5 Research Procedure

The research being undertaken is one to help the IT Industry and the software companies identify a new system of employment selection that could lead to greater effectiveness of the IT Software Industry. The objective of the research is to identify opportunities, and provide a greater cutting edge to meet future challenges of the Indian IT Software Industry. To an extent, it is problem that the industry may face in the coming years if not addressed. The research being undertaken is exploratory research that is defining the problem, helping identifying a course of action and gaining insight into the problem and opportunities. This chapter describes the research design and the procedure undertaken for conducting the study.

5.1 Instrument Surveys Used

Following section describes the process of instrument development which started with an introductory letter sent along with the questionnaire for pilot testing, sampling, data collection, and data analysis procedures (Appendix A). To have authenticity in the effectiveness of the study undertaken, a set of variables was evolved comprising the input variables, controlled variables and output variables. The detailed description of the instrument shows the variables as they are used. The questionnaire is non- disguised and structured with approximately 12-18 questions. The issues of the reliability and validity of the measurement scales are also covered in the chapter. Due to the variety of respondents in terms of their turnover, number of employees and diversity in services provided, the collection of data was unstructured. The professionals who are interviewed or to whom questionnaires were administered comprised Project Managers, HR Managers, Industry experts and software professionals who gave grass
root inputs. From the size of the population available, the objective is to have a sample, which represented at least a population sample with about 95 percent confidence level. The response provided by the IT Software Companies has been positive but their perception of corporate secrecy and willingness to part with confidential financial data has been far from positive. Quota sampling is used for the study of the population. These responses were used to describe the sample parameters and to screen out some companies that did not meet the sample criteria in a scientific manner.

The pilot survey was conducted by sending the Pilot Questionnaire to about 204 IT Companies identified as part of quota sampling. The initial email to each company HR Head/representative included an introductory letter about the research and the link to online questionnaire itself to complete the survey. After about 15 days, a follow up email was sent reminding IT Companies that had not answered the questionnaire and thanking IT Companies that had responded in the survey. Telephone calls were also made directly to some IT Companies that could be accessed. The response was analyzed and discussed with the Guide and a main questionnaire was evolved. Finally, the revised “Final version” of the instrument that was evolved, is as given in (Appendix B). The research variables identified were specific qualities and weight-ages, if any considered for these in effectiveness of the recruitment and selection system. The number of tests companies employ at the time of recruitment and selection, the combination of interviews, psychological tests and intelligence tests employed by them and the weight-ages if any given for effectiveness of recruitment and selection were asked. The selection criteria employed by the IT Software Companies with reference to the preference for academic record, performance in interviews, performance in group tests, experience record and any other test used were also elicited. IT Companies were also to respond to the minimum educational qualities acceptable in terms of 10+2 level, engineering
graduate and non engineering graduate, preference of the IT Software Companies to the nature of entry preferred in terms of IT engineering graduate, other engineering graduate, graduate from non engineering stream, diploma holders and others. The other variables were the forecast to meet challenges of the IT Industry in the next 5 years, the evolution of specific criteria to meet the effectiveness in recruitment and selection of IT Software Companies, the viability of undertaking psychological testing of the software professionals. A response was also elicited to identify the possible stage at which the centralized system of testing could be introduced.

5.2 Instrument Validation: Pilot Testing

It was important to validate the instrument by pilot testing of the items and verify the whole scale. This was to seek confirmation of some of the measurement items that were developed or modified for the purposes of this research. In this study, both the validity and reliability of the instrument were checked by means of using statistical validating techniques. It was also necessary, in order to evolve a new questionnaire. The preliminary survey questionnaire that was sent to 204 IT Companies was also to gain their feedback regarding the content, criteria, wording and ease of understanding the measurement items. They were also asked to offer suggestions for improving the proposed scale and suggest criteria, query on variables posed in the questionnaire and content adequacy. The feedback was taken into account in revising the questionnaire. The response from the Companies to Pilot Instrument was encouraging and assisted immensely in formulating the list of qualities, which the IT Companies were employing to evaluate while selecting the IT professionals. A few specific examples from these questionnaires are listed below to illustrate the research methodology.
5.2.1 Response to Job Specification Criteria to Meet Sample Criteria

The first section of the instrument asked the Companies, if a proper job specification was considered by them as criteria for undertaking the recruitment and selection system. Most Companies stated that they had a job specification for employees who came forward as potential candidates but several Companies did not give out the job specification on grounds of corporate secrecy. A few companies were vague in answering the query possibly for the same reason. A proper response to this requirement was considered as a preliminary process to screen out companies that do not meet the sample criteria.

