CHAPTER III
RESEARCH METHODOLOGY

3.1 INTRODUCTION

The research methodology constitutes the blueprint for the data collection, measurement and analysis of data. It is the overall operational pattern or framework, of the research that stipulates what information is to be collected from which sources by what procedures.

3.2 IT INDUSTRY IN INDIA

Information Technology has made possible information access at gigabit speeds. Today a country’s IT potential is paramount for its march towards global competitiveness, healthy GDP, improving defense capabilities and meeting up the energy and environmental challenges. It has created a level playing field among nations and has made positive impact on the lives of millions who are poor, marginalised and living in rural and far-flung topographies. In the early 1970s, American firms looked offshore for cheaper ways to develop software products. India, Ireland and Israel were obvious choices given the widespread knowledge of English and relatively low costs of programmers.

The implantation of a technically sophisticated industry like software into a less developed host country has typically been explained by the access of transnational corporations to local resources facilitated by policy reform (often after efforts to create industry through protectionist policies have failed). In the 1980s, domestic software startups, funded by government research contracts, were established. Initially, they provided software services to the defense industry and later developed security software products for global markets. This trend continued into the 1990s with support from global Venture Capital firms.
Local product firms currently dominate the market accounting for 75 per cent of employment.

Indian policy in the 1970s was appropriately described as “statistic, protectionist and regulatory.” In IT, the state was the main producer of products and services. Its strategy was to create ‘national champion’ state-owned enterprises. These were granted monopolies. The creation of national champions resulted, not surprisingly, in championship-scale failures. It created no output of any significance, crowded out the private sector and produced a labor force of dubious quality. A key protectionist policy was the Foreign Exchange Regulation Act of 1973 (FERA-1973). Under FERA-1973, a foreign firm could operate in India only with a minority interest (foreign ownership was restricted to a maximum of 40 per cent). Many foreign firms closed their Indian operations, including firms as diverse as Coca-Cola and IBM, citing concerns about the protection of intellectual property. FERA-1973 thus closed the door to product software development in India by Trans National Companies.

Domestic and transnational firms jointly discovered an innovative solution. Since software development could not come to India, Indian programmers were sent to developed countries. It began in 1974 with the mainframe manufacturer, Burroughs, asking its India sales agent, Tata Consultancy Services, to export programmers for installing system software for a U.S. client. Other firms followed, including foreign IT firms that formed FERA-1973 compatible joint ventures. Initially, the exported programmers worked for global IT firms. Later in the decade, as IBM grew in market share, end-users such as banks used Indian firms to convert existing applications software into IBM-compatible versions. By 1980, there were 21 firms with annual exports of $4m.

The state remained hostile to the software industry through the 1970s. Import tariffs were high (135 per cent on hardware and 100 per cent on software) and software was not considered an “industry”, so that exporters were ineligible for bank finance. These protectionist policies favored established firms with conglomerate interests and access to finance over small firms. Bombay, the
country’s commercial capital, became the natural center of the business. Seven of the top eight exporters in 1980 were headquartered in Bombay with a 90 per cent market share. While protection led to labor exports, it slowed the inflow of new skills into India. The industry learned global skills primarily through programmers returning from overseas assignments, but this was further slowed because many chose to remain overseas.

Government policy changed to a supportive stance with the election of a new Prime Minister, Rajiv Gandhi, in 1984. His New Computer Policy (NCP-1984) consisted of a package of reduced import tariffs on hardware and software (reduced to 60 per cent), recognition of software exports as a “delicensed industry”, i.e., henceforth eligible for bank finance but not subject to the intrusive licensing regime, permission for foreign firms to set up wholly-owned, export-dedicated units (Texas Instruments was the first to enter in 1985) and a project to set up a chain of software parks that would offer infrastructure at below-market costs. In 1985, all export revenue (including software exports) was exempted from income tax.

