Chapter 6

ANALYSIS AND INTERPRETATION

The usable response rate to the survey was 40 percent. The analysis of the responses involved calculating summary statistics such as mean, median, standard deviation, etc. In addition, the relationship between variables were examined using chi-square contingency analysis. Where a statistically significant relationship was found to exist at alpha=0.05, the variables are reported as being related.

The software industry in India consists of over 650 firms, of which 150 are foreign multinationals such as Microsoft, IBM and Oracle. The State of Gujarat and Maharashtra have approximately around more than 300 software development firms. The survey sample represents over 15 percent of the total number of software organization in these two state. The numbers employed in this industry have been growing at the rate over 20 percent per annum, and 75 percent of the software produced in India is exported. The influence of such multinational respondents, may make the study findings representative of a more global set of HRM practices that single country study would suggest.

The mapping exercise was followed by case studies of the companies with opposing approaches to HR management. These organizations were chosen based on their responses to the survey questionnaires in relation to their resource practices. The researcher wanted one company that placed much emphasis on human resource practices, and one company that regarded process and technology as more important than human resources. Semi-structured interviews were undertaken with the personal manager, software manager, and a number of software engineers in each organization. An examination of relevant documents was also undertaken. Interviews were of on an average two hours in duration and were conducted on-site. The interviews covered the same topics as the survey (listed above) and examined the cause and effects of the results reported in the survey. Data analysis consisted of using data displays are matrices to explain the case study findings.
6.1 Human Resource Practices in Software Sector: Analysis and findings

- Sixty eight percent of the companies surveyed were Pvt. Ltd., fourteen percent were public limited & others were ltd. companies.

<table>
<thead>
<tr>
<th>Nature of company</th>
<th>Percent of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Partnership</td>
<td>9.09</td>
</tr>
<tr>
<td>Private ltd.</td>
<td>68.18</td>
</tr>
<tr>
<td>Public ltd.</td>
<td>13.64</td>
</tr>
<tr>
<td>Limited.</td>
<td>4.55</td>
</tr>
</tbody>
</table>

Table 6.1 Different Kind of Companies surveyed

<table>
<thead>
<tr>
<th>No. of employees</th>
<th>Percent of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 20</td>
<td>22.73</td>
</tr>
<tr>
<td>20 – 50</td>
<td>27.27</td>
</tr>
<tr>
<td>50 – 100</td>
<td>22.23</td>
</tr>
<tr>
<td>More than 100</td>
<td>27.27</td>
</tr>
</tbody>
</table>

Table 6.2 Employee- wise segregation of companies surveyed
**Number of employees in organizations**

(A) Less than 20  (B) 20-50  (C) 50-100  (D) More than 100

![Pie chart showing the distribution of employees into different age groups.](image)

**Figure 6.1** Employees wise segregation of companies surveyed

- Around 82 percent organizations are found to have employees belonging to an age group 25-30 year, while rest of the companies had average age group of employees 30-40 years.

- The companies were asked to rank the four departments (Finance, HRM, production and marketing) according to their importance. The following is the result there off.

<table>
<thead>
<tr>
<th>Rank of HRM dept. as its importance</th>
<th>Percentage of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13.64</td>
</tr>
<tr>
<td>2</td>
<td>22.73</td>
</tr>
<tr>
<td>3</td>
<td>31.82</td>
</tr>
<tr>
<td>4</td>
<td>22.73</td>
</tr>
<tr>
<td>Did not replied</td>
<td>9.09</td>
</tr>
</tbody>
</table>

*Table 6.3 Rank of HRM department given by different Respondents*
• The study revealed that only forty five percent organizations have separate HRM department in their organization. While rest of the organizations, HRM activities are looked after by either Director of company or software manager.

• Analysis revealed that the educational background of those responsible for human resource management in software organizations is primarily engineering (59 percent), computer science (20 percent) and others (21 percent).

• The result of qualities seen in incumbent while selecting them are as follows

<table>
<thead>
<tr>
<th>Qualities seen</th>
<th>Percentage organization</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technical skill</td>
<td>64</td>
</tr>
<tr>
<td>Personal attribute</td>
<td>15</td>
</tr>
<tr>
<td>Human Attribute</td>
<td>16</td>
</tr>
</tbody>
</table>

Table 6.4 Qualities seen in incumbents while selecting them

• A question was asked, "Which of the following functions/ activities do you regularly perform in your organization."

   (a) Man power planning (b) Training & development (c) Performance appraisal (d) Job evaluation

   Manpower Planning is performed by 81.82 percent, Training and development is performed by 77.27 percent, Performance Appraisal is performed by 81.82 percent of companies, while Job evaluation is regularly done in only 59.09 percent of companies.

