CHAPTER III
RESEARCH METHODOLOGY

This chapter deals with the selection of appropriate method of data collection and tools for the scientific analysis of the data. An attempt has been made to follow flexible research design in the light of objectives of the study. Further, research questions have been set up on the basis of which hypotheses have been framed. The limitations of the study have also been discussed.

3.1 RESEARCH DESIGN

The research study entitled ‘Organizational Climate and its Correlates: A Study of Large Scale Food Processing Industry of Punjab’ is primarily a survey based research in which the data has been collected from well-structured and non-disguised questionnaire. The study gives an insight into the organizational climate prevailing in large scale food processing industry of Punjab and discusses its relationship with job attitudes and employee behaviour.

3.1.1 Research Questions

There are many questions that remain unanswered for the food processing industry. The present study addresses following research questions:
1. What is the status of organizational climate prevailing in food processing industry of Punjab?
2. What influence the socio-economic variables exert on the organizational climate?
3. How organizational climate is related to the job attitudes?
4. How organizational climate is related to employee behaviour?

3.1.2 Hypotheses of the Study

Hypothesis is simply a statement of the tentative solution to a problem. This statement may or may not be true. The research is designed to ascertain the truth about the statement. From the review of literature and the research questions the following hypotheses have been framed:

\[ H_{01} = \text{There is no significant relationship between organizational climate and job satisfaction.} \]
\( H_{02} = \) There is no significant relationship between organizational climate and job involvement.

\( H_{03} = \) There is no significant relationship between organizational climate and organizational commitment.

\( H_{04} = \) There is no significant relationship between organizational climate and organizational deviance.

\( H_{05} = \) There is no significant relationship between organizational climate and organizational citizenship behaviour.

\( H_{06} = \) There is no significant relationship between organizational climate and turnover intentions.

### 3.2 UNIVERSITY OF THE STUDY

The universe of the present study includes the employees working in the large scale food processing industry of Punjab registered with Department of Industries and Commerce, Chandigarh in the year 2011-2012. The large scale industry includes those companies having investment in plant and machinery more than Rs. 10 crores. The reason for selecting food processing industry is that it is one of the largest manufacturing sectors in India in terms of production, consumption, export and growth prospects (MOFPI, 2011-2012). The state of Punjab is the hub of food processing industry in India and one of the largest producers of processed food in India. Punjab is also one of the states having highest number of food processing units in India (National Account Statistics, 2014). Further, the large scale processing industry contributes the maximum share in the overall production of processed food in Punjab and they are involved in production of wide variety of processed food under one roof (Department of Industries and Commerce, Punjab, 2011-2012). These companies deals with the production of milk and milk products, baby foods, sauces, biscuits, breads, snack foods, confectionary, culinary, crumbs, semi-cooked foods, etc. For the purpose of present study, a list of large scale food processing companies in Punjab has been drawn from the Department of Industries and Commerce, Punjab. There were 75 large scale food processing companies registered with the department.
in the year 2011-2012 and a total of 26,200 employees were working in these companies in year 2011-2012, which constitute the universe of the present study.

3.3 SAMPLE DESIGN

The large scale food processing companies which form the sample of the study are selected using proportionate stratified sampling. The seventy five companies have been divided into three stratas based on the fixed investment of the companies. On the basis of proportionate stratified sampling, a sample of 10 companies has been selected for the purpose of the study. The distribution of the strata and the number of companies’ lie in each strata and the sample size taken from each strata is presented in table 3.1.

Table 3.1: Distribution of population and sample size according to strata

<table>
<thead>
<tr>
<th>Number of companies</th>
<th>Fixed investment (Rs. 10-50 crores)</th>
<th>Fixed investment (Rs. 50-100 crores)</th>
<th>Fixed investment (&gt;Rs. 100 crores)</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population of each strata</td>
<td>45</td>
<td>15</td>
<td>15</td>
<td>75</td>
</tr>
<tr>
<td>Proportionate sample size from each strata</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>10</td>
</tr>
</tbody>
</table>

The 10 companies have been selected on the bases of simple random sampling. Out of these companies, only 6 companies agreed to provide data without affecting their work schedule. In the second phase, four companies have been again selected randomly, excluding those four companies who refused to provide required data. So, ultimately 10 companies have been taken for the collection of data. Approximately 20 per cent of the employees working in these companies have been considered for the collection of data. The list of companies, their fixed investment, the total number of employees working in them and the estimated size of the sample from each company is presented in table 3.2.
Table 3.2: Sampling frame of the study

