomly for the present investigation. Hence, 51 colleges were selected as first stage of sampling. The selection of colleges is shown in Table 3.1 and Figure 3.1. Further, irrespective of the total staff of the selected colleges, the faculty available was selected purposely as second and ultimate unit of sample for this study.

SAMPLE SIZE

Initially, data was collected from 600 college teachers. But the data of 400 respondent college teachers was complete and reliable and hence, selected for data analysis and interpretation. Therefore, the total sample according to location of college, gender and type of management consisted of 400 respondent college teachers selected from 51 General Degree Courses colleges of GNDU, Amritsar comprising of male and female teachers, single or married (Table 3.2 and Fig 3.2). Nearly three-fourth (72 per cent) of the college teachers was from urban area and the remaining (28 per cent) was from the rural area. Furthermore, nearly two-third (67.5 per cent) of the
sample consisted of female college teachers and the remaining (32.5 per cent) were male college teachers.

**Table 3.1: Distribution of Selected Colleges according To Location of college and Type of Management**

<table>
<thead>
<tr>
<th>Location of college/Type</th>
<th>Government Owned Colleges</th>
<th>Government Aided Colleges</th>
<th>Self Financed Colleges</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Total</td>
<td>Percentage</td>
<td>Total</td>
<td>Percentage</td>
</tr>
<tr>
<td>Urban</td>
<td>5     (5)</td>
<td>100.00</td>
<td>12   (24)</td>
<td>50.00</td>
</tr>
<tr>
<td>Rural</td>
<td>8     (8)</td>
<td>100.00</td>
<td>4    (7)</td>
<td>57.14</td>
</tr>
<tr>
<td>Total</td>
<td>13    (13)</td>
<td>100.00</td>
<td>16   (31)</td>
<td>51.61</td>
</tr>
</tbody>
</table>

Figures in brackets are total number of colleges affiliated to Guru Nanak Dev University, Amritsar.
Source: College Branch, GNDU, Amritsar

The distribution of respondent college teachers according to location, gender and type of management was reported in Table 3.2 and Fig 3.2

**Table 3.2: Distribution of Respondent College Teachers according to Location of college, Gender and Type of Management**

<table>
<thead>
<tr>
<th></th>
<th>Male</th>
<th>Female</th>
<th>Total (M + F)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>GO C</td>
<td>GA C</td>
<td>SFC</td>
</tr>
<tr>
<td>Rural</td>
<td>22   (45.8)</td>
<td>6    (8.8)</td>
<td>12   (19.3)</td>
</tr>
<tr>
<td>Urban</td>
<td>26   (54.2)</td>
<td>62   (91.2)</td>
<td>2    (3.0)</td>
</tr>
<tr>
<td>Total</td>
<td>48   (36.3)</td>
<td>68   (52.3)</td>
<td>14   (10.5)</td>
</tr>
</tbody>
</table>

Figures in brackets are percentages.
Fig. 3.1 Diagrammatic Representation of Selection of Colleges
DATA COLLECTION

Two types of data were taken into consideration i.e. primary and secondary data. The major emphasis was on collecting primary data. Secondary data had been used to make things more clear and to supplement the results.

a) Primary Data: The primary source of collecting information was directly approaching the teachers of different General Degree Courses Colleges of Guru Nanak Dev University, Amritsar to fill the questionnaires.

b) Secondary Data: To supplement the results, information was collected through consulting different journals, e-journals, websites, dissertations, books, various government publications and magazines etc. These sources proved very fruitful during the preparation and completion of research study.

TOOLS USED

Various standardized questionnaires were used to study the level of job satisfaction of college teachers with respect to their personal, professional and organizational characteristics. These questionnaires were selected because of their suitability to the sample and their being able to meet the various standards.

A. To test the personal characteristics of respondent college teachers, following tests were used:

1. To test Intelligence, Revised version of A Group Test of General Mental Ability (A point scale of general ability for college educated adults) by Jalota.


B. To assess the professional characteristics of respondent college teachers, self-prepared questionnaire by the investigator was used.

C. To test the organizational characteristics of respondent college teachers, following tests were used.

1. Organizational Climate scale developed by Pethe, Chaudhary and Dhar (2001).

2. Leadership behaviour scale developed by Hinger(2005).

D. Job Satisfaction scale by Singh and Sharma (1999) was used to study the level of job satisfaction of college teachers.
A. Personal Characteristics Tools

1. Intelligence

Revised version of A Group Test of General Mental Ability (A point scale of general ability for college educated adults) developed by Jalota was used as a measure of intelligence because of its reliability and validity, easy to administer, its popularity and wider use. The test carried hundred questions administered in 25 minutes only. Another 20 minutes extra were given which were required for seating the candidates, the distribution of answer sheets, the explanation of examples and the collection of the test material.