• Thirty six percent organizations opined that they get less than 15 days lead time before actual recruitment while fifty percent opined 15-30 days lead time
only 30 percent had more than 30 days (30-60 days) lead time before actual recruitment.

- The research found sixty eight percent of the companies were engaged in first internal and then external source of recruitment eighteen percent companies purely involved in external recruitment.

- Different sources of recruitment and components of selection procedure used by companies are as follows.

The analysis revealed that majority (81.82 percent) of companies generally uses single source i.e reference by friends and employees. While newspaper is preferred by 68.18 percent, Recruitment consultant 45 percent, Campus recruitment 32 percent, while modern source Job melas only 18 percent, Internet is used by 45 percent of companies.

In selection components, most of the companies uses traditional approach interview (73 percent). The online interview and telephonic interview is used by 14 percent of companies, while written test, technical test and group discussions are used by 36 percent of companies.

- Different strategies adopted by organizations for employing people is shown in table.

<table>
<thead>
<tr>
<th>Options</th>
<th>Strategy</th>
<th>Percent of companies</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Contractual or Project base</td>
<td>13.64</td>
</tr>
<tr>
<td>B</td>
<td>Permanent base</td>
<td>50.00</td>
</tr>
<tr>
<td>C</td>
<td>Both A + B</td>
<td>27.27</td>
</tr>
<tr>
<td>D</td>
<td>Depends on requirement</td>
<td>9.09</td>
</tr>
</tbody>
</table>

Table 6.5 Strategy adopted by organizations for employing people
• Various efforts made by companies to enrich employees for job has found following results.

Very few companies engaged in such practices. Twenty three percents uses frequent training programs, thirty two percent uses incentives and fast technological up gradation to enrich job.

• Only seventy three percent companies provide training to their employees before they are placed on job.

• Different methods used by companies for assessing training needs have revealed interesting results.

Most of the companies(59 percent) make use of operational analysis followed by observation(41 percent) and some companies(32 percent) even involve employees themselves to assess training need.

• Fifty percent organizations replied they use on the job training methods while eighteen percent use off the job, rest uses both type of training methods.

• Various methods of training used by organizations are described below.

On the job method is used by 51 percent, on line training is used by only 9 percent, Lecture method by 22 percent.
6.2 Some Relevant Figures

Different kinds of Performance Appraisal methods used by companies

(A) Formal performance appraisal  (B) Individual appraisal  (C) Project wise appraisal  (D) Team appraisal  (E) Time based

![Bar chart showing different performance appraisal methods](image)

**Figure 6.2**

Type of facilities are provided to employees

(A) Canteen Facilities  (B) LTC  (C) Free children Education  (D) Paid holidays  (E) Any others (pls. Specify)

![Bar chart showing facilities provided](image)

**Figure 6.3**
Extra measures/ benefits are given to employees to retain them longer in organization

(A) ESOP    (B) Flexi time    (C) Performance base incentives    (D) Any Others
(E) None

Possible reason/s for recent recession in software industry

(A) 11\textsuperscript{th} September Attack    (B) Demand Supply mismatch
(C) Due to market/ Economic recession    (D) Cyclic variation
(E) Any other
Techniques used to reduce job stress

(A) Yoga  (B) Meditation  (C) Flexi time  (D) Recreational facilities

Source of recruitment are used by organizations

(A) Newspaper  (B) Magazine  (C) Campus Interview  
(D) Recruitment Consultant  (E) Employment Agencies  
(F) Internet (Online recruitment)  (G) Job Melas  
(H) References by friends & employees
Time interval for performance appraisal

(A) Yearly  (B) Half Yearly  (C) Quarterly  (D) Monthly  (E) Project wise

![Pie chart showing time intervals for performance appraisal]

Employees turn over rate in organizations

(A) less than 5%  (B) 5 -10%  (C) 10 -20%  (D) 20-40%  (E) Above 40%  (F) did not reply

![Pie chart showing employees turnover rate]

Figure 6.8

Figure 6.9
• The study revealed that only eighteen percent of organizations take service of external experts in providing training, thirty six percent companies use internal experts for training, while rest uses both sources.

• Various methods and duration used for performance appraisal has found following results.

  Majority of companies (64 percent) use individual appraisal, only eighteen percent use team appraisal. Forty five percent of companies also do project wise appraisal. Thirty two percent of companies perform yearly and half yearly appraisal, twenty three percent perform quarterly while only nine percent use monthly appraisal.