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Name of company</th>
<th>Fixed investment (Rs. in crores)</th>
<th>No. of employees</th>
<th>Estimated sample size</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EBI Cremica Food Coating Pvt. Ltd. Phillaur.</td>
<td>10.88</td>
<td>180</td>
<td>36</td>
</tr>
<tr>
<td>2</td>
<td>The Doaba Co-op Milk Products Union Ltd. Jalandhar.</td>
<td>17.11</td>
<td>372</td>
<td>74</td>
</tr>
<tr>
<td>3</td>
<td>Supreme Agro Foods Pvt. Ltd. Ludhiana.</td>
<td>24.02</td>
<td>192</td>
<td>38</td>
</tr>
<tr>
<td>4</td>
<td>Mrs. Bectors Food Specialties Ltd. Ludhiana.</td>
<td>33.10</td>
<td>188</td>
<td>38</td>
</tr>
<tr>
<td>5</td>
<td>Nijjar Agro Foods Ltd. Amritsar.</td>
<td>37.87</td>
<td>156</td>
<td>31</td>
</tr>
<tr>
<td>6</td>
<td>Punjab Agro Juices Ltd. Abohar.</td>
<td>42.68</td>
<td>215</td>
<td>43</td>
</tr>
<tr>
<td>7</td>
<td>Glaxo Smithkline Consumer Health Care Ltd. Nabha.</td>
<td>62.93</td>
<td>385</td>
<td>77</td>
</tr>
<tr>
<td>8</td>
<td>Pepsico India Holding Pvt. Ltd. Sangrur.</td>
<td>75.52</td>
<td>259</td>
<td>52</td>
</tr>
<tr>
<td>9</td>
<td>The ASR Distt. Co-op Milk Products Union Ltd. Amritsar.</td>
<td>104.82</td>
<td>327</td>
<td>65</td>
</tr>
<tr>
<td>10</td>
<td>Nestle India Ltd. Moga.</td>
<td>612.49</td>
<td>398</td>
<td>80</td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>2672</td>
<td>534</td>
<td></td>
</tr>
</tbody>
</table>

The questionnaires were distributed to the managers of these companies. The managers using referral sampling guided the researcher to approach the employees. The data has been collected from company premises at the employee’s offices, work area, from rest room during rest breaks and even from their residences. The respondents in the sample include the following: managers, executives, shift in-charges, shop-floor supervisors, junior officers, machine operators and laboratory technicians. A total of 600 questionnaires were distributed as per the plan of the study. However, out of 600 questionnaires, only 522 questionnaires have been returned. Out of 522, only 509 questionnaires found completed, representing an 85 per cent response rate. Thus, analysis of the data is based on 509 questionnaires.
3.4 CONSTRUCTION OF THE QUESTIONNAIRE

The next important step is the construction of questionnaire for the purpose of data collection. A well structured, non-disguised questionnaire has been designed in order to fulfil objectives of the study. This includes the selection of instrument for the seven variables considered for the present study viz. organizational climate, job satisfaction, job involvement, organizational commitment, organizational deviance, organizational citizenship behaviour and turnover intentions. After considering the merits and demerits of the several instruments as described in the review of literature, the standardized questionnaire cum scales have been considered most suitable for the present study. The standardized scales have a number of benefits. Firstly, they appropriately serve the purpose of the present study. Secondly, these instruments have already been tested on a variety of samples and have well tested for reliability and validity. Thirdly, they are easy to tabulate and the results can be correlated meaningfully. The instruments used for the present study and their reliability statistics have been presented below:

1. Organizational Climate Measure

To evaluate the organizational climate of the food processing industry Patterson et al. (2004) “Organizational Climate Measure” has been used. It is a multidimensional behavioural inventory used for measuring the organizational climate of a manufacturing organization. The scale consisted of 17 subscales with a total of 82 items. The 17 subscales known as dimensions of organizational climate were labelled as – autonomy, clarity of organizational goals, formalization, effort, efficiency, innovation and flexibility, integration, outward focus, participation, performance feedback, pressure to produce, quality, reflexivity, supervisory support, tradition, training, and welfare. The statements were based on climate characteristics of an organization concerning perception and observations about the organization in which they have been working. The respondents were asked to tick mark the appropriate score on a four-point continuum. The scoring weights assigned were: 1 = definitely false, 2 = mostly false, 3 = mostly true and 4 = definitely true. Thirty two statements were negatively worded; so the scores of these items were reversed. The internal consistency of the seventeen dimensions and the overall organizational climate is measured by using Cronbach’s alpha and is presented in table 3.3.
Table 3.3: Reliability coefficient of organizational climate and its dimensions

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Dimension</th>
<th>Cronbach’s alpha</th>
<th>S. No.</th>
<th>Dimension</th>
<th>Cronbach’s alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Autonomy</td>
<td>.824</td>
<td>10</td>
<td>Performance feedback</td>
<td>.776</td>
</tr>
<tr>
<td>2</td>
<td>Clarity of organizational goals</td>
<td>.841</td>
<td>11</td>
<td>Pressure to produce</td>
<td>.824</td>
</tr>
<tr>
<td>3</td>
<td>Formalization</td>
<td>.780</td>
<td>12</td>
<td>Quality</td>
<td>.731</td>
</tr>
<tr>
<td>4</td>
<td>Effort</td>
<td>.766</td>
<td>13</td>
<td>Reflexivity</td>
<td>.764</td>
</tr>
<tr>
<td>5</td>
<td>Efficiency</td>
<td>.791</td>
<td>14</td>
<td>Supervisory support</td>
<td>.887</td>
</tr>
<tr>
<td>6</td>
<td>Innovation and flexibility</td>
<td>.827</td>
<td>15</td>
<td>Tradition</td>
<td>.748</td>
</tr>
<tr>
<td>7</td>
<td>Integration</td>
<td>.743</td>
<td>16</td>
<td>Training</td>
<td>.739</td>
</tr>
<tr>
<td>8</td>
<td>Outward focus</td>
<td>.852</td>
<td>17</td>
<td>Welfare</td>
<td>.823</td>
</tr>
<tr>
<td>9</td>
<td>Participation</td>
<td>.795</td>
<td>18</td>
<td>Overall organizational climate</td>
<td>.864</td>
</tr>
</tbody>
</table>

The score obtained from the respondents, on all the 82 items were aggregated and the possible scores ranged from 82 to 328. The score is then categorized into three levels, namely unfavourable (82-163), moderate (164-246) and favourable (247-328). The seventeen dimensions of the organizational climate scale have different number of items ranging from 4 to 6 items in each dimension. The possible total score for each dimension ranges from 4 -16 for a four-item scale, from 5 - 20 for a five-item scale and from 6-24 for a six-item scale. The dimension total score is then categorized into three levels, namely low, moderate and high based on the perception towards each statement in the questionnaire (annexure 1). The range of each level is different based on the number of items in each dimension and it is shown in table 3.4.

Table 3.4: Scoring of organizational climate dimensions

<table>
<thead>
<tr>
<th>Category</th>
<th>Dimension Total Score Range</th>
<th>For 6-item dimension</th>
<th>For 5-item dimension</th>
<th>For 4-item dimension</th>
</tr>
</thead>
<tbody>
<tr>
<td>Low</td>
<td></td>
<td>6-12</td>
<td>5-10</td>
<td>4-8</td>
</tr>
<tr>
<td>Moderate</td>
<td></td>
<td>13-18</td>
<td>11-15</td>
<td>9-12</td>
</tr>
<tr>
<td>High</td>
<td></td>
<td>19-24</td>
<td>16-20</td>
<td>13-16</td>
</tr>
</tbody>
</table>
The low score on any dimension means unfavourable perception of respondents towards that dimension and high score on any dimension mean favourable perception towards that organizational climate dimension.

2. **Job Satisfaction Scale**

The level of job satisfaction has been measured using 10-item ‘The Generic Job Satisfaction Scale’ developed by Macdonald and Maclntyre (1997). The statements were quantified on a five point scale using Likert type technique (from 1 = strongly disagree to 5 = strongly agree). The reliability of the instrument has been determined by using Cronbach’s alpha which is found to be 0.838.