The combination of the U-W standard and lower costs made writing programs in India economical. The relocation of work to India, though gradual, was led by considerable new entry by TNCs and domestic firms and experimentation with different activities. Some TNCs did R and D and wrote product software using cross country teams (such as Texas Instruments and Hewlett Packard), others wrote custom software for in house use (such as ANZ Bank and Citigroup) and for clients; domestic firms, such as TCS, shifted from exporting programmers to outsourced custom software and others started product development (such as Wipro). Overall, the number of software firms went from 35 in 1984 to 700 in 1990 and the share of smaller firms rose.

As a result, they needed more physical facilities than in the earlier recruiting business. Bangalore began to grow in importance in consequence. It had several advantages:

1. **Infrastructure was cheaper:** Firms were attracted by cheaper real estate than Mumbai and the first software technology park under
NCP-1984, with assured supply of electricity and telecommunications bandwidth, was located in Bangalore.

(2) Labor was cheaper and in greater supply: Unlike Mumbai and Delhi, with histories of large firms and labor militancy, Bangalore had small companies that were relatively free of union troubles. Further, Bangalore is located at the center of the four southern states, Karnataka (whose capital is Bangalore), Tamil Nadu, Andhra Pradesh and Kerala, which together produce 52 per cent of India’s engineering graduates.

The government had earlier chosen Bangalore to locate several high technology SOEs, thus creating a trained labor force – although the quality of the labor force was dubious and provided only a small percentage of the software industry’s needs. In 1909, the elite Indian Institute of Science had been established in Bangalore. Most of its graduates and research were directed towards the public sector. Some of these, if indirectly, helped Bangalore’s development in software. The biggest success from IIS was Wipro Technologies, India’s 3rd largest software exporter. It was founded at IIS by a group of engineers working under Ashok Soota, an academic at IIS. (3) Over time, TNCs, a key conduit for domain skills came to be largely headquartered in Bangalore, adding to its advantage as a center of learning. These included the pioneers, TI and HP, but also IBM, Accenture, Oracle, GE and Dell.

Policy reforms in the 1990s and 2000 reduced import tariffs to near zero and standardized foreign ownership, intellectual property protection, venture capital, stock market listing and telecommunications policies to global best practices. Thus, many of the weaknesses and challenges described above are likely to reduce in importance. In addition, technological changes during this period, particularly the Internet, led to a sharp decline in data storage and transmission costs. These changes induced a new round of entry of TNCs and startups and opened new opportunities for existing firms in remote software services, such as email management and remote software maintenance.
Indeed, product development (including R&D) rose from eight per cent of software exports in 1999 (the year from which key changes in foreign ownership rules, and telecommunications, intellectual property protection and venture capital policy reforms began) to 25 per cent in 2003 and revenue per employee rose by 14 per cent. It appears that the Indian software industry is acquiring domain skills. Some of this is undoubtedly due to the leveling of the playing field for TNCs and startups since 1999. Some has to do with a strategy of overseas alliances being pursued by the larger domestic firms. The industry, therefore, appears to have the capability to move up the value-chain. As a result, industry leadership, currently with large domestically owned software services firms offering custom programming services, will have to be shared with startups (diaspora-linked or funded with foreign venture capital) and TNCs offering innovative products and services. The top 24 software exporters included four TNCs in 2006, up from just one in 2000.

In the year 2008 the Information Technology (IT) industry in India had registered moderate growth and had expected to register a lower rate of growth in the year 2009 compared to the previous year because of the ongoing recessionary trends in the US, constitutes the principal market of about 60 per cent for the industry. Overall, decrease in the demand from European countries is also a cause of concern for the Indian IT industry. While the existing deals of the IT firms are stable or growing at a moderate rate while new deals are likely to get affected. Income from existing deals accounts only for around 60 per cent of an IT company’s total revenues, thus 40 per cent of income sourced to new deals may get affected in most of these companies. The IT industry billing showed a decline of 2-3 per cent during the first five months of 2009.