• Fifty nine percent of organization, the basis of salary increment and promotion was performance only. Only four percent considers seniority for salary increment and promotion.

• The research revealed that forty one percent organization do not pay any kind of bonus to its employees, neither time based not project based.

• Very few organizations (twenty seven percent) provide their employees recreational facilities (sports, picnics etc.) to motivate them & reduce job stress. Even modern techniques like yoga, meditation to reduce job stress are used by four percent of the organizations.

• Suggestion method is used by seventy seven percents of the organizations for involving employees in management decision making. Works committees are formed by fourteen percents and joint employee-management councils are used by twenty seven percents of the organizations.

• The important result of the research was about job turnover of employees. Sixty percent of organizations have more than ten percent job turnover rate. The following table shows the detailed result.
<table>
<thead>
<tr>
<th>Employee turn over rate</th>
<th>Percent of organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Less than 5 percent</td>
<td>13.64</td>
</tr>
<tr>
<td>5-10 percent</td>
<td>22.73</td>
</tr>
<tr>
<td>10-20 percent</td>
<td>45.45</td>
</tr>
<tr>
<td>More than 20 percent</td>
<td>9.09</td>
</tr>
<tr>
<td>Did not replied</td>
<td>9.09</td>
</tr>
</tbody>
</table>

Table 6.6 Employee turn over rate in organizations

- Different type of facilities and fringe benefits provided to employees has found surprising results.

  The basic facility of canteen is provided by fourteen percent of companies, free children education by only 4.5 percent of companies, paid holidays by 64 percent and LTC by 32 percent of organizations.

  Even Provident fund is given by 64 percent and gratuity by 45 percent and family pension is given by 18 percent of companies.

- The study found that only twenty three percent organizations provide ESOP benefit to retain the employees longer in organization.

- The important aspect of HRM, “conflict management” is practiced by forty five percent of the organizations.

- One of the striking result of the study is that, there were very few companies (35 percent) making any effort for diversity management in their organizations.

- Companies use various methods to upgrade employees with latest technology. Eighty two percents use training program while 59 percent use seminars, 23 percent companies send their employees to different institutions.
• Very few companies offering various scheme to employees for better career advancement Opportunities. Only eighteen percent of companies use special career advancement scheme and twenty two percent were using abroad training facilities. Twenty seven percent companies did not have any scheme for career advancement.

• Fifty percent managers believe that there is demand supply parity exist in software industry.

• Only four percent of organizations were using human resource accounting and auditing practice in their organizations.

• Eighty six percent organizations surveyed revealed that eighty percent of their software done in teams.

• Sixty four percent of the organizations surveyed revealed that they had never used team building exercises, even on in experimental basis.

• Sixty three percent Managers believe that teams are equipped with all resources.

• Majority of Managers (77 percent) ascribed Market/Economic recession as one of the reasons for the recent recession in software industry, eighteen percent believe, it is due to cyclic variation or demand supply mismatch. Only fourteen percent were in opinion that 11th September attack has affected the industry recession.

6.3 Relationship Between different issues of HRM Practices

For Exploring the influence of the areas of HRM practices on the job turnover rate of employees in software industry, following Null Hypotheses have been formulated.

Ho 1: There is no significant relationships between job turn over rate and existence of training scheme.
Ho 2: There is no association between Software engineer involvement in deciding training need and staff turnover rate.

Ho 3: Career development practices does not affect on employee turnover rate of organizations.

Ho 4: ESOP and job turnover rate are not related with each other.

Ho 5: Performance based incentives like measures and job turnover rate are not related with each other.

Ho 6: Existence of HRM dept (HRM Manager) and job turnover rate of organizations does not have significant relationship.

The Chi square test is done at Alfa = .05 significant level and all the above null hypotheses have been rejected except Ho 5 i.e the performance base incentives and job turnover rate are not related with each other.


As a mapping of human resource practices, the survey revealed what could be best described as a 'laissez-faire' approach to human resource management among the majority of companies studied. This is reflected in the political nature of recruitment and the low level of support and training given to software engineers. In addition, the appraisal of software engineers tends to be conducted in an environment that emphasis individual rather than team achievements. Such practices are evident despite the knowledge importance of the human element in the software development process, and the high turnover of staff.

The majority of the organizations studied have less than 100 software engineers. Fifty five percent of organizations do not have separate HR department. These organizations generally place the responsibility for human resource management with software managers. Analysis revealed that the educational background of those responsible for human resource management in software organizations is primarily engineering not computer science. The majority of those who had computer science backgrounds had a lower standard of education than their
engineering counterparts. This is interesting as the lack of emphasis by computer science curricula on management and human factors theory, as opposed to their engineering counterparts may explain why computer science graduates are promote less to the higher management positions in software organizations.