3. **Job Involvement Scale**

To evaluate the job involvement of respondents, the ‘Job Involvement Scale’ developed by Kanungo (1982) has been used. This scale measures the degree of psychological importance of one's job using a five-point Likert scale (1 = strongly disagree to 5 = strongly agree). Kanungo (1982) reported that the questionnaire has reasonably high levels of internal consistency, test-retest reliability and both convergent and discriminant validity. The scale consisted of a total of 10 items. Two statements were negatively worded and their score have been reversed while data coding. The internal reliability alpha coefficient has been found to be 0.819.

4. **Organizational Commitment Scale**

The organizational commitment of the respondents has been measured using an ‘Organizational Commitment Scale’ developed by Cook and Wall (1980). The scale consisted of 9 items which determine the degree of commitment with the organization. The response scale is a 7 point likert-scale ranging from 1 to 7 (1 = No, I strongly disagree, 2 = No, I disagree quite a lot, 3 = No, I disagree just a little, 4 = I'm not sure, 5 = Yes, I agree just a little, 6 = Yes, I agree quite a lot, and 7 = Yes, I strongly agree). The reliability of the instrument has been determined by using Cronbach’s alpha which comes out to be 0.773. Three statements were negatively worded and therefore, the score of these items have been reversed.

5. **Organizational Deviance Scale**

A 12-item ‘Organizational Deviance Scale’ developed by Bennett and Robinson (2000) has been used to measure the behaviour of the employees which is
directly harmful to the organization. The respondents have been asked to rate how
frequently they have engaged in deviant behaviour in the past. The response scale
ranges from 1 to 7 (1 = never, 2 = once a year, 3 = twice a year, 4= several times a
year, 5 = monthly, 6 = weekly and 7 = daily). The reliability of the organizational
deviance scale as measured by Cronbach’s alpha has been found to be 0.754.

6. **Organizational Citizenship Behaviour (Individual) Scale**

The individual’s organizational citizenship behaviour has been measured by
using ‘Organizational Citizenship Behaviour (Individual)’ scale developed by Lee and
Allen (2002). This encompasses statements that lead to interpersonal facilitation (Van
Scotter & Motowidlo, 1996), interpersonal harmony (Farh et al., 1997), and
interpersonal helping (Graham, 1991). Each respondent has been instructed to
indicate how frequently they would participate in the identified behaviours based on a
7-point scale (1 = Never, 7 = Always). The reliability of the instrument has been
measured by using Cronbach’s alpha which has been found to be 0.867.

7. **Turnover Intentions Scale**

The respondents’ intentions to leave the organization have been determined by
4-item ‘Turnover Intention Scale’ developed by Kelloway et al. (1999). The turnover
intention statements have been quantified on a five point scale using Likert type
 technique (from 1 = strongly disagree to 5 = strongly agree). The 4- items have
produced acceptable reliability level (Cronbach’s alpha = 0.963).

In order to determine the socio-economic profile of the respondents, few socio
economic variables have also been included in the questionnaire. These includes: age
of respondents, gender, marital status, number of dependents, educational
qualification, designation, experience and income level of the respondents.

3.5 **PROCEDURE FOR DATA COLLECTION**

The study is mainly based on primary data. The data has been collected with
the help of above discussed questionnaire from the respondents belonging to the ten
large scale food processing companies under study. The questionnaires were
distributed to the respondents of the companies individually by the researcher and in
some cases through the company representatives. The questionnaires were filled by the respondents either at the company premises in their office or in rest rooms during rest breaks as well as in private at their residence.

Secondary data has also been used to emphasize the distinct features organizational climate and its correlates as well as the characteristics of the food processing industry of Punjab. To collect the diverse literature both online and offline resources have been used. The main online sources of secondary data have been the publications in journals, books, reports, dissertations, the reports available from Ministry of Food Processing Industry (MOFPI), FICCI (Federation of Indian Chambers of Commerce and Industry), Annual Survey of Industries (ASI), etc. Among the offline sources, the data has been collected from Department of Industry and Commerce, Chandigarh and research database available in various libraries of different institutions such as Guru Nanak Dev University-Amritsar, IIM-Indore, ICFAI-Hyderabad, Punjab Agriculture University-Ludhiana, etc. These sources have been used as supporting evidence to justify the significance of study.

