CHAPTER III

 METHODOLOGY

In order to achieve the objectives outlined in the previous chapter two studies were conducted.

STUDY I

SAMPLE

The subjects for the study were operatives working as weavers in the plain loomsheds of two Composite Textile Mills in Ahmedabad. The weavers' job is considered critical among other operative jobs in the textile mills in terms of weavers' contribution to overall loomshed efficiency. Generally, a mill runs three shifts called 'A', 'B' and 'C' shifts*. 'C' shift has less number of working hours as compared to 'A' and 'B' shifts and is generally a permanent shift, while weavers working in 'A' and 'B' shifts are rotated every month. To eliminate the effect of shift on the performance of weaver the study was conducted on weavers working in 'A' and 'B' shifts only. These weavers had a four loom allocation and they worked only on their specific looms. The weavers working on the same set of looms in two different shifts (shifts 'A' and 'B') by rotation are called counterpart.

* 'A' shift runs from 07.00 to 15.30 hours, 'B' shift from 15.30 to 24.00 hours and 'C' shift from 00.00 hours to 07.00 hours.
weavers. These counterpart weavers work on the same set of looms (machines) and hence weave same sort of cloth and they work in 'A' and 'B' shifts by rotation, therefore, any differences in their efficiency can by and large be attributed to weavers themselves.

Prior to study, the efficiency records for the preceding six months of all the weavers of 'A' and 'B' shifts from two textile mills were collected. The monthly efficiency of a weaver is calculated on the basis of the cloth they produce on looms. For calculating weavers' efficiency from their cloth production first the expected production is worked out by the following formula:

\[
\text{Expected Production of Cloth in Metres per Day} = \frac{\text{RPM} \times 8 \times 60}{\text{Picks} \times 39.37}
\]

where, RPM = Revolutions per minute,
8 is for no. of working hours per day,
60 is for minutes of an hour,
Picks = No. of wefts per inch, and
39.37 is for conversion of inches in a metre.

The expected production thus calculated for all the four looms is totalled for getting the total expected cloth production per day for a weaver.

From the expected production of cloth, weaver's monthwise efficiency in percentage is worked out as:
Monthwise Efficiency of a Weaver in % = \frac{\text{Cloth actually produced in metres by a weaver in a month on four looms}}{\text{Expected production of cloth in metres for a month on four looms}} \times 100

The efficiency of each pair of workers (one working in 'A' and the other in 'B' shifts) was then compared. A weaver was considered low in efficiency if his efficiency was less by 3% or more than his counterpart (weaver working in the other shift than his own on the same set of looms) in more than half of the months, and if in none of the months he showed higher efficiency than his counterpart. In one mill 46 pairs of weavers out of a total of 162 pairs of weavers were identified where efficiency difference according to the criteria was noticed. Out of 46 pairs of weavers 46 weavers (working in any of the two shifts) who showed poor efficiency in the pair were considered to be low efficiency weavers and the counterparts of these weavers from the other shift were taken to be high in efficiency.

In the second mill weaver-wise efficiency records were not maintained, however, the wage data of all the 105 pairs of weavers were available. Differentials in basic wage which are worked out on the cloth produced reflect the efficiency differences in a pair of weavers in a crude way. Those pairs of weavers where the wage differences were large were first identified. The efficiency of these pairs of weavers was, then, calculated by the researcher from the figures of production on the looms allotted to weavers in 'A' and 'B'
shifts. The weavers were labelled high and low in efficiency on the criteria mentioned earlier. Twenty pairs of weavers out of 34 pairs of weavers with large wage difference were found to differ in efficiency calculated according to the criteria. Twenty of these weavers were labelled as low efficiency weavers and their 20 counterparts were taken to be high efficiency weavers.

A total of 66 pairs of weavers (of which 66 were high efficiency weavers and 66 were low efficiency weavers) were identified in this manner out of 267 total pairs of weavers from the two textile mills. Two high and six low efficiency weavers were on leave and the remaining weavers comprised the sample for the final study.

The means of age, experience, total experience of working as weaver and education for 64 high efficiency weavers and 60 low efficiency weavers (barring the weavers who were not available) who comprised the final sample were as follows.

The means and ranges of age, tenure, total experience of working as weavers and education for high and low efficiency weavers who comprised the sample are presented in Table 1.
The means and ranges of age, tenure, total experience & education for 46 low efficiency weavers who had undergone various kinds of training are presented in the Table 2 below for total group as well as three training groups separately.