6.4.1 Recruitment

The research revealed that generally software managers determined when a software engineering position existed and the characteristic and qualifications necessary for the job.

This is in line with their responsibility for the human resource management of software engineers. However, even though software managers have responsibility for human resource management, the directors of organizations make the majority of final selection decisions for new recruits, with software managers not involved in the decision-making. The decision are taken in isolation of the teams into which the recruits are selected, as directors generally do not personally know the team into which the recruit is being selected.

It is interesting to note that when an organization did have a personnel department, software managers made the final selection decision. One explanation for this is that the organization recognizes that software managers are the closest to software team members. They know the team processes and culture, and are able to make a more informed decision about who may be suitable for the job. Sixty nine percent of organizations that had directors making final selection decisions attested to the fact that human attributes did not enter into the selection decision process. This contrasts with 86 percent of organizations, that had software managers making the final selection decision stating, that human attributes and human qualities were very important in the final selection decision. A director making the final selection decision probably means that human and interpersonal qualities necessary for a software
engineering position are not concerned for. On the other hand, when software managers make the decision, there is a greater chance that the candidates chosen are able to work with group goals as well as possessing the required technical skills.

6.4.2 Team activity and support

To a large extent, software engineering takes place in a team environment. Eighty six percent of organizations surveyed revealed that more than 80 percent of their software development was done in teams. These teams were volatile, as the rate of staff turnover was a significant problem in the majority of organizations surveyed. Fifty five percent of organizations had an annual staff turnover rate that was greater than ten percent.

Sixty-nine percent of organizations, that had the highest percentage of software being produced in teams, believed that the organization did not give sufficient resources to teams. The majority of those organizations who had the highest staff turnover rates also did not provide enough resources for software teams. On the other hand, 77 percent of those organizations that had low staff turnover rates (less than 5 percent) believed that the organization provided sufficient resources for software teams. A statistically significant patterns emerged where those organizations who were seen to be providing sufficient resources to software teams had lower staff turnover rates than those seen to provide insufficient resources to software teams.

Sixty four percent of the organizations surveyed revealed that they had never used team building exercises, even on an experimental basis. The apparent irony was that the majority (i.e., sixty-five percent) of those organizations that had not practiced team building also had the highest percentage of software being produced in teams. Ninety seven percent of organizations that had employed team building exercises believed that it had improved team cohesiveness and in general expressed a favourable response to such an investment.
6.4.3 Training and Development

Twenty eight percent of organization had no training schemes at all. This was one of the more striking results of the study. Seventy two percent of those organizations who had no training schemes for software engineers had very high staff turnover rates. A statistically significant relationship was found between the existence of training schemes and low staff turnover rates. It was also noted that organizations that had a personnel department had a formal training policy which was jointly formulated by the personnel department and software managers.

An important motivational factor of software engineers is that they are able to dictate their training requirements. Thirty two percent of organizations said that their software engineers had some element of control over their training. However, Sixty eight percent of organizations who had training schemes did not allow individual software engineers to dictate their own training requirements. In other words, there was not a definite link between what the software engineer thought he or she needed and what he or she received. It was also found that software engineer input into training and staff turnover were inversely related, i.e., the higher the input, the lower the staff turnover rate.

Fifty percent of all the training methods used by organizations surveyed were on-the-job. Thirty two percent use both type of methods. The majority of training was not planned and possible one might argue haphazard. Sixty six percent of organizations that employed on-the-job as the primary training method also indicated that the organization did not provide sufficient resources for teams.

The study revealed that there is a remarkable indifference towards the motivational potential of career development. Eighty-two percent of organizations surveyed dismissed the practice of career development. The message is clear, the majority of organizations did not engage in or recognize the potential of career development. This was not withstanding the fact that 78 percent of those organizations that had low staff turnover rate engaged in career development. On the other hand, 68 percent of organizations that had high staff turnover rates did not engage in career development at all. A statistically
significant relationship between an organization engaging in career development and staff turnover rates was found.

It was noted also that 71 percent of those organizations that ranked or rated people the most important (1st or 2nd rank in question 7) component of software engineering engaged in career development. Organizations that held people factors important to the software engineering effort supported the software engineers by mapping and planning career paths for their staff. It is note-worthy that 76 percent of those organizations that did not engage in career development ranked people as being of little importance to the software engineering effort.