3.6 SOCIO-ECONOMIC PROFILE OF THE RESPONDENTS

The individuals working in an organization can make the environment of the organization as conducive or non-conducive, friendly or formal to work. The individuals are involved in creating situations which can be encouraging to make effort at workplace; therefore, this cannot just be ignored. More particularly, the socio-economic profile of an individual has a significant role to play in creating conducive organizational climate at the workplace. An attempt has been made in this section of the study to present and analyse the various socio-economic characteristics of the respondent’s age, gender, marital status, number of dependents, work experience, designation, educational qualification and income. Table 3.5 shows the socio-economic characteristics of the respondents.
### Table 3.5: Distribution of the respondents by their socio-economic characteristics

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Socio-Economic Characteristics</th>
<th>Frequency</th>
<th>Per cent</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Age (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 &amp; Below</td>
<td>156</td>
<td>30.65</td>
</tr>
<tr>
<td></td>
<td>31-40</td>
<td>202</td>
<td>39.69</td>
</tr>
<tr>
<td></td>
<td>41-50</td>
<td>101</td>
<td>19.84</td>
</tr>
<tr>
<td></td>
<td>Above 50</td>
<td>50</td>
<td>9.82</td>
</tr>
<tr>
<td>2</td>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Male</td>
<td>418</td>
<td>82.12</td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td>91</td>
<td>17.88</td>
</tr>
<tr>
<td>3</td>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Married</td>
<td>409</td>
<td>80.35</td>
</tr>
<tr>
<td></td>
<td>Unmarried</td>
<td>100</td>
<td>19.65</td>
</tr>
<tr>
<td>4</td>
<td>Dependents</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2 &amp; Below</td>
<td>319</td>
<td>62.67</td>
</tr>
<tr>
<td></td>
<td>3-4</td>
<td>161</td>
<td>31.63</td>
</tr>
<tr>
<td></td>
<td>Above 4</td>
<td>29</td>
<td>5.70</td>
</tr>
<tr>
<td>5</td>
<td>Employment Type</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Permanent</td>
<td>509</td>
<td>100</td>
</tr>
<tr>
<td></td>
<td>Temporary</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>Educational Qualification</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Under Graduate or below</td>
<td>151</td>
<td>29.66</td>
</tr>
<tr>
<td></td>
<td>Graduate</td>
<td>247</td>
<td>48.53</td>
</tr>
<tr>
<td></td>
<td>Post Graduate or above</td>
<td>111</td>
<td>21.81</td>
</tr>
<tr>
<td>7</td>
<td>Designation level</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Upper level</td>
<td>76</td>
<td>14.93</td>
</tr>
<tr>
<td></td>
<td>Middle level</td>
<td>223</td>
<td>43.81</td>
</tr>
<tr>
<td></td>
<td>Lower level</td>
<td>210</td>
<td>41.26</td>
</tr>
<tr>
<td>8</td>
<td>Experience (years)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>5 or Below</td>
<td>162</td>
<td>31.83</td>
</tr>
<tr>
<td></td>
<td>6-15</td>
<td>218</td>
<td>42.83</td>
</tr>
<tr>
<td></td>
<td>Above 15</td>
<td>129</td>
<td>25.34</td>
</tr>
<tr>
<td>9</td>
<td>Income (Rs. per month)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Less than 20000</td>
<td>134</td>
<td>26.33</td>
</tr>
<tr>
<td></td>
<td>20000-40000</td>
<td>240</td>
<td>47.15</td>
</tr>
<tr>
<td></td>
<td>40000-60000</td>
<td>108</td>
<td>21.22</td>
</tr>
<tr>
<td></td>
<td>Above 60000</td>
<td>27</td>
<td>5.30</td>
</tr>
</tbody>
</table>
Socio-economic profile of the respondents as presented in table has been discussed in detail below:

3.6.1 Age

Table 3.5 shows that majority (39.69 per cent) of the respondents fall under the age group of 31-40 years, 30.65 per cent of the respondents fall under the category of 30 years or below and 19.84 per cent of the respondents have been under the age group of 41-50 years and a few (9.82 per cent) have been above 50 years.

3.6.2 Gender

Being a manufacturing sector, the majority of the respondents have been males (82.12 per cent). The female respondents are only 17.88 per cent.

3.6.3 Marital Status

Table 3.5 shows that most of the respondents have been married (80.35 per cent) and only 19.65 per cent been unmarried.