**TABLE 1**

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>High Efficiency Weavers (N=64)</th>
<th>Low Efficiency Weavers (N=60)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
</tr>
<tr>
<td>Age</td>
<td>30.73</td>
<td>22-60</td>
</tr>
<tr>
<td>Tenure in Present Mill (Years)</td>
<td>17.68</td>
<td>2-34</td>
</tr>
<tr>
<td>Total Experience</td>
<td>19.32</td>
<td>2-34</td>
</tr>
<tr>
<td>Education (Years)</td>
<td>4.78</td>
<td>0-11</td>
</tr>
</tbody>
</table>

**TABLE 2**

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<tr>
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</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
<td>Mean</td>
</tr>
<tr>
<td>Age</td>
<td>40.27</td>
<td>25-60</td>
<td>36.46</td>
</tr>
<tr>
<td>Tenure in Present Mill (Years)</td>
<td>18.62</td>
<td>5-36</td>
<td>16.46</td>
</tr>
<tr>
<td>Total Experience</td>
<td>19.62</td>
<td>5-36</td>
<td>18.75</td>
</tr>
<tr>
<td>Education (Years)</td>
<td>5.27</td>
<td>0-11</td>
<td>5.78</td>
</tr>
</tbody>
</table>
Although a great deal of research based on Weiner et al. (1971) model of causal attributions for success and failure has been published during the 1970s, relatively little attention has been given to the question of how causal attributions should best be measured (Deaux and Farris, 1977; Smith, 1977). Although a few articles (e.g., Elig and Frieze, 1975; Frieze, 1976; Weiner, 1974; McHaugh, 1978) have referred to the variety of measures used for assessing attributions, there has been no formal study of the implications of using one attribution measure over another and researchers have tended to be subjective in their selection and use of the techniques for assessing attributions (Elig and Frieze, 1979).

There are a number of commonly used techniques for assessing causal attributions; open-ended responses, independent ratings, ipsative ratings, choice of one major cause, and bipolar ratings. Each of these methods has its own advantages and disadvantages in terms of practical considerations.

Most attribution studies use structured ratings rather than open-ended approach. However, there are problems with structured response measures which confine subjects to a limited set of factors defined in advance by the experimenter as important for the situation. This set may include the factors of importance for some subjects but not for others. Open-ended response measures help to avoid this problem as well as allow
subjects toward considering causal possibilities that they may not otherwise have spontaneously considered (Frieze, 1976; Smith, 1977). Studies have been conducted using open-ended questions for a variety of social and achievement situations (Elig and Frieze, 1975; McHugh, 1978).

Elig and Frieze (1979) advocating the open-ended approach further stated that subjects may find open response questions easier and more natural to respond to, and they have utility for the researcher who is asking for causal attributions, particularly in a new situation. However, they also noted that open-ended procedures are psychometrically inferior to more structured responses used in scale ratings.

Russell (1982) pointed out that previous attribution research has suffered from a basic problem that could be termed "The fundamental attribution researcher error" (i.e., assuming that the researcher can accurately interpret the meaning of the subject's causal attributions). In the traditional attribution paradigm, an essential step involves the translation by the researcher of causal attributions into causal dimensions, such as internal-external or stable-unstable. Based on this classification of the subject's causal attributions, the investigator can then test a variety of predictions about the attribution process. He warned that the danger in this procedure is that the researcher and the attributor may not agree on the meaning of a causal attribution. One difficulty is
that attributional statements are often ambiguous (Ross, 1977) and therefore very difficult to interpret.

Moreover, even when the meaning of a causal attribution is clear, the attributor may perceive the cause quite differently than the researcher. As Weiner (1979) has noted, the placement of a causal attribution in terms of causal dimensions may vary greatly from person to person, as well as from situation to situation. For example, one student may state that his or her failure in a maths course is due to a lack of ability and perceive this cause as stable over time. Another student might also view the failure as caused by ability but believe that ability in maths can be improved through hard work. Situational variability in attributions can also occur. As ability attribution for performance in an academic subject is undoubtedly perceived differently than an ability attribution for performance in athletics, where improvement in skill occurs through practice. The typical attributional paradigm does not allow for these variables in the perception of causes.

Russell (1982) argued that it may be possible to assess directly how the attributor perceives his or her own causal attributions in terms of causal dimensions, rather than having the researcher code the attributional statements into dimensions.

Russell (1982) in his study attempting at developing a scale of causal dimension in a specific situation, i.e., in academic achievement context, to assess causal perceptions in terms of
the locus of causality, stability and controllability dimensions described by Weiner also remarked that previous attribution measures are designed to assess the individual's general or cross-situational perceptions of causality, but no measure has been developed to assess the respondent's perceptions of causes in a particular situation. However, Weiner (1979) noted that attributional styles or general beliefs concerning locus of control may influence how an individual perceives the causes in a specific situation. Causal perceptions are also greatly influenced by situational factors.