6.4.4 Performance appraisal

The study revealed that the frequency of performance appraisals in the organizations surveyed was very low. Software managers, despite the fact that they generally do not make recruitment decisions, generally conduct such appraisals. It must be questioned, if the directors are best at making the final selection decisions, then surely they ought to be involved in the appraisal process. If directors are the most informed of the needs of the software team and the manner in which it operates, then surely they are equally qualified for involvement in the performance appraisal process.

Ninety-three percent of performance appraisals are conducted by software managers. This seems paradoxical in that they only make 29 percent of the final selection decision. In comparison, directors do not conduct any performance appraisals yet make 70 percent of final selection decision.

Sixty four percent of organizations indicated that software engineers were appraised once or twice a year. A mere 9 percent of organizations attested that performance appraisals were carried out on a monthly basis. This is low considering that performance appraisals are crucial to many human resource practices including training, compensation, career development and team development. Without regular information about individual performance, it seems unlike that individual software engineers can be given the proper support in order to ensure team effectiveness.
Fifty five percent of the organizations surveyed verified that they used a standard performance appraisal form to assess software engineers' performance. There is a danger when using a standard appraisal form that aspects of the software engineers' job would not be taken into account, because standard performance appraisal forms usually concentrate on individual performance rather than performance as part of a team. Sixty four percent of organizations did not include the software engineers' support of team processes in the performance appraisal. In effect, the majority of software engineers are not appraised on how well they support the team and how well they function as part of the team in which they work. This appears unwise as 62 percent of organizations that revealed that most of their software engineering is done in teams do not assess their software engineering performance within these teams.

Eight two percent of organizations claimed that pay was related to performance. However, this seemed peculiar as majority of organizations studied appraised their software engineers only once or twice a year. Seventy percent of the organizations, that testified that pay was related to performance, appraised software engineers on an irregular basis. Therefore, those organizations were basing their compensation of staff on one or two performance appraisals in a year. It appears to be difficult enough to compensate fairly as per performance when performance appraisals take place on regular basis, without the added difficulty of when they do not. Only ten percent of organizations considered that they pay for performance and appraised staff on a monthly basis. Consequently in real terms, compensation was not visibly tied to performance in the majority of organizations.

The result of this analysis is clear; organizations implements teams, and expect software engineers to work as part of team, but do not recognize that their performance has anything to do with their involvement with the team. Human resource management on the whole is not considered as important in the organizations surveyed as researchers (e.g. DeMarco and Lister, 1987; Thomsett, 1990; Curts, 1994 have advocated). Many important human resource practices are completely ignored. These include training, team development, and career development. The mere fact that so many of the software organizations
surveyed discount the previous mentioned human resource practices is testament to what they consider important in a software engineering environment.

6.5 Analysis of Contrasting Human Resource Practices

While it is clear that the majority of software development organizations studied do not have appropriate human resources practices, evidences exists of many progressive organizations among the sample. In order to explain the differences in approaches to human resource management, two organizations were chosen for more in-depth study. The researches wanted to study companies that had opposing views on the importance of human resource management, and whose practices reflected these views. To isolate the effects of these variables, both companies chosen had human resource departments, and are similar in relation to other organizational attributes such as size and structure.

Company A was established in India in 1993 and its headquarters in the Udaipur. Company A was established by the survey data as example of 'best practice' for human resource management of software engineering. This was primarily due to the company's focus and attention on people and people related issues in the company. People factors ranked for more important than the issues concerning process and technology in company A. Company B was established in India in 1994 and develops a range of computer products for personal computers including word processing, project management and software development. Company B was established as an example of 'Poor practice' of human resource management of software engineering because of the company's disregard for people issues in the company and because of the over-dedication of the company on the issue of process and technology. An overview of Company's A human resource strategy is shown in figure 6.10, with that of company B shown in figure 6.11. A comparison of human resource practices of both companies is presented in table 6.7.
Figure 6.1: Overview of Human Resource Strategy of Company A

- **Recruitment**: A software manager selects recruits for the team based on their competency. The recruit is selected by the team, no emphasis on dual approach to entry.
- **Selection**: Recruits are selected based on performance information.
- **Performance**: Performance appraisal allows direction of training. Performance information helps the development.
- **Career**: Performance improves the motivation of individual team members.
- **Development**: Development helps the career.
- **Team**: Team support for software engineers.
- **Software**: Software development helps the recruitment policy.