The Indian Information Technology- Information Technology-Enabled Services (IT-ITES) industry has continued to perform its role as the most consistent growth driver for the economy. Service, software exports and BPO remain the mainstay of the sector. Over the last five years, the IT and ITES industry has grown at a remarkable pace. IT/ITES exports have grown to a staggering US$ 46.30 billion in 2008-09. IT sector is currently employing 2.20
million professionals directly and another 8 million people indirectly accounting for over five per cent of GDP. Majorities of the Fortune 500 and Global 2000 corporations are sourcing IT/ITES from India and it is the premier destination for the global sourcing of IT/ITES accounting for 55 per cent of the global market in offshore IT services and garnering 35 per cent of the ITES/BPO market.

The Indian IT-BPO sector including the domestic and exports segments continue to grow from strength to strength, witnessing high levels of activity both onshore as well as offshore. The companies continue to move up the value-chain to offer higher end research and analytics services to their clients. India’s leadership position in the global IT and BPO industries are based primarily on the following advantages.

India accounts for around 28 per cent of IT and BPO talent among 28 low-cost countries. It has a rapidly growing urban infrastructure fostering several IT centers in the country. Offshore service centers are spawning in the country due to operational excellence with low delivery cost, quality leadership and a conducive business environment. Favourable policy interventions, enabling infrastructure and augmenting a wide skill base from the government has further enhanced India’s brand image.

The Department of IT is coordinating strategic activities, promoting skill development programmes, enhancing infrastructure capabilities and supporting R and D for India’s leadership position in IT and IT-Enabled Services. The Indian Software and services industry has grown at a remarkable pace since 2001-02. The overall Indian Software and Services industry revenue is estimated to have grown from US $ 10.20 billion in 2001-02 to reach US $ 58.7 billion in 2008-09, translating to a CAGR of about 26.90 per cent. Despite the severe global recession, the industry grew at modest rate of 12.90 per cent in 2008-09.

As per NASSCOM, the industry is diversified across three major focus segments – IT Services, BPO and software products and Engineering services. While IT Services have been the mainstay of the industry, BPO and Engineering services sector has built upon the Indian value proposition and today there exist integrated service providers across the three focus areas as well as niche
providers. The major three components of IT Services sector are custom application development, application management and support and training. Other significant components are IT consulting, systems integration, Infrastructure Services (IS) outsourcing, network consulting & integration and software testing.

Among the verticals serviced by India’s IT-ITES-BPO industry those that account for the largest share of revenue are banking, financial services and insurance (BFSI-41 per cent), Hi-Tech/Telecom (20 per cent), manufacturing (17 per cent), retail (8 per cent), with smaller contributions coming from media, publishing and entertainment, construction and utilities, healthcare and airlines and transportation. Important industry verticals being serviced by the BPO segment are insurance, retail banking, travel and hospitality, auto manufacturing, telecom and pharmaceuticals. Horizontals such as Customer Interaction and Support (CIS), Finance and Accounting (F&A) and Human Resource Management (HRM) are important areas in the BPO segment.

Though the IT-BPO sector is export driven, the domestic market is also significant. The revenue from the domestic Software and Services market is estimated to have grown from US $ 2.60 billion in 2001-02 to US $ 12.40 billion in 2008-09 a CAGR of about 22.20 per cent. In the Domestic verticals of the Indian IT-ITES industry, the IT Services segments continue to dominate domestic portfolio of the industry. Its share however has declined from 80.80 per cent in 2001-02 to 66.90 per cent in 2008-09.

ITES-BPO segment in the domestic market has witnessed noticeable growth over the past few years. The share of ITES-BPO industry in domestic market is estimated to have increased from 3.80 per cent in 2001-02 to 15.30 per cent in 2008-09. The total IT Software and Services employment is estimated to touch 2.20 million in 2008-09, as compared to 0.52 million in 2001-02. This represents a net addition of 1.68 million to the industry employee base since 2001-02. The indirect employment attributed by the sector is estimated to about 8.0 million in 2008-09. This translates to the creation of about 10.20 million job opportunities attributed to the growth of this sector.
IT-ITES Exports constitute the major source of employment for employment in this industry and its share has increased over the years. The share of IT-ITES Exports segment in total employment of the IT Software & Services Industry has grown from 52.90 per cent in 2001-02 to 77.6 per cent in 2008-09 whereas, the share of domestic market in total employment of the IT Software & Services Industry has declined from 47.10 per cent in 2001-02 to 22.60 per cent in 2008-09.