3.6.4 Dependents

It is inferred from the table 3.5 that majority of respondents have dependents 2 or below (62.67). Whereas, 31.63 per cent of the respondents have 3 or 4 dependents and only 5.70 per cent of the respondents have number of dependents more than 4.

3.6.5 Employment Type

With regards to the type of employment, all of the respondents have been permanent employees of the companies.

3.6.6 Educational Qualification

Regarding their educational qualifications, the majority of respondents (48.53 per cent) have been found to be graduates, 29.66 per cent of the respondents have been undergraduates or below and 21.81 per cent of the respondents have been postgraduates or above.

3.6.7 Designation

With regard to designation, mostly the respondents have been at middle level (43.81 per cent) which includes production executives, quality executives and shift-incharges from other technical and non-technical departments. 41.26 per cent of the respondents have been working at lower level that includes junior officers, lab
technicians and machine operators. The respondents at upper level have been only 14.93 per cent which included the managers and departmental heads.

3.6.8 Experience

Table 3.5 shows that the majority (42.83 per cent) of the respondents’ work experience has been between 6-15 years, 31.83 per cent of the respondents’ work experience has been 5 years or below and, 25.34 per cent of respondents have work experience of above 15 years.

3.6.9 Income

Table 3.5 shows that most of the respondents belong to income level of Rs. 20,000 – 40,000 (47.15 per cent) per month. 26.33 per cent of the respondents have been drawing salary below Rs. 20,000 per month whereas 21.22 per cent of the respondents have monthly income in range of Rs. 40,000-60,000 and only 5.30 per cent of the respondents draw income above Rs. 60,000 per month.

3.7 STATISTICAL TECHNIQUES USED FOR DATA ANALYSIS

After the completion of the collection of primary data, the next important step is the analysis of data. Of course some statistical tools were identified for the analysis of data at the time of preparation of synopsis and the questionnaire was designed accordingly even then the suitability for the application of selected statistical parametric and non-parametric tools for the analysis of data has been again tested. Ultimately, following tools have been selected for the analysis of data in the light of pre-determined objectives and hypotheses framed for the study.

3.7.1 Reliability Analysis

Reliability of the scale refers to the consistency and stability of results of a scale. A scale is considered to be reliable if on repeated administration, it yields similar results. The most widely used method to check reliability of the scale is Cronbach’s Alpha (α) and it can be calculated as the average of all the possible split-half reliabilities estimated on single scale. The Cronbach’s Alpha has been calculated for all the scales used in this study. According to Nunnally (1978) the acceptable level of coefficient α is to greater than 0.70 for considering the scale to be reliable.
3.7.2 Mean and Standard Deviation

The mean is also known as average of the data which is obtained by dividing the sum of observed values by the number of observations. The formula for the mean is given below:

\[ \bar{X} = \frac{\sum_{i=1}^{n} X_i}{n} \]

The standard deviation (square root of the variance) determines dispersion or variation of the data from mean value. It is the square-root of the mean of squared deviation from the mean as represented in equation below. A low standard deviation indicates that the observation values are tend to be very close to the mean whereas a high standard deviation indicates that the observation values are not close to the mean but extend over a large range of values.

\[ \sigma = \sqrt{\frac{1}{n-1} \sum_{i=1}^{n} (X_i - \bar{X})^2} \]

Where:
- \( \sigma \) = symbol of standard deviation
- \( \bar{X} \) = Mean
- \( X_i \) = data value
- \( i \) = observation ranges from 1 to n
- \( n \) = number of observations

In present study the mean and standard deviation has been calculated for various job attitudes and employee behaviours.

3.7.3 Chi-square test for association

Chi-square (\( \chi^2 \)) test for association also called chi-square test for independence is used to find out whether there is a relationship between two categorical variables. The two variables should be categorical and should consist of two or more categorical independent groups. The chi square test of association begins with the null hypothesis of no association or no relationship, between the two variables. The statistics of chi-square test is represented by equation below:

\[ \chi^2 = \sum_{i=1}^{r} \sum_{j=1}^{c} \frac{(O_{ij} - E_{ij})}{E_{ij}} \]
The expected frequencies can be calculated using equation

\[ E = \frac{\sum_{i=1}^{r} O_i \times \sum_{j=1}^{c} O_j}{N} \]

The number of degree of freedom is equal to

\[ df = (r - 1) \times (c - 1) \]

Where:
- \( O \) = observed frequency
- \( E \) = Expected frequency
- \( i, j \) = observation or data values
- \( N \) = Sample size
- \( C \) = number of column
- \( r \) = number of rows

For the test of independence, the chi-square probability of less than or equal to 0.05 interpreted as rejection of null hypothesis i.e. the two variables are not independent but have some relationship between them. In present study chi-square has been used to determine the association between organizational climate and demographic variables such as age, marital status and experience of employees.