5.2.2 Tests Conducted During Recruitment and Selection System

The number of tests conducted by companies varied from one/two to four/five. The response of the IT Companies to the tests conducted during recruitment and selection and weight-ages given to the tests was collated and response was thereafter categorized into three groups. The first group A comprised companies that undertook 4/5 prescribed tests out of Interviews, Group Tests, Psychological Tests, Intelligence Tests, Technical Tests and others. The second group B comprised companies that took 3/5 tests and the last group C comprised companies that took less than two of such tests.

5.2.3 Sampling Procedure and Questionnaire Administration

The population for this research study was the IT software companies in India, who in their quest for growth were recruiting and selecting potential candidates for meeting their business needs in the IT Software Industry. An unstructured list of such companies was generated by search on the net. A sample was chosen using systematic quota sampling technique. Further details of the companies in terms of number of employees and turnover were also acquired so as to classify them in the intended categories for the research study. This data
was only partially provided by most of the IT Companies and therefore had to be largely collected using on line survey through search engines and accessing websites of IT Companies. The details of HR Officials of the IT Companies were also acquired from the Company websites and on line.

5.3 **Hypotheses Formulation**

Based on the research objectives, the instrument for research (main questionnaire) helped formulate 12 hypotheses to test relationship between the variables identified in Chapter 4. The level of significance for rejecting null hypothesis was kept at .05. Descriptive statistics were computed for all variables before testing the null hypothesis for means, standard variables, frequencies, percentages and to correlated response values between variables.

The key hypotheses relating to the questions and its analysis are: It is widely perceived that greater number of tests would assist in sieving better candidates in the selection and recruitment to result in higher growth and sales in IT Companies. In this vein, the research tests for H1- H4 posit that there is no significant difference in the growth in sales, net margin of profit, revenue / profit growth or average net profit per employees of the IT Companies.

**H1.** Increased combination of interviews, psychological tests, intelligence tests, technical tests and others taken at the time of recruitment and selection for the IT Software Companies in India does not improve the relationship of growth in sales of IT Software Companies.

**H2.** Increased combination of interviews, psychological tests, intelligence tests, technical tests and others taken at the time of recruitment and selection for the IT Software Companies in India does not improve the relationship of net profit margin of IT Software Companies.
H3. Increased combination of interviews, psychological tests, intelligence tests, technical tests and others taken at the time of recruitment and selection for the IT Software Companies in India does not improve the relationship of revenue/profit growth of IT Software Companies.

H4. Increased combination of interviews, psychological tests, intelligence tests, technical tests and others taken at the time of recruitment and selection for the IT Software Companies in India does not improve the relationship of average net profit per employee, of IT Software Companies.

Considerable thought is given by IT Companies to the academic record, socio economic conditions, overall work experience and experience in the IT field while undertaking recruitment and selection in respective companies. While considering the socio economic background, only few IT Software Companies, across the board, gave any weight-age to the socio economic back ground of candidates. On the issue of assessing the Overall Work Experience, there was much more agreement. A few companies did give preference to work experience while selecting candidates. Some IT Software Companies have however preferred new candidates for employment. Hypothesis H5-H8 addresses the relative importance of these variables.

H5. The academic record has no domination while overall work experience, experience in field and socio-economic conditions, have more effect on the recruitment and selection for the IT Software Companies in India that affects growth in sales of IT Software Companies.
H6. The academic record has no domination while overall work experience, experience in field and socio-economic conditions, have more effect on the recruitment and selection for the IT Software Companies in India that affects the net profit margin of IT Software Companies.

H7. The academic record has no domination while overall work experience, experience in field and socio-economic conditions, have more effect on the recruitment and selection for the IT Software Companies in India that affects the revenue/profit growth of IT Software Companies.

H8. The academic record has no domination while overall work experience, experience in field and socio-economic conditions, have more effect on the recruitment and selection for the IT Software Companies in India that affects the average net profit per employee, of IT Software Companies.

Several attributes for potential candidates were listed in the responses from the software companies. After collating the feedback from companies, a generally common list of attributes, that the software companies considered desirable in potential candidates, was evolved. These attributes have constituted the variables which are used in selection for the study. Hypothesis H9-12 test the relative contributions of those parameters.

H9. The combination of various factors considered in the study at the time of recruitment and selection for the IT Software Companies in India affects growth in sales of IT Software Companies of all the factors considered for evaluation of the output variables of most factors did not affect the growth rate and revenue / profit growth.
H10. The combination of various factors considered in the study at the time of recruitment and selection for the IT Software Companies in India affects net profit margin of IT Software of all the factors considered for evaluation of output variables, factors and affect the net profit margin and net profit per employee of IT Companies.

H11. The combination of various factors considered in the study at the time of recruitment and selection for the IT Software Companies in India affects revenue/profit growth of IT Software Companies of all the factors considered for evaluation of the output variables of most factors did not affect the growth rate and revenue / profit growth.