USA and UK continues to be major markets for the IT software and services exports. However, the share of USA has declined from 68.30 per cent in FY2005 to 60 per cent in FY2008, whereas that of Europe has increased from 23.10 per cent to 31 per cent over the same period. Markets across Continental Europe and the Asia Pacific are also witnessing significant year-on-year growth. This trend towards a broader geographic market exposure is positive for the industry, not only as de-risking measure but also as a means of accelerating growth by tapping new markets.

3.3 SELECTION OF STUDY AREA

Information Technology in India accounts for a substantial part of the country's GDP and export earnings while providing employment to a significant number of its tertiary sector workforce. The most prominent IT hubs are IT capital Bangalore and presently growing Chennai. Technically proficient immigrants from India sought jobs in the western world from the 1950s onwards as India's education system produced more engineers than its industry could absorb. India's growing stature in the information age enabled it to form close ties with both the United States of America and the European Union. Hence, the Chennai city has been selected purposively for the present study.

India's abundant, high quality and cost effective services and its vast resource of skilled software human power have made it an attractive location for global software clients. There has been a steady growth in the number of India's IT professionals over the last decade. From a base of 6800 knowledge workers in
1985-86, the number increased to 5,22,000 software and services professionals by the end of 2001-02. It is estimated that out of these 5,22,000 knowledge workers, almost 1,70,000 are working in the IT software and services export industry; nearly 1,06,000 are working in the IT enabled services and over 2,20,000 in user organizations.

According to NASSCOM-McKinsey Report 2008 the offshore IT and BPO industries directly employ around 9,00,000 professionals and provide indirect employment to approximately 2.5 million workers. With the steady gain of females at both software companies prompting NASSCOM to believe that women’s involvement in IT services will climb a further 12 per cent by 2010.

3.4 SAMPLING PROCEDURE

Among the different IT hubs in Tamil Nadu, Chennai city has been purposively selected for the present study. The lists of IT firms in the city are classified into Indian managed and Foreign managed IT firms. The foreign managed firms namely IBM, CTS, Accenture, Oracle, HP, and Polaris and the Indian managed firms namely Infosys, HCL, Wipro, TCS, Satyam and Saskan are randomly selected.

Convenient sampling method was resorted due to the following reasons:

i. The researcher was not able to access the complete database of employees since companies did not part with the information for security reasons.

ii. Duration required to complete the questionnaire was more.

iii. Respondents’ willingness.

3.5 INSTRUMENT

The respondents from both Indian and foreign managed IT firms are selected for the present study by adopting convenient sampling technique through pre-tested, structured, direct interview method.
3.6 **Sample Size**

Total Sample Size: 400

Indian managed IT firms: 200

Foreign managed IT firms: 200

3.7 **Period of Study**

The data and information collected from respondents pertains to the year April 2009 – Jan 2010.

3.8 **Statistical Tools**

All statistical processes were conducted using SPSS version 14.

3.8.1 **Descriptive Statistics**

In order to understand the socio-economic background of employees of IT firms, descriptive statistics, percentage analysis and frequency distribution are worked out. Besides, the conventional analysis, mean score and standard deviation have also done for identifying the key dimensions of both organizational culture and commitment.

3.8.2 **Correlation Analysis**

In order to analyze the relationship between the socio-economic factors and organizational culture and commitment of the employees, Person’s correlation coefficient is worked out.