Group cohesion does not create a barrier to entry.
Overall there is a marked difference in the human resource practices of the two companies. Company A employed a comprehensive human resource strategy, which supported every aspect of the functioning of the software team. The software engineers in company B, though obviously individuals, essentially had to work in some form of team (group). The human resource strategy that company B persisted in enforcing meant that these individuals did not benefit from being a part of a software team. Company B implemented a human resource strategy that served and depended on the abilities of individuals not on the software team. Unlike the human resource strategy of company A, the human resource strategy of company B is not a 'team-based' strategy. One could aptly describe it as that of an 'individual-based' human resource strategy.

The most striking differentiation of both companies' human resource strategy was the team-based versus the individual-based human resource strategy. Company A and company B were chosen as they were examples of 'preferred practice' and 'poor practice' respectively. The researches suggest that a key reason for this difference is the attention and focus given by the organization's human resource strategy to the software team. The software team was shown to be the central focus of all human resource practices in company A, as well as being the central focus of the software managers role. In contrast, company B's human resource practices supported individuals, not software teams.

This team v/s. group comparison can be used to explain the result of the survey. Ultimately, human resource practices are testament to an organization's concept of what constitutes a software team. For most of the organizations surveyed the concept of team that they espouse is shallow and does not emphasis the core fundamentals of what makes a 'true' team. This means that in effect the majority of software organizations surveyed have the individual, not the software team as the basis for operations. For human resource management and human resource strategy in these organizations, it means that these organizations implement 'individual-based' human resource strategies rather than team based strategies. The decision by these software organizations to opt for a human resource strategy that focuses on the individual rather than the team within a software
Figure 6.11 Overview of Human Resource Strategy of Company B

Figure 6.12 The Proposed Amendment to Humphrey's Model
engineering environment has serious consequence for these organizations and their staff.

Table-6.7 The Basis for policy on the Relevant Human Resource Practices

<table>
<thead>
<tr>
<th>H.R. Practices A</th>
<th>Company A</th>
<th>Company B</th>
<th>Differences</th>
</tr>
</thead>
<tbody>
<tr>
<td>Team Development</td>
<td>The team was the basic unit of human resource management, which meant that support for the team was important.</td>
<td>The individual was the basis of human resource management, team support was not necessary.</td>
<td>Team development was necessary for co. A because they had implemented teams. It was not necessary for co. B because there were no software teams.</td>
</tr>
<tr>
<td>Performance Appraisal</td>
<td>Performance information was vital to directing other human resource practices.</td>
<td>No need for frequent performance information because software engineers were categorized as ordinary staff.</td>
<td>Frequent performance appraisals in co. A was based on the software engineers contribution to the team. Infrequent PAs were based solely on individual performance in B.</td>
</tr>
<tr>
<td>Recruitment and selection</td>
<td>Software engineering means software teams recruit and select well-</td>
<td>Software engineering is a technically demanding job. This implies a</td>
<td>In co. A, people were selected for particular software teams. In co. B, people were</td>
</tr>
<tr>
<td>Training</td>
<td>Consistent training is a means to staying ahead of competitors and motivating staff.</td>
<td>Software engineers experienced enough to pick up new development and techniques in the field.</td>
<td>In co. A, training motivated software team members and kept a supply of skills in the team. No training in co. B, individuals had sufficient experience.</td>
</tr>
<tr>
<td>----------</td>
<td>--------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Compensation</td>
<td>Compensation maintains a consistent level of performance and rewards exceptional work. Compensation is a by-product of performance appraisal.</td>
<td>Compensation is merely fulfilling a legal obligation. No role in the human resource strategy.</td>
<td>In co. A, software engineers were paid as per performance in the software team. In co. B compensation fulfilled a legal obligation.</td>
</tr>
<tr>
<td>Career</td>
<td>To retain staff and improve staff</td>
<td>High rate of staff turnover in</td>
<td>Co. A held that the software team was</td>
</tr>
</tbody>
</table>
Table-6.7 The Basis for policy on the Relevant Human Resource Pratices.

The contrast in practices illustrates the effect of a team and an individual approach to Humphrey's (1989) model. It shows that it is not sufficient for software organizations to incorporate the people dimension by having a human resource strategy. Rather, it is necessary to have this strategy at the core of the software team. Organizations whose strategies embody all three dimensions of software engineering (People, process and technology), but whose human resource strategy does not support the software team and its processes, function less effectively from a HR perspective. Consequently, the researchers suggest an amendment to Humphrey's (1989) model as, shown in figure 6.12. It is proposed that in looking beyond the process and technology to people, it is important to recognize the difference between an individual and a team based approach to human resources. The adjustment to Humphrey's model is significant in that it not only means that software organizations need to encompass all three dimensions (technology, process and people) into their strategy dimensions, but that the people dimension as it relates to software engineering means software teams not individuals. This is the next challenge as researchers look beyond the technology and the process to the human element.
6.6 Analysis of open end questions

6.6.1 Future challenges of software industry.

A question on future challenges of software industry was asked to Human Resource Managers. A summary of the responses to this question is made here under.