H12. The combination of various factors considered in the study at the time of recruitment and selection for the IT Software Companies in India affects net profit margin of IT Software of all the factors considered for evaluation of output variables, factors and affect the net profit margin and net profit per employee of IT Companies.

5.4 Data Analysis

The data gathered from the online questionnaire were entered into a computer database and then analyzed using Statistical Package for Social Sciences (SPSS.10). The statistical software used for the research analysis (SPSS 10.0) can undertake complex analyses on large data files. It can run multiple SPSS sessions simultaneously on the same desktop computer, making it possible to analyze more than one data file at the same time. It has variables tab that makes it much easier to view and define variable attributes such as data types and descriptive variable and value labels. Improved quality for interactive graphics can now be copied as Windows metafiles, which are better suited to resizing and printing in other applications without jagged
lines and edges. SPSS can also print interactive graphs as metafiles for faster results at the same high quality. It enables application of regression techniques to ordinal outcomes (such as low, medium and high).

The data analysis consisted of factor analysis, multivariate analysis, multiple regression and descriptive statistics including multiple means, frequencies and percentiles, Independent samples Kruskal-Wallis tests and Independent samples Mann-Whitney ‘U test.

### 5.5 Reliability of Instrument and Testing

For the research to able to draw valid results, measures of variables should have validity and reliability. While reliability deals with how consistently similar measures produce similar results (Rosental and Rosnow 1984), and it has repeatability and internal consistency as two dimensions. Internal consistency in generally referred to the ability of a scale item to correlate with other items in the scale, that are intended to measure the same construct.

A hypothesis test tells us the probability of our result (or a more extreme result) occurring, if the null hypothesis is true. If the probability is lower than a pre-specified value (alpha, usually 0.05), it is rejected. It can be likened to a search process; we are searching for evidence to reject the null hypothesis, in the same way that we may search for (say) presence of a chemical in an environment. The ability to reject the null hypothesis depends upon:

- **Alpha (α):** Usually set to be 0.05, although this is somewhat arbitrary. This is the probability of a Type I error, that is the probability of rejecting the null hypothesis given that that the null hypothesis is true. To use the search analogy, it is the probability of thinking we have found something when it is not really there.

- **Sample Size:** A larger sample size leads to more accurate parameter estimates, which leads to a greater ability to find what we were looking for.
Effect Size: The effect of size the in the population. The bigger it is, the easier it will be to find. However, the above is not strictly correct. Jacob Cohen (author of several books and articles on power analysis) has pointed out "all null hypotheses, at least in their 2-tailed forms, are false." Whatever we are looking for is always going to be there – it might just be there in such small quantities that we are not bothered about finding it, (J Cohen, 1989).

A key factor in avoiding these small quantities is “Sample Size”. To determine the minimum sample size required for this research, the factors that were considered were the confidence level, nature of model, its size and maximum likelihood estimation. The minimum requirement for sample in each group was to exceed the number of dependent variables and provide statistical power to assess group differences. Power analysis enables this aspect to be viewed from the context so as to make sure that the data has been analyzed adequately enough to find from the data what the purpose of the research is. It is equally important that the size of what is being searched is also vital. It is generally referred as the "effect size." Several methods exist for deciding what effect size would be interested in the research. The power of a test refers to its ability to detect what it is looking for. In other words, the power of a test is the probability of finding what the research is looking for, given its size.

The above analysis uses data from over 50 companies to test across 4 different output variables and numerous input variables. In determining the reliability of this sample size and the overall validity of the analysis, it is to be ascertained whether the differences that were detected in the initial analysis undertaken across the various sample means were significant or not. This is typically done using the same statistical software.

As an Example: Analyzing the Null Hypothesis in Question 3. In Part 1, the study is testing the effect of Y1 across groups A, B and C. Each group has a mean of 36, 47 and 102 respectively with a standard deviation (stdev) around ~ 30. The experiment is trying to
determine that for a given Alpha value (0.05 as in this case), whether a difference in means (~50) can be detected at various sample sizes. This results in a plot of power vs, sample size. As can be seen in the plot below, a group sample of ~18-20 yields in a >95% confidence in Power. Thus, in this study, a sample size of 50 is more than sufficient to detect the differences that the research is looking for.

Figure 5.1: A Sample Size of 50

Carrying out this analysis for the hypothesis in Question 4, the experiment is comparing means across groups D and E with means of 31 and 64 respectively. A power analysis results in the following
A sample size of ~ 25-30 results in sufficiently high power, i.e. greatly lower risk of accepting a false null hypothesis. It is therefore unambiguous that the sample size of 50, chosen is adequate.