The formula for Person's Correlation Co-efficient(r) is:

\[
 r = \frac{\sum\frac{XY}{N} - \left(\frac{\sum X}{N}\right) \left(\frac{\sum Y}{N}\right)}{\sqrt{\sum\frac{X^2}{N} - \left(\frac{\sum X}{N}\right)^2 \cdot \sum\frac{Y^2}{N} - \left(\frac{\sum Y}{N}\right)^2}}
\]

Where:

N    represents the number of pairs of data
\[ \sum \] denotes the summation of the items indicated
\[ \sum X \] denotes the sum of all X scores
\[ \sum X^2 \] indicates that each X score should be squared and then those squares summed
\[ (\sum X)^2 \] indicates that the X scores should be summed and the total squared.
[avoid confusing \( \sum X^2 \) (the sum of the X squared scores) and \( (\sum X)^2 \)
(the square of the sum of the X scores)]
\[ \sum Y \] denotes the sum of all y-scores
\[ \sum Y^2 \] indicates that each Y score should be squared and then those squares summed
\[ (\sum Y)^2 \] indicates that the Y scores should be summed and the total squared
\[ \sum XY \] indicates that each X score should be first multiplied by its corresponding Y score and the product (XY) summed

The numerator in equation 1 equals the mean of XY \( (\overline{XY}) \) minus the mean of X \( (\overline{X}) \) times the mean of Y \( (\overline{Y}) \); the denominators are the standard deviation for X \( (SD_X) \) and the standard deviation for Y \( (SD_Y) \).

Thus, Pearson’s formula can be written as:

\[
r = \frac{XY - \overline{XY}}{SD_X \times SD_Y}
\]

3.8.3 FACTOR ANALYSIS

In order to identify the factors affecting organizational culture and organizational commitment, the factor analysis has been employed with principal component extraction with varimax rotation. To assess the internal consistency of scale “Coefficient of Internal Consistency (Cronbach alpha) has been computed.

The primary objectives of an EFA are to determine:

1. The number of common factors influencing a set of measures.
2. The strength of the relationship between each factor and each observed measure.
Some common uses of EFA are to:
1. Identify the nature of the constructs underlying responses in a specific content area.
2. Determine what sets of items “hang together” in a questionnaire.
3. Demonstrate the dimensionality of a measurement scale. Researchers often wish to develop scales that respond to a single characteristic.
4. Determine what features are most important when classifying a group of items.
5. Generate factor scores representing values of the underlying constructs for use in other analyses.

i. **Performing Exploratory Factor Analysis (EFA):** There are seven basic steps to performing an EFA.
1. Collecting measurements: Variables are measured on the same (or matched) experimental units.
2. Obtaining the correlation matrix.
3. Selecting the number of factors for inclusion: The Kaiser criterion states that it should use a number of factors equal to the number of the eigen values of the correlation matrix that are greater than one. The Screen test states that it should plot the eigen values of the correlation matrix in descending order, and then use a number of factors equal to the number of eigen values that occur prior to the last major drop in eigen value magnitude.
4. Extracting initial set of factors: Correlations or co variances are submitted into a computer program to extract factors. This step is too complex to reasonably be done by hand. There are a number of different extraction methods, including maximum likelihood, principal component, and principal axis extraction. The best method is generally maximum likelihood extraction, unless it seriously lacks multivariate normality in measures.
5. Rotating factors to a final solution: For any given set of correlations and number of factors, there are infinite number of ways to define factors and still account for the same amount of covariance in measures. By rotating factors, it is attempted to find a factor solution which is equal to that obtained in the initial extraction but which has the simplest interpretation.

There are many different types of rotation, but they all try make factors each highly responsive to a small subset of items (as opposed to being moderately responsive to a broad set). There are two major categories of rotations, orthogonal rotations, which produce uncorrelated factors, and oblique rotations, which produce correlated factors. The best orthogonal rotation is widely believed to be Varimax. Oblique rotations are less distinguishable, with the three most commonly used being Direct Quartimin, Promax, and Harris-Kaiser Orthoblique.