For scoring, the scoring key was placed on the answer sheet in such a way that the key answers to page 1 lie on the column for serial no. 1 to 20, and the other columns of the key covered the appropriate columns of serial numbers. By comparing the answers, one was able to score the answer sheet in a couple of minutes. Every right answer was given one score and every unattempted and wrong answer was given zero score. The raw total score was taken in the record sheet when all columns had been scored; added and put the sum at the space marked ‘Total score’ and signed the answer sheet. The total score can be interpreted as a grade on a 7-point intelligence grading Table 3.3. The centre position can be determined by reference to the centile norm Table 3.4. A useful I.Q. Reckoner is provided for the range 60 to 140.

Table 3.3  Intelligence Grades as Adopted

<table>
<thead>
<tr>
<th>P.E.</th>
<th>Score</th>
<th>Grade</th>
</tr>
</thead>
<tbody>
<tr>
<td>+3 to above</td>
<td>85+</td>
<td>Very superior</td>
</tr>
<tr>
<td>+2 to +3</td>
<td>73-84</td>
<td>Superior</td>
</tr>
<tr>
<td>+1 to +2</td>
<td>62-73</td>
<td>Bright average</td>
</tr>
<tr>
<td>-1 to +1</td>
<td>40-62</td>
<td>Average</td>
</tr>
<tr>
<td>-1 to -2</td>
<td>29-40</td>
<td>Dull Average</td>
</tr>
<tr>
<td>-2 to -3</td>
<td>18-29</td>
<td>Borderline</td>
</tr>
<tr>
<td>-3 below</td>
<td>0-17</td>
<td>Mental defect</td>
</tr>
</tbody>
</table>

Table 3.4  Norms of Intelligence as Adopted

<table>
<thead>
<tr>
<th>Grade</th>
<th>Range</th>
<th>%ile</th>
<th>Score</th>
<th>I.Q.</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>88+</td>
<td>97%</td>
<td>84+</td>
<td>140</td>
<td>85</td>
</tr>
<tr>
<td>9</td>
<td>80-87</td>
<td>95%</td>
<td>77-83</td>
<td>130</td>
<td>80</td>
</tr>
<tr>
<td>8</td>
<td>71-79</td>
<td>90%</td>
<td>72-76</td>
<td>125</td>
<td>76</td>
</tr>
<tr>
<td>7</td>
<td>63-70</td>
<td>80%</td>
<td>67-71</td>
<td>120</td>
<td>72</td>
</tr>
<tr>
<td>6</td>
<td>55-62</td>
<td>75%</td>
<td>64-66</td>
<td>115</td>
<td>68</td>
</tr>
<tr>
<td>5</td>
<td>47-54</td>
<td>70%</td>
<td>62-63</td>
<td>110</td>
<td>64</td>
</tr>
<tr>
<td>4</td>
<td>39-46</td>
<td>60%</td>
<td>57-61</td>
<td>105</td>
<td>58</td>
</tr>
<tr>
<td>3</td>
<td>31-38</td>
<td>50%</td>
<td>53-56</td>
<td>100</td>
<td>51</td>
</tr>
<tr>
<td>2</td>
<td>23-30</td>
<td>40%</td>
<td>48-52</td>
<td>95</td>
<td>46</td>
</tr>
<tr>
<td>1</td>
<td>15-22</td>
<td>30%</td>
<td>43-47</td>
<td>90</td>
<td>40</td>
</tr>
<tr>
<td>0</td>
<td>0-14</td>
<td>25%</td>
<td>40-42</td>
<td>85</td>
<td>34</td>
</tr>
<tr>
<td></td>
<td></td>
<td>20%</td>
<td>36-39</td>
<td>80</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td></td>
<td>16%</td>
<td>27-35</td>
<td>75</td>
<td>24</td>
</tr>
<tr>
<td></td>
<td></td>
<td>5%</td>
<td>22-26</td>
<td>70</td>
<td>19</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2%</td>
<td>16-21</td>
<td>65</td>
<td>15</td>
</tr>
</tbody>
</table>


2. Socio-Economic Status Scale

Socio-Economic status scale developed by Bhardwaj (1984) was used for literate people. It could be administered on illiterate people also but only by personal interviews. It was self-administering scale which gave better results with individual test rather than with group testing. There was no time limit to record the responses in this scale. Ordinarily, an individual took 15 minutes to record his responses.