3.7.4 One-sample t-test

One sample ‘t’ test is used to determine whether the sample mean is significantly different from the specified population mean. The data used for applying this should be independent of observation and the dependent variable should be measured at continuous level and should be approximately normally distributed. The null hypothesis is \( \mu = \mu_0 \) and the equation is represented by:

\[ t = \frac{\mu - \mu_0}{\frac{\sigma}{\sqrt{n}}} \]

Where:
- \( \mu \) = sample mean
- \( \mu_0 \) = population mean
- \( \sigma \) = standard deviation of sample
- \( n \) = sample size

After determining the t value, the p-value can be found using t-distribution. If the calculated p-value is less than the critical value (which in present study is 0.05), the null
hypothesis is rejected. One sample ‘t’ test has been used to study the total score of job attitudes in order to determine the difference between the observed mean score and neutral point.

### 3.7.5 Independent sample t-test

Independent sample ‘t’ test is used to compare the means of two unrelated groups on same continuous dependent variable. The independent variable should consist of two categorical groups. The dependent variable should be approximately normally distributed. The null hypothesis is \( \mu_1 = \mu_2 \) and the equation is represented by:

\[
t = \frac{\mu_1 - \mu_2}{s_p\sqrt{\frac{1}{n_1} + \frac{1}{n_2}}}
\]

The value of \( s_p \) can be calculated as:

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

Where:
- \( \mu_1 \) = mean value of first sample
- \( \mu_2 \) = mean value of second sample
- \( n_1 \) = Sample size (i.e., number of observations) of first sample
- \( n_2 \) = Sample size (i.e., number of observations) of second sample
- \( s_1 \) = Standard deviation of first sample
- \( s_2 \) = Standard deviation of second sample
- \( s_p \) = pooled standard deviation

After determining the t value, the p-value can be found using t-distribution. If the calculated p-value is less than the critical value (which in present study is 0.05), the null hypothesis is rejected. Independent sample ‘t’ test has been used to determine the influence of gender difference on organizational climate.

### 3.7.6 One-way Analysis of Variance (ANOVA)

One-way ANOVA is used to determine if there is any significant difference exists between the means of two or more independent groups. The independent variable should consist of two or more categorical groups. The dependent variable should be measured on continuous scale and should be approximately normally distributed. There should also be
homogeneity of variance. The null hypothesis is that the population means are equal. The ANOVA table is presented in table 3.6 given below:

Table 3.6: ANOVA table

<table>
<thead>
<tr>
<th>Source of variation</th>
<th>S.S.</th>
<th>d.f.</th>
<th>M.S.</th>
<th>F-ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between the group(B)</td>
<td>SS(B)</td>
<td>k-1</td>
<td>SS(B)/k-1 = MS(B)</td>
<td>MS(B)/MS(W)</td>
</tr>
<tr>
<td>Within the group(W)</td>
<td>SS(W)</td>
<td>N-k</td>
<td>SS(W)/N-k = MS(W)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>SS(B) + SS(W)</td>
<td>N-1</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Where  
- d.f. = Degree of freedom  
- k = number of samples  
- N = Number of respondents  
- S.S. = Sum of square deviation from the mean  
- M.S. = Mean Sum of squares

If F-ratio is significant then there is a significant difference between the groups under study. One-way analysis of variance has been applied after testing the assumptions to study the variation in organizational climate due to the number of dependents, qualification level, designation level and income level.