Forgers, Morris and Furnham (1982) found on the basis of a factor analysis, specific causal categories (factors) which are not identical to a priori categories proposed in the literature. On the basis of this finding they argued that context-specific causal categories need to be constructed before any analysis of attributions for real-life occurrences is attempted.

Development of Attribution Measure

As proposed by researchers like Frieze (1976); Elig and Frieze (1979); Russell (1982); Weiner (1979) and Forgers, Morris and Furnham (1982) an attempt was made to develop a specific open-ended response measure to assess the weavers' causal attribution for low and high efficiency in work setting. Looking at the literacy level of weavers, and on the basis of researcher's previous experiences with weavers, an interview
schedule containing some questions on causal attribution was prepared. A list of possible factors responsible for efficiency and the resultant feelings was also included. This instrument was tested on a pilot basis on 84 weavers in a mill in Rajasthan. On the basis of responses, some modifications were made in the measure. To test the workability of the revised measure, it was again tested on a small number of weavers from a mill in Ahmedabad.

The final measure demanded open-ended responses to questions regarding the perceived level of own as well as counterpart weaver's efficiency, the important reasons considered responsible for own as well as counterpart weavers' efficiency, and perceived 'controllability', 'stability' and 'internality' of the mentioned factors.

The scores for 'controllability', 'stability' and 'internality' dimensions of causal attribution were calculated in terms of percentages, i.e., the number of controllable, stable and internal factors mentioned out of the total number of factors listed by the respondent. This fraction was multiplied by a hundred to get the percentage. This scoring procedure made it possible to give the freedom of mentioning as many causal factor to the respondents as they wished to mention.

**PROCEDURE**

Excluding the eight weavers who were on leave at the time of starting the interviews the remaining 64 high efficiency and
60 low efficiency weavers selected for the study were interviewed individually on attributional measure on the mill premises. The questions in interview were asked in vernacular language. The responses on attribution measure were analysed with respect to various hypotheses in the context of the first objective i.e., to test the assumptions of the attribution theory in the context of performance efficiency.

In order to achieve the second and the third objective of the study i.e., to examine whether a change in causal attributions of low efficiency can be brought about through training, and to examine the impact of changes in attribution on performance efficiency, the low efficiency weavers who scored very high on 'controllability' dimension of attribution were excluded. The number of such weavers was seven. Again, barring the weavers who were on leave at the time of starting the training the available 46 low efficiency weavers were randomly divided into three experimental groups: (1) Attribution change training group (consisting of 13 weavers), (2) Skill training group (consisting of 17 weavers). These two groups were formed to assess the relative impact of skill training as compared to attribution change training, and (3) Attribution change together with skill training group (consisting of 16 weavers). This group was formed to assess the combined effect of attribution change as well as skill training. The number of weavers was unequal in the groups because of the unequal dis-
tribution of low efficiency weavers in the two shifts, and the availability of weavers on all those days when the training was being imparted. The high efficiency counterparts of trainees formed the control groups.

EXPERIMENTAL TREATMENTS

Attribution Change Training

This group was imparted 9 hours of training spread over 3 days. Attribution change training aimed at changing the inefficient weavers' attribution from external uncontrollable and internal uncontrollable factors to controllable factors. It was also tried to change the subjective meaning of the particular causes to inefficient weavers. An attempt through this training was made to make the trainees realize through lecture, and group discussion, the uniformity of the external conditions under which they as well as their counterparts worked. Different work practices and work methods as well as the impact of these on efficiency was discussed. This would help the weavers to perceive the genuine causes for their low efficiency which are under their own control. They were also shown general tentative ways to correct themselves for improvement in various matters so that they can perceive the scope of improvement as well as their own role in it.
Skill Training

The skill training group also was imparted 9 hours training spread over 3 days. This training included information regarding the theoretical 'know-how' of various technical job operations and ways to carry out various direct and indirect technical activities required to be performed by the weavers. They were also informed about the systematic work organization and work practices, and were imparted knowledge regarding various parts, motions, spare parts and accessories of looms. They were also given demonstrations for various elemental loom operations, and practice regarding certain basic operations. Although an attempt was made not to bring in the aspect of attribution in this training but it was not possible to do so entirely (e.g., when the weavers are asked to adopt a particular work practice it is also being communicated that it is an internal controllable factor and weavers can do this on their own).

Combined Training of Attribution and Skill

This group was imparted combined training of attribution change and skill, as outlined above, for 18 hours spread over 6 days.