Scoring key gave weightage score for each item. Every alternative of any of the items gave weighted score which served to provide the score if any ticked item present in the horizontal plane for father, mother and case. The separate scores for each location of college were than to be totalled. These totals of the scores for each separate location of college were thereafter to be given, provided at the vertical end of
each location of college for father, mother and case. The location of college wise total of scores for father, mother and case were converted into scores which were given at mean 50 and of standard deviation 10. Than this location of college wise Z-scores were put to location of college wise weighted scores for father, mother and case separately in the provided space of the table given in the test. After the completion of the test, the analysis of any status out of nine statuses or all of the nine statuses was easily done with the help of the charts given in the manual.

The reliability of the test of the revised scale had been calculated by test and retest method. The scale was administered on a sample of 200 students and after 21 days, it was re-administered on the same sample. The correlation between two scores was calculated by Spearman-Brown formula. The reliability coefficient correlations were found in seven location of colleges (family, social, education, profession, caste, total assets, monthly income and scale (as a whole).

The content validity of the revised scale, since location of colleges and then items solely based on research proven items, is high and promising. Interpretation of any status or all of the nine types of statuses can be made with the help of T-scores; categories of any status can be ascertained with the help of table given as follows:

<table>
<thead>
<tr>
<th>Category</th>
<th>Range of scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Upper class</td>
<td>70 and above</td>
</tr>
<tr>
<td>2. Upper middle class</td>
<td>60-69</td>
</tr>
<tr>
<td>3. Middle class</td>
<td>40-59</td>
</tr>
<tr>
<td>4. Upper lower class</td>
<td>30-39</td>
</tr>
<tr>
<td>5. Lower class</td>
<td>39 and below</td>
</tr>
</tbody>
</table>


3. **Life Satisfaction Scale**

Life satisfaction scale developed by Alam and Srivastava (2001) was used to find out the adjustment problems faced by individuals in rapidly changing societies. 60 items related to six location of colleges viz. health, personal, economic, marital, social and job, were put in the scale to test life satisfaction of Respondent College Teachers. The responses were to be given in yes/no. Yes responses indicated the
satisfaction. There was no time limit to complete yet it takes 20 minutes to complete the questionnaire.

875 adult males and females drawn from rural and urban location of colleges of Azamgarh comprised the representative sample over which the scale was standardized. Individuals were selected for the sample keeping in view different characteristics e.g. educational level, intelligence, and socio-economic status and personality characteristics. The range of age was between 18 to 40 years.

Test-retest reliability was computed after a lapse of 6 weeks. The estimated quotient was 0.84. The validity of the scale was obtained by correlating it with Saxena’s Adjustment Inventory and Srivastava Adjustment Inventory. The quotient estimated was 0.74 and 0.82 respectively. The scale had face validity as well as content validity.

B. Professional Characteristics Questionnaire

Self prepared questionnaire was used to assess the professional characteristics of college teachers. It was pretested on a sample of 20, before administering to the Respondent College Teachers. Questionnaire covered three aspects, namely, general background, financial aspect and academic aspect. Financial aspect was further divided into two sub-sets, namely, financial cover (salary) and security cover. Financial aspect covered as many as 7 questions while Academic aspect covered 14 questions. All the questions were assigned one score each for ‘Yes’ answer and otherwise ‘zero’. In the general background, teaching experience was taken as such. Four scores were assigned for Permanent/Regular/Adhoc teachers in GOC of rural/urban area. Three scores were assigned for permanent/regular teachers in GAC of rural/urban area. Two scores were given to permanent/regular teachers in SFC in rural/urban area and one score was given for Adhoc/Part-time teachers in GAC/SFC in rural/urban area. Similarly, 4,3,2,1 scores were awarded to professor, reader, senior lecturer and lecturer respectively. A score of 1, 2, 3 was given to respondent college teachers having PG, M.Phil and Ph.D. Sum of all these scores on all the aspects was taken as Professional Characteristics (PC) score

C. Organizational Climate Scale

Organizational climate scale developed by Pethe, Chaudhari and Upinder Dhar (2001) was used which consisted items compiled in the form of a bipolar scale with affirmative and negative poles or ends.
The reliability of the scale was determined by calculating reliability coefficient on a sample of 205 subjects comprised of executives and supervisors. The split half reliability coefficient was 0.87.

Besides face validity, as all items were related with the variable under focus, the scale has high content validity. The items of the scale are directly related to the concept of organizational climate. In order to find out the validity from the coefficient of reliability (Garret, 1981), the reliability index was calculated, which indicated high validity on account of being 0.93. To ensure the internal consistency of the scale, the inter-item correlation was calculated along with the total item correlation.