6.6.1.1 Globalization

With globalization, the IT industry today ceases to remain within any boundaries. Wherever one operates, global competition exists. The industry is characterized by shortening product life cycles. As a corollary, manufacturing has assumed a different significance in enabling organizations to compete effectively. And Indian organizations in order to succeed need to prepare themselves for the changing realities and business environment.

The global IT environment has underground a huge change in character. It is estimated that there are more IT appliances in the world today than people.

Most of the respondents told that the industry will have to prepare adequately for competition. Till now, Indian companies continue to leverage the development centers for higher margin, now they will face increasing competition from other countries producing low cost products like China, Israel, Ireland and Mexico. International Companies will set up their own captive development units in these nations. Consumers will be having many choices available and they can keenly exercise their right to buy whatever goods or services most closely meets their need, regardless of origin. So business will have to be operated at lower margin with high quality services.

Equally important challenge is emerging from consumers. They are becoming more discerning and more demanding. Worldwide telecommunication systems, a
myriad of satellites and inexpensive television are giving consumers global exposure and sharpening their awareness making them more discerning. As a result consumer orientation and innovation are fast becoming the key ingredients to success. The focus on the consumer would be prime importance of requirement of every business in coming years.

Similarly, the challenges will emerge from other direction also, Business are likely to be under pressure to adopt environmental policies and incorporate them into their strategic business planning as a matter of routine. The pressure will come from government, consumers competitors, employees, general public etc. Besides organizational concern for ethics, integrity, employee health, safety and development, quality and consumer services are certain to become a more integral part of corporate life. Further there will be increasing demands on organizations from share holders consumers, people, employees etc.

6.6.1.2 Productivity and quality

The quality in every sphere of the business activities would be another key factor that would decide the survival of the fittest in the twenty first century. The quality cost will become the cutting edge for the success of any business. In tomorrow's markets only those companies can survive and grow whose products can face the severe local and international competition. Therefore the most important management challenges will be to improve the productivity of Indian companies and the quality of their products to the international levels. Productivity relates to efficient and effective use of existing resources. It is concerned with almost all resources and areas of enterprise. It is concerned with employees, plant and machinery, materials, energy, product design, technology, management practices, system and procedure, work methods, organization structure etc. Productivity also closely linked with many aspects of the relationship between workers, management and owners of an enterprise. The improvement in all these areas/factors will result in higher productivity and quality should go together. Anyone who will ignore the quality would be at great jeopardy to his or her
business. Similarly operating in an environment of constant changes, technological developments cannot be ignored. Modern and relevant technology has to be used even at the cost of short term failures and costs if the organizations have to become competent and competitive in future. High quality, high technology products will be the only key to continued success in the emerging turbulent times. However in country like India where capital is scarce resources and the cost of servicing the capital is very high, making the best use of any investment assumes great significance. Therefore the programs of improvement of productivity and quality are to be designed in the light of results. The management has to channelise various resources to certain international levels of cost and quality.

6.6.1.3 Globalization & Strategies

Another important challenge to software industry will be globalization of their companies. No country today survive and grow within its own boundaries. Our world is advancing rapidly and inexorably towards a global market place. This is true change and needs to be recognized in its latent form. The most successful firms of the future will be those that embrace this change and centre their strategies around it. Globalization became theme of the organizations throughout the world. Japanese and Korean companies are now reaping the benefits of long years of investing in understanding overseas markets, foreign competition, foreign customers and foreign cultures. As the liberalization picks up momentum and more business opportunities emerge in India, more foreign companies will enter and Indian companies will have to learn to manage in more competitive environment. International competition will force Indian companies to extend their strategic mindset beyond national boundaries. Therefore it is better for management of software companies to prepare for this challenge well in advance. They should examine various strategies for planning their invasion into foreign markets. They must develop global vision and develop the strategies coherent with this vision. They need to ever invest in understanding overseas markets, foreign competitors, customers and cultures and adopt their
organizational structure to accelerate, retain and apply what they learn. I am talking about those companies which have capabilities for becoming global. Some may find it difficult and costly in the short-run, but it will be advantages for them to keep it on their agenda for future of the survival and growth in the domestic market should be first priority, but the realities of the global market place and global competition should not be ignored. The companies who will avoid globalization of their products and concentrates narrowly on their domestic operations will be more vulnerable to the international competition which may relentlessly hound them.