3.7.7 Correlation

Correlation or “Pearson’s correlation” or “Pearson’s product-moment correlation” is a measure of linear dependence between the two variables. It is obtained by dividing the covariance of the two variables by the product of their standard deviations. It is represented by ‘r’ and calculated using following equation:

\[
r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\left(\sum x^2 - \frac{(\sum x)^2}{n}\right)\left(\sum y^2 - \frac{(\sum y)^2}{n}\right)}}
\]

Where  
- x, y = variables  
- n = number of observations  
- r = correlation coefficient

The value of ‘r’ lies between +1 and -1. The values near to +1 means significant positive correlation and values close to -1 indicate significant negative correlation.
between the two variables and the values close to 0 indicates very weak or no significant correlation between the two variables. Pearson correlation has been studied between the organizational climate and job attitudes, and organizational climate and employee behaviour in order to examine the degree of linear dependence between them.

### 3.7.8 Multiple Regression Analysis

Multiple regression analysis is a statistical technique used to predict and explain the relationship between a dependent variable and a set of independent variables. It helps in understanding how a typical value of dependent variable changes when any one of the independent variable is varied, keeping other independent variables fixed. For applying the multiple regression analysis the dependent variable should be measured on continuous scale and the independent variables can be either continuous or categorical. The data must not show multicollinearity and residuals (errors) are approximately normally distributed. The multiple regression equation takes the following form:

\[ y = b_1x_1 + b_2x_2 + \cdots + b_nx_n + c \]

Where \( y \) = dependent variable  
\( x_1, x_2, \ldots x_n \) = independent variables  
\( b_1, b_2 \ldots b_n \) = regression coefficients  
\( c \) = constant

The constant represents the value where the regression line intercepts the y-axis, representing the amount the dependent ‘y’ will be when all the independent variables are zero.

The regression analysis gives useful results when the independent variables have some correlation with the dependent variable. Therefore, after analysing the correlation between the dependent variable and independent variables, multiple linear regression has been carried out to gauge the impact of organizational climate dimensions on various job attitudes and employee behaviour. Before conducting an analysis to test the hypotheses, the data have been examined for its linearity, normality, and outliers. In order to test the autocorrelation between the residuals from the regression analysis, Durbin-Watson test has been applied. The Durbin-Watson statistic ranges in value from 0 to 4. A value near 2 indicates non-autocorrelation, near 0 indicates positive autocorrelation and a value near 4 represents negative autocorrelation between the residuals. Multicollinearity in regression
models occurs due to unacceptably high level of inter-correlation among the independent variables. It has been examined using tolerance levels. Tolerance is defined as amount of variability of the selected independent variable which is not explained by other independent variables. Thus, very small tolerance values denote high collinearity. If the tolerance value is less than some cut off value, usually 0.10, the independent variable should be dropped from the analysis due to multicollinearity (Hair et al., 2010).

In the result table, the $R^2$ denotes the variance in the dependent variable explained collectively by all of the independent variables. The higher the value of $R^2$, greater will be the explanatory power of the regression model, and therefore better will be the prediction of the dependent variable. The beta weights are the standardized version of the ‘b’ regression coefficients.

3.8 **LIMITATIONS OF THE STUDY**

Every research has its own limitation despite of any area or field in which it is conducted. This may be due to the reason that the researcher possibly cannot confine or bring the whole perspective of a specific field or area in one fine study. Hence, like other researches, this research has also some limitations which are discussed below:

1. The present study is limited to the large scale food processing industry of Punjab. The study is confined to state of Punjab only and the medium, small and micro scale industries are also not included. Thus, generalization of data beyond this population may be limited.

2. The sample size of the present study is limited in nature and which may limits its generalization of results to the universe of the study.

3. An entire random sample from the population was not feasible due to constraints in obtaining permission to collect the data from companies. The companies which have been selected on the bases of random sample and which were willing to participate in the study have been included in the sample and the companies which have hesitated to participate are not included in sample. Therefore, the findings of the study may not necessarily represent the organizational climate and its correlates from the broad range of large scale food processing industry of Punjab.
4. The sampling method used in the study has certain limitations in relation to the degree of control of the researcher on the questionnaire being distributed in the companies.

5. The study is also limited in generalization due to respondent’s bias, which might affect the internal validity of the study. It has been assumed that the employees will understand the survey questions and respond truthfully.

6. The present research is confined to few psychological variables. The other important variables could also be included such as absenteeism, work moods, work performance, employee engagement, perceived organizational support, stress etc.

7. The relationship between job attitudes and employee behaviour has also not been discussed in the present study.

8. The effect of demographic variables on job attitudes and employee behaviour has also not been analyzed in the present study.