The scale was administered on 205 subjects. The scores obtained were subjected to factor analysis and four factors were identified. These are

1) Results, rewards and interpersonal relations
2) Organizational processes
3) Clarity of roles and sharing of information
4) Altruistic behaviour

The scale can be used for research and survey purposes. It can also be used for individual assessment. It was self administering and does not require the services of a highly trained tester. It was eminently suitable for group as well as individual testing. The scale purported to measure organizational climate of which the subjects have some awareness.

Norms of the scale were available on a sample of working population. These norms can be regarded as reference points for interpreting the organizational climate scores. Individuals with scores within normal range can be considered to perceive the level of organizational climate as favourable, those with high and low score can be considered to perceive the level of organizational climate as highly favourable and unfavourable respectively.
### Table 3.6: Showing Norms for Interpretation of Raw Scores of Organizational Climate Factors as Adopted

<table>
<thead>
<tr>
<th>Factors</th>
<th>1 Results, Rewards &amp; interpersonal relations</th>
<th>2 Organizational Processes</th>
<th>3 Clarity of roles &amp; sharing of information</th>
<th>4 Altruistic behaviour</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal Range (Favourable)</td>
<td>33-53</td>
<td>30-45</td>
<td>14-23</td>
<td>4-6</td>
<td>84-124</td>
</tr>
<tr>
<td>High Score</td>
<td>54 &amp; above</td>
<td>46 &amp; above</td>
<td>24 &amp; above</td>
<td>7 &amp; above</td>
<td>125 &amp; above</td>
</tr>
<tr>
<td>Low Score</td>
<td>32 &amp; below</td>
<td>29 &amp; below</td>
<td>13 &amp; below</td>
<td>3 &amp; below</td>
<td>83 &amp; below</td>
</tr>
<tr>
<td>Items Nos.</td>
<td>2, 3, 4, 5, 10, 11, 12, 14, 15</td>
<td>13, 16, 17, 18, 19, 20</td>
<td>6, 7, 8, 9</td>
<td>1</td>
<td>all</td>
</tr>
</tbody>
</table>


### 2. Leadership Behaviour Scale

Leadership Behaviour scale developed by Hinger (2005) was used to test leadership behaviour of the college teachers. A six dimensional scale comprising 30 items was used. These were:

1. **Emotional Stabilizer (ES)**
2. **Team Builder (TB)**
3. **Performance Orientor (PO)**
4. **Potential Extractor (PE)**
5. **Socially Intelligent (SI)**
6. **Value Inculcator (VI)**

These were operationalized in terms of the following criteria:

### 1. Emotional Stabilizer (ES)

Capable of providing emotional stability to one’s employees. Motivating, inspiring, and energizing them to overcome major socio-economic hurdles. Apart from the organizational requirement, ones’ ego needs must be kept under control, as depicted by
a) Balanced behaviour
b) Empathy
c) Absence of prejudice
d) Substantial patience, and
e) Managing the emotions of self and others.

2. Team Builder (TB)
   Able to have proper alliance, with clear communication with members of the team so as to motivate them to work for a vision with dedication, must also entertain multiple perspectives by appreciating, conversing and diverging viewpoints for better achievement. The leader must encourage team work and
   a) Prefer collaborative decision making
   b) Resolve problems of members
   c) Maintain team cohesion
   d) Possess team spirit, and
   e) Avoid unhealthy competition among members

3. Performance Orientor (PO)
   Shows concern for the accomplishment of tasks in stipulated time by instituting strategies that are adaptable to change for enhancing overall organizational performance. The leader should emphasize
   a) Prioritization of work
   b) Achievement motivation
   c) Adherence to high standards of performance
   d) Regular rejuvenation, and
   e) Impregnable (Resists all attacks).

4. Potential Extractor (PE)
   Focuses on development and utilization of skills and abilities of individuals. The capabilities of a leader would lie in exploring and channelizing the latent potentialities in a proper manner so that their fuller utilization is ensured. This requires
   a) Identification of potentials
   b) Providing proper opportunities to employees
   c) Proper channelization of individual’s potentials
   d) Delegating adequate authority, and
   e) Building confidence for overall development
5. **Socially Intelligent (SI)**

Develops relationship based on empathy, support, challenge, and respect with successive personal transformations according to opportunities and situations. The leader should have abilities of
a) Proper use of body language
b) Good listener and analyzer
c) Clarifying limitations and constraints
d) Resolving conflicts tactfully and
e) Keeping track of overall latest developments.

6. **Value Inculcator (VI)**

The inculcation of values promotes axiological potentials in the organization by percolating competencies down the various levels of organization. This would require
a) Commitment to work
b) Organizational loyalty
c) Time management.
d) Trust based relationship, and
e) Acceptance for mistakes and failures.