All the training for the three groups was imparted through various methods like lectures, group discussion, debates, role playing, demonstrations, practice, etc., on the mill
premises. Although it was difficult to isolate 'skill' from 'attribution' completely as some of the aspects of training included both, but an attempt was made to give major emphasis on 'skill' in skill training group, and on 'attribution' in attribution change training group.

After an interval of one month's time, the weavers of all the three experimental groups, who were imparted training as well as their control high efficiency counterparts were reinterviewed on the same attributional measure as before. Post-training efficiency data were collected for three months following the training for the weavers who had undergone various types of training and their control high counterpart weavers.

**STUDY II**

The criterion for assessing the improvement through training in the previous study was the production efficiency of weavers. An effort was made in this study to take the criterion of adoption of work practices for which the weavers were trained. The adoption of these practices has direct relation with their efforts and motivation for improvement. Weavers' on-the-job performance in terms of their work practices and elemental job operations were, therefore, considered as the criterion in this study.
SAMPLE

60 trained and 60 untrained weavers from a total of 175 trained and 423 untrained weavers working in 'A' and 'B' shifts were selected randomly from two textile mills of Ahmedabad (30 from each mill in each category). These were the mills where combined training of attribution change and skill was imparted to randomly selected weavers, a few months earlier (7 months back in one mill and 4 months back in another mill).

Excluding the weavers whose data either on attribution or on work practices was not available, the means and ranges of age, tenure, total experience and education for 48 trained weavers and 48 untrained weavers who comprised the final sample for Study II are presented in Table 3 below.

TABLE 3

<table>
<thead>
<tr>
<th>Demographic Variables</th>
<th>Trained Weavers (N=48)</th>
<th>Untrained Weavers (N=48)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Mean</td>
<td>Range</td>
</tr>
<tr>
<td>Age</td>
<td>38.53</td>
<td>26-60</td>
</tr>
<tr>
<td>Tenure in Present Mill (Years)</td>
<td>17.26</td>
<td>6-38</td>
</tr>
<tr>
<td>Total Experience</td>
<td>18.47</td>
<td>6-40</td>
</tr>
<tr>
<td>Education (Years)</td>
<td>3.09</td>
<td>0-10</td>
</tr>
</tbody>
</table>
MEASURES

Attribution Measure

The same measure of attribution as in the first study was used for this study. However, as the method of selecting the trainees was different in this study (whereas only less efficient weavers were selected for training in the first study, the trainee group in the second study was selected randomly) it necessitated modification in the first question which asked weavers in the first study to indicate the level of their efficiency while in the second study it asked them to list the causes of low efficiency and high efficiency of weavers as compared to their counterparts in the loomshed.

On-the-Job Performance Measure

An observation form containing various critical aspects of work practices and elemental job operations being performed by weavers on the job was prepared.

Some of the most frequent and critical operations included in skill training comprised the observation form. Six such items of work practice on which the trained and untrained weavers were observed were - Handling machine interference, the state of bottom, i.e., the amount of yarn left on the bobbin when changed, shuttle change on running loom and pick finding, keeping the extra shuttle refilled, mending the broken yarn immediately and the quality of knotting. Besides these the
weavers were trained on a number of other weaving operations but because of the least frequency of their occurrence these were not included in observation.

Each weaver was observed for an hour for his performance on the above mentioned six work practices. If the weavers followed the correct work method on a particular item a score of one was given, if the work practice followed by him was wrong a score of zero was given. For very frequent operations scores were fractionated i.e., if on half the occasions the weaver used the correct method while on the other half his method was incorrect a score of one half was given. In this manner the scores on any given item ranged from 0 through .1, .2 to 1.00. The score on items were totalled to get total score. The possible range of score on the measure was 0 to 6.

PROCEDURE

Excluding the weavers who were on leave, 57 trained and 54 untrained weavers from the two mills were interviewed individually on attributional measure on the mill premises. The questions in the interview were asked in vernacular language. In the second step, excluding the weavers who were not available, 48 trained and 48 untrained weavers were observed for their various aspects of work practices and elemental job operations on the job. Each weaver was observed individually for about an hour and the observations were recorded in the
observation form. Before actual observations were recorded, two observers observed the same few weavers separately on a pilot basis. Final observations were recorded only after a very high level of consensus between the observers was reached.

ANALYSIS

The results obtained in Study I and II were analysed with the use of appropriate non-parametric tests as most data obtained were in frequency and percentages. A few parametric tests were also used as some of the data were in scores. The analyses of the data are presented in the following chapter.