6. Interpreting factor structure: Each of the measures will be linearly related to each of the factors. The strength of this relationship is contained in the respective factor loading, produced by rotation. This loading can be interpreted as a standardized regression coefficient, regressing the factor on the measures. A factor is defined by considering the possible theoretical constructs that could be responsible for the observed pattern of positive and negative loadings. To ease interpretation all of the loadings for a given factor can be multiplied by -1.

7. Constructing factor scores for further analysis: If additional analyses are to be performed using the factors as variables, factor scores are needed to be constructed. The score for a given factor is a linear combination of all of the measures, weighted by the corresponding factor loading. Sometimes factor scores are idealized, assigning a value of 1 to strongly positive loadings, a value of -1 to strongly negative loadings, and a value of 0 to intermediate loadings. These
factor scores can then be used in analyses just like any other variable, although it should be remember that they will be strongly collinear with the measures used to generate them.

ii. Factor Analysis vs. Principal Component Analysis

1. Exploratory factor analysis is often confused with principal component analysis (PCA), a similar statistical procedure. However, there are significant differences between the two: EFA and PCA will provide somewhat different results when applied to the same data.

2. The purpose of PCA is to derive a relatively small number of components that can account for the variability found in a relatively large number of measures. This procedure, called data reduction, is typically performed when a researcher does not want to include all of the original measures in analyses but still wants to work with the information that they contain.

3. Differences between EFA and PCA arise from the fact that the two are based on different models. The first difference is that the direction of influence is reversed: EFA assumes that the measured responses are based on the underlying factors while in PCA the principal components are based on the measured responses. The second difference is that EFA assumes that the variance in the measured variables can be decomposed into that accounted for by common factors and that accounted for by unique factors. The principal components are defined simply as linear combinations of the measurements, and so will contain both common and unique variance.

4. In summary, EFA should be used while interested in making statements about the factors that are responsible for a set of observed responses, and PCA should be used while interested in performing data reduction.
3.8.4 **Chi Square Test**

In order to understand and elucidate the differences in culture and commitment of the employees, the Chi-Square Test has been employed and the formula is:

\[ \psi^2 = \sum \left( \frac{(O-E)^2}{E} \right) \]

Where,

\[ O \] = Observed Frequency in each category

\[ E \] = Expected Frequency in the corresponding category

\[ df \] = Degree of Freedom (c-1)(r-1)

\[ \psi^2 \] = Chi Square

3.8.5 **Discriminant Analysis**

Discriminant Analysis (DA) is used to classify cases into the values of a categorical dependent, usually a dichotomy. If discriminant function analysis is effective for a set of data, the classification table of correct and incorrect estimates will yield a high percentage correct.

In order to discriminate the employees based on the organizational culture and organizational commitment, discriminant analysis has been employed.

The functional form of discriminant function is:

\[ D = b_1 X_1 + b_2 X_2 + \ldots + b_n X_n + c \]

Where,

\[ D \] = Discriminant (dependent) Variable

\[ X_i \] = Discriminating (independent) Variables (organizational culture/commitment dimensions)

\[ b_i \] = Discriminant coefficients;

\[ c \] = Constant
In the present study, the independent variables are organizational culture and commitment dimensions and the dependent variable is gender of the employees.

3.8.6 Multiple Regression

In order to examine the effect of organizational cultural dimensions on organizational commitment, the multiple linear regression analysis by Ordinary Least Square (OLS) estimation has been applied for identified variables. The functional form of multiple linear regression models are given below:

\[ Y = \alpha + \beta_i X_i + e_i \]

Where

\( Y \) = Dependent Variable - Organizational Commitment

\( X_i \) = Independent Variable - Organizational Cultural Dimensions

\( i = 1 \) to \( n \)

\( \alpha \) = Intercept

\( \beta_i \) = Partial Regression Coefficients

\( e_i \) = Random Error or Stochastic Disturbance Term

\( \alpha \) and \( \beta_i \) are the coefficients which are to be calculated through Ordinary Least Square (OLS) estimation.