This scale consisted of 30 items in which 24 items were positive and 6 items were negative. It could be administered to higher and middle level male and female executives of private and public sector undertakings.

The scale comprised of 30 items had five alternative answers viz. ‘always’, ‘usually’, ‘sometimes’, rarely and ‘never’. The subject was asked to choose an alternative for each item, which best characterizes his/her behaviour.

The answers of the respondent college teachers given in terms of five categories viz. always, usually, sometimes, rarely and never were assigned scores 5, 4, 3, 2 and items (6, 11, 16, 21, 25 and 26) are to be scored in reverse order i.e. 1 for 5, 2 for 4, 3 for 3, 4 for 2 and 5 for 1).

The total score ranged from 30 to 150. Each leadership dimension score ranged from 5 to 30. The scores on each dimension were summed up to find out total leader behaviour score. All the scores on six dimensions were to be summed up and then classified as highly effective, effective and ineffective. Construct validity was found to be 0.49.
A comprehensive insightful multivariate analysis was used for all sub-scales of leader behaviour at the initial level and a keen observation of Principal Component Matrix (PCM) of Multiple Factorial Analysis (MFA) was found to be nonlinear and Thurston’s PCM was found to be non-specific. Owing to the spurious nature of ‘r’ factor loadings and their orthogonal rotations merely clumped the variances instead of representing it from true variance.

Hence, in all forms of sub-samples, the basic nature of homogeneity was found. It suggests that these dimensions may not be distinctly separated but nevertheless it measures overall behaviour of the leader in an organizational setting.

**RELIABILITY**

Selection of items was made on the basis of the agreement split half reliability using Spearman-Brown formulae 0.69. Norms of the scale were available on a sample of different working groups. These norms can be considered as reference points for analyzing leader behaviour.

**Table 3.7: Leader Behaviour Effectiveness Scores as Adopted**

<table>
<thead>
<tr>
<th>Leader Behaviour (Effectiveness)</th>
<th>Scores</th>
</tr>
</thead>
<tbody>
<tr>
<td>High</td>
<td>110-150</td>
</tr>
<tr>
<td>Medium</td>
<td>70-109</td>
</tr>
<tr>
<td>Low</td>
<td>69 and below</td>
</tr>
</tbody>
</table>


**Table 3.8: Dimensions-wise Norms for Interpretation of Raw Scores as adopted**

<table>
<thead>
<tr>
<th>Dimensions/ LB Effectiveness</th>
<th>Emotional stabilizer (ES)</th>
<th>Team Builder (TB)</th>
<th>Performance Oriento (PO)</th>
<th>Potential Extractor (PE)</th>
<th>Socially Intelligent</th>
<th>Value Inculcator (VI)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Medium</td>
<td>10-19</td>
<td>10-19</td>
<td>10-19</td>
<td>10-19</td>
<td>10-19</td>
<td>10-19</td>
</tr>
<tr>
<td>Low</td>
<td>9 &amp; below</td>
<td>9 &amp; below</td>
<td>9 &amp; below</td>
<td>9 &amp; below</td>
<td>9 &amp; below</td>
<td>9 &amp; below</td>
</tr>
</tbody>
</table>

Utility

This scale can be used to measure the various dimensions of leader behaviour of white-collar employees in private and public organizations.

Limitations

In such tests, respondent college teachers can manipulate their responses according to the purpose of the test resultantly; social desirability and faking of responses may take place. Therefore, at the time of individual diagnosis, other evidences should be taken in.

E. Job Satisfaction Scale: Job Satisfaction scale developed by Singh and Sharma (1999) was used. This scale had drawn motivation from the works of Hoppock (1935), Morse (1953), Kahan (1951), Herzberg (1959), Kelliberg (1977), Rajbir (1976), Sokhey (1975), Pestongee (1973) and Muthaya (1984). The level of job satisfaction was measured in two types of location of colleges – job-intrinsic (factors lying within the job itself) and job-extrinsic (factors lying outside the job). Job intrinsic location of college was further conceptualized as job-concrete (say: excursions, working conditions etc.) and job-abstract (say: cooperating, democratic, functioning etc.) job-extrinsic location of college as consisting of three components, viz. psycho-social aspects, financial aspects and community/nation growth aspect. For the final scale only 30 items were selected. Each statement has give alternatives from which a respondent has to choose any one which candidly expresses his response.

The scale was personally administered to each of the 320 professionals consisting of an equal number of engineers, doctors, advocates and college teachers as per stratified random technique from all over the state of Punjab. The rural and urban area was given due representation. The scale in its totality or in parts depending upon the requirements can be administered to any category of professionals. It is comprehensive and omnibus in nature.