6.6.1.4 Human Resources

Managing human resource is the central and most important task of management. Actually it is not fixed assets but people in the organization which makes the difference. Technological up gradation, optimum utilization of resources and innovation are entirely dependent upon the performances of people. While strategy, technology, market developments, acquisition or disposition and rest of all business are important, putting them altogether comes back to people. In fact, business success ultimately depends upon the quality and attitude of human resources employed and how well business uses and involves its workers. However the changing facets of employees are making the management of human resources very difficult. We are witnessing a complete change in employee expectations. They are concerned more with recognition feelings, ambitions, emotions, empowerment, improvement in standard of life, more freedom, short hours of work and participation in decision making. They are no longer willing to be cogs in the wheel, but are seeking participation in the enterprise in a manner that is qualitatively different. Today workers question the status quo; they want to make their own decisions. They want to share their ideas and not like just be told what to do. They want to be treated with dignity and respect. Nurturing these tendencies in a positive direction is perhaps the most difficult management challenge.
While by 2008 employees will grow more demanding and management may have a difficult time trying to meet even their greater expectations.

Employees will also be required to get themselves prepared for future challenges. Tomorrow's jobs will be more complex, demanding high skill levels. They will necessitate greater problem-solving skills. They will be computer assessed and richly rewarded more loyalty and sacrifice may be expected rather than indifference and aloofness. Employees will be expected to learn new skills and thrive on new challenges across their entire work lives. No level of learning will be considered enough for very long. Computer based technology is already having an enormous impact on workers and in one way or another it is changing the jobs of the people. Therefore, employees will need proper tools and training to develop the appropriate skill to remain successful in future.

Thus by the year 2008 management will have to deal with empowered, skilled and educated work force, armed with technology and information. Sound human resource management practice will be needed to nurture and develop motivated people. Rule book oriented personnel policies of the organizations may not be effective because, they are generally found grossly inadequate. They may create a gulf between employees and organizations. Management will be required to follow such policies and practices that inculcate positive attitudes and encourage performance among employees. The key management challenge will be how to channelise human resources as the winning force.

6.6.1.5 Finance

Finance, which is an essential ingredient of business, is going to provide another area of management challenge. Since in India, capital is short and the cost of capital is too high, a successful company will be the one that manage its finances the best. Most of the Indian companies have to restructure their businesses and improve their productivity and the quality of their products for survival and growth in the emerging environment. This will need huge investment, which most industries may find difficult to mop up, in spite of the capital market having grown.
The challenge before the management will be to evolve new ways of financing investments and deploy finance most effectively.

Presently companies are managing to get finance from government owned financial institutions irrespective of the quality of their performance. Although these institutions currently have significant stakes in most Indian companies, but they do not take any active interest or question their performance. However, this approach will change by the year 2008. Government owned financial institutions will become more privately owned and more genuinely accountable to investors. Foreign financial institutions will enter into the Indian financial market due to liberalisation policy and the present institutions will themselves face competition for funds and will have to ensure better returns on their investments. Therefore, financial institutions in future will be more concerned with the performance of the companies and getting finance will not be an easy thing especially, for the companies showing poor performance. Furthermore, companies will themselves also face more discerning, more demanding and more sophisticated investors who will take more active interest in the performance of companies management. They will progressively demand quality performance, management accountability, fairness to all stakeholders and adequate disclosure of corporate information. In addition to this, government may also be after the available finance to finance its development projects. Thus, this management challenge is likely to assume major significance by 2008.

6.7 Concluding Remarks

The result of the study must be interpreted in light of the exploratory research approach used and the population from which study participants were selected. The aim of the study was to 'map' current practices rather than evaluate the contribution of specific approaches to organizational success. Nevertheless, the hypothesis proposed regarding the importance of the designing human resource practices within a frame work that considers teams rather than groups of individuals, has important implications for software organizations addressing the issue of human resource management. Such implications should become
increasingly important as the global nature of the software industry make the attraction and retention of good people, so central to competitive success, more difficult. For most organizations, however, human resource management still takes a back seat to more technical matters. Even within those organizations with well-established human resource strategies, the full benefits of good people may not be realized if software teams are managed as groups of individuals. Further research will be required to test this hypothesis amongst a wider set of organizations. However, even if only some elements of this study prove to be applicable to organizations outside of the software sector in India, software organizations need to radically rethink their approach to staffing, supporting and managing software development teams.