The scale had both positive and negative statements. Items at Sr. No. 4, 13, 20, 21, 27 and 28 are negative, others are all positive. The positive statement carried a weightage of 4, 3, 2, 1 and 0 and the negative ones a weightage of 0, 1, 2, 3 and 4. The total score gave a quick measure of satisfaction/dissatisfaction of a worker towards his job.
The test-retest reliability worked out to be 0.978 with N=52 and a gap of 25 days. The scale compared favourably with Muthayya’s (1984) job satisfaction questionnaire giving a validity co-efficient of 0.743. Moreover, the satisfaction means obtained from this scale have a close resemblance to the ratings given to the employees on a 3-point scale: fully satisfied, average satisfied, dissatisfied by the employees. The coefficient of correlation was 0.812 (N=52). The scale is brief, reliable, valid and has administrative facility. It is easily scorable. It can be administered to any category of workers. Each of the 30 statements has been provided with suitable alternatives characterised by the nature of the statement. All statements were clear, distinct and concept based. Table 3.7 showed the degree of satisfaction among workers:

**Table 3.9: Degree of Satisfaction among workers as Adopted**

<table>
<thead>
<tr>
<th>Score</th>
<th>Degree of Satisfaction</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. 74 or above</td>
<td>Extremely satisfied</td>
</tr>
<tr>
<td>2. 63-73</td>
<td>Very satisfied</td>
</tr>
<tr>
<td>3. 56-62</td>
<td>Moderately satisfied</td>
</tr>
<tr>
<td>4. 48-55</td>
<td>Not satisfied</td>
</tr>
<tr>
<td>5. 47 or below</td>
<td>Extremely dissatisfied</td>
</tr>
</tbody>
</table>


**STATISTICAL TECHNIQUES USED**

Depending upon the nature of the data, various statistical techniques such as mean, standard deviation, variance, co-variance, coefficient of correlation, regression and factor analysis were applied. To test the level of significance, t-ratio, Z-ratio and F-ratio were worked out.

1. The arithmetic mean is written simply as ($\bar{X}$) and was computed by using the formula:

$$\bar{X} = \frac{\sum X}{N}$$

The limits of the summation were omitted. The summation was understood to extend over all available values of X.
2. The variance is written as

\[ s^2 = \frac{\sum(x - \bar{x})^2}{N - 1} \]

\[ = \frac{\sum(x^2 - \bar{x}^2 - 2\bar{x}x)^2}{N - 1} \]

\[ = \frac{\sum x^2 + N\bar{x}^2 - 2N\bar{x}^2}{N - 1} \]

\[ = \frac{\sum x^2 - N\bar{x}^2}{N - 1} \]

In this derivation the summation of \( \bar{x}^2 \) over \( N \) is \( N\bar{x}^2 \); also the summation of \( 2x\bar{x} \) is \( 2\bar{x}\sum x = 2N\bar{x}^2 \), since \( EX = N\bar{x} \).

3. The standard deviation is given by

\[ s = \sqrt{\frac{\sum x^2 - N\bar{x}^2}{N - 1}} \]

Thus to calculate the standard deviation using this formula, we sum the squares of the original observations, subtract from this \( N \) times the square of the arithmetic mean, divide by \( N - 1 \), and then take the square root.

An alternative formula for the standard deviation which avoids the calculation of the arithmetic mean and is, therefore, useful for certain computational purposes is

\[ s = \sqrt{\frac{N\sum x^2 - (\sum x)^2}{N(N-1)}} \]

This formula requires one operation of division only.

4. In situations where sets of observed and theoretical frequencies are to be compared, Chi-square (\( \chi^2 \)), is defined by

\[ \chi^2 = \sum \frac{(0 - E)^2}{E} \]

where 0 and E denote the observed and expected, or theoretical, frequencies respectively. Inspection of this definition shows that \( X^2 \) is a descriptive measure of the magnitude of the discrepancies between the observed and expected frequencies. The larger these discrepancies, the larger \( X^2 \) will tend to be. If no discrepancies exist, and the observed and expected frequencies are
the same, $X^2$ will be 0. The value of $X^2$ in this definition is always 0 or a positive number. Negative values cannot occur.

5. Further, to test the difference in the average level of job satisfaction, Z-statistics was used. Z value was calculated by using the formula

$$Z = \frac{x_1 - x_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

When the sample was large ($N > 30$), t-statistics was estimated

The t-statistics for comparison of two population means is similar to the procedure of using the Z-statistics for comparison of two population means. Two additional elements are considered when using the t-test. These are:

a. The number of degrees of freedom is the sum of the degrees of freedom for each sample. When $n_1$ is the sample size from population 1, and $n_2$ is the sample size from population 2, the number of degrees of freedom would be expressed as:

$$Df = (n_1 - 1) + (n_2 - 1) = (n_1 + n_2)$$

b. The two standard deviations $S_1$ and $S_2$ calculated from the two samples of size $n_1$ and $n_2$ respectively, are pooled together to form a single estimate ($s_p$) of the population standard deviation, where ($s_p$) is calculated as:

$$s_p = \sqrt{\frac{(n_1 - 1)s_1^2 + (n_2 - 1)s_2^2}{n_1 + n_2 - 2}}$$

Then, the t-statistics is calculated by the following formula.

$$t = \frac{x_1 - x_2}{s_p \sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}$$

Where

$x_1$ = mean of the first sample
$x_2$ = mean of the second sample
$n_1$ = size of the first sample
$n_2$ = size of the second sample
$s_p$ = pooled estimate of population.
This calculated t-statistics is compared with the critical t-score from the table in a given level of significance and \((n_1 + n_2 - 2)\) degrees of freedom and a decision is made whether to accept or reject a null hypothesis.

6. To examine the relationship between job satisfaction and various variables, the coefficient of correlation was computed using the formula:

\[
 r = \frac{n(\Sigma XY) - (\Sigma X)(\Sigma Y)}{\sqrt{n(\Sigma X)^2 - (\Sigma X)^2} \sqrt{n(\Sigma Y)^2 - (\Sigma Y)^2}}
\]

Where,
\[n\] = Number of paired observations.
\[\Sigma XY\] = Summation of individual products of values of X and Y.
\[\Sigma X\] = Summation of the X variable
\[\Sigma Y\] = Summation of the Y variable
\[\Sigma X^2\] = The X variable is squared and then summed.
\[(\Sigma X)^2\] = The X variable is summed and then squared.
\[\Sigma Y^2\] = The Y variable is squared and then summed.
\[(\Sigma Y)^2\] = This Y variable is summed and then squared.

7. The Coefficient of Determination \(r^2\)

The coefficient of determination \((r^2)\), the square of the coefficient of correlation \((r)\), is a more precise measure of the strength of the relationship between the two variables and lends itself to more precise interpretation because it can be presented as a proportion or as a percentage.

The coefficient of determination \((r^2)\) can be defined as the proportion of the variation in the dependent variable \(Y\) that is explained by the variation in dependent variable \(X\), in the regression model.

In other words:

\[
r^2 = \frac{\text{Explained Variation}}{\text{Total Variation}}
\]

\[
= \frac{\Sigma (Y_i - \bar{Y})^2}{\Sigma (Y - \bar{Y})^2}
\]

\[
= \frac{b_y \Sigma Y + b_x \Sigma XY - (\Sigma Y)^2}{\Sigma (Y)^2 - (\Sigma Y)^2/n}
\]
For predicting the effect of various independent variables on the level of job satisfaction, linear regression equation was estimated through ordinary least squares method

\[ J_s = b_0 + b_1 \times x_i \]

Where \( J_s \) = level of job satisfaction

And \( x_i \) = value of its independent variables

\( b_0 \) and \( b_1 \) are the two pieces of information called parameters which determine the position of the line completely. Parameter \( b_1 \) is known as the Y-intercept and parameter \( b_0 \) determines the slope of the regression line which is the change in job satisfaction for each unit change in Y.

Following formula was used to estimate the value of \( b_0 \) and \( b_1 \)

\[
b_1 = \frac{n(\Sigma XY) - (\Sigma X)(\Sigma Y)}{n(\Sigma X^2) - (\Sigma X)^2}
\]

and

\[
b_0 = \frac{n\Sigma Y - (\Sigma X^2) - (\Sigma X)(\Sigma Y)}{n(\Sigma X^2) - (\Sigma X)^2}
\]

To test the level of significance of \( b_1 \), t-value was estimated using the formula

\[
t = \frac{b_1}{SE_{b_1}}
\]

Standard error of \( b_1 \) was estimated using the formula.

\[
S_{YX} = \sqrt{\frac{\Sigma(Y)^2 - b_0(\Sigma Y) - b_1(\Sigma XY)}{n-2}}
\]

8. **Factor Analysis**

To identify the factors which influenced the level of job satisfaction of college teachers, factor analytic approach had been used. This is a statistical approach that could be used to analyse interrelations among a large number of variables and to explain these variables in terms of their common underlying dimensions (factors). The factor analysis is designated as the queen of analytical methods because of its power and elegance.

The general purpose of factor analytic technique was to find a way in condensing (summarizing) the information contained in a number of original variables into a smaller set of new, composite dimensions (factors) with a minimum loss of
information, that was, to search for and define the fundamental constructs or dimensions assumed to underline the original variables.

The suitability of the data for factor analysis can be tested on the basis of following criterion:

a. A visual inspection of the correlation data matrix can reveal whether there were sufficient correlations to justify factor analysis.

b. Anti-image correlation matrix showed the negative values of partial correlation among variables. In order for true factors to exist in the data these values must be small.

c. Kaiser-Meyer-Olkin Measure of Sampling Adequacy (KMO) was another measure to quantify the degree of inter-correlations among the variables and appropriateness of factor analysis. The index ranged from 0 to 1. Small values for KMO measure indicated that a factor analysis of variables may not be a good idea, since correlation between pairs of variables cannot be explained by the other variables. A high value between 0.5 to 1.0 indicated that the factor analysis was appropriate technique to be used.

There were two basic models that the analyst can utilize to obtain factor solutions. They were known as common factor and principal components analysis. The common factor and principal component analysis models were both widely utilized. Selection of the extraction method depends upon the analysts’ objective. Principal component analysis was used when the objective was to summarise most of the original information (variance) in a minimum number of factors for prediction purposes. In contrast, common factor analysis was used primarily to identify underlying factors or dimensions reflecting what the variables share in common. In the present study principal components method of factoring had been used. This was the most common type of factor analysis. It was a statistical technique that linearly transformed an original set of variables into a substantially smaller set of uncorrelated variables that represented most of the information in the original set of variables. A small set of uncorrelated variables was much easier to understand and use in further analysis than a larger set of correlated variables.

Here linear combinations of variables were used to account for variation (spread) of each dimensions in a multivariate space. The variance of the factors was called Eigen Values, characteristic root or Latent Root. Communality was the amount of variance an original variable shares with others. Factor loadings were the
correlation between the original variable and the factor. Guidelines existed for identifying significant factor loadings based on sample size. Squared factor loadings indicated what percentage of the variance in an original variable was explained by a factor. When the set of variables was large, the analyst first extracted the largest and best combinations of variables and then proceeded to smaller less understandable combinations. Hence, the number of factors to be extracted became an important issue in the absence of any set criterion.

The four possible criteria were: (i) In a Priori Criterion, the analyst already knew how many factors to extract and accordingly instructs the computer; (ii) In Latent Root Criterion, only those factors which have latent roots greater than 1 were considered significant; (iii) In percentage of Variance Criterion, the cumulative percentage of variance extracted by successive factors was considered. In social sciences, it was common to consider a solution satisfactory when it accounts for 60 per cent of the total variance (and sometimes even less); and (iv) In Scree Test Criterion, at least one factor more than latent root criterion was usually extracted. The later factors extracted in principal component factor analysis model, contain both common and unique variance – the proportion of unique variance was much higher in later than in earlier factors. The Scree Test was used to identify the optimum number of factors that can be extracted before the amount of unique variance begins to dominate the common variance structure. In the present study, exploratory efforts were made with all of the above methods. Initially, latent root was used as guideline and then the scree test was used. In all the attempts percentage of the explained variance was also taken into consideration. Further an interpretation and assessment of the structure matrix was made in each case. Thus, several factors solutions with different number of factors were examined before a satisfactory solution was reached.

**Factor Rotation**

An important step in factor analysis was the rotation of factors. Loadings were rotated to make them more interpretable by making the loadings for each factor either large or small, not in between. For rotation, either Orthogonal or Oblique method can be employed. In Orthogonal Rotation method, the axis was maintained at 90 degrees so that the resulting factors were uncorrelated. In Oblique Rotation method, the axis was rotated, without maintaining the 90 degree angle between them. This makes the method more flexible. However, analytical procedure for oblique rotations was still
controversial. Within orthogonal method, either Varimax or Quatrimax method can be employed. Varimax method simplified the columns in a matrix whereas Quatrimax method stressed on simplifying the rows. In the present study, Orthogonal Rotation along with the Varimax method of rotation of factors was used in order to have more clarity in factor solution. Varimax Rotation was probably the most popular Orthogonal Rotation Procedure. The Varimax criteria maximized the sum of the variances of the squared loadings within each column of the loading matrix. This tends to produce some high loadings and some loadings near zero, which was one of the aspects of simple structure. This statistical approach had been used to condense the information collected by using questionnaires on 17 selected statements to know the perceptions of the college teachers on the important aspects related to pull and push factors of job satisfaction.

The final step in factor analysis was the naming of factors. The naming of factors was done by the factor analyst depending upon its appropriateness for representing the underlying dimensions of a particular factor.