CHAPTER 4
RESEARCH DESIGN AND METHODOLOGY
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4.1. Introduction:
In order to cope up with the change in business process as a result of BPR implementation and introduction of new technologies, the employees’ of an organization and its management must work together. OC of an organization implementing BPR plays a significantly important role in adapting to such quick changes identified in chapter two. The different variables of our study have been explained in the previous chapter in detail and now the proposed research model needs to be validated. Taking queue from the earlier chapter, the present chapter explains the research philosophy and paradigm that guided this study and the methods and techniques pursued for instrument design, sample design, data collection and data analysis.

4.2. Selecting Research Methodology:
The research methodology is the theory or knowledge that guides a particular research project (Cohen & Manion, 2007). Therefore it is more than merely a method. Lather (1992) states that research methodology not only describes and analyses the methods used to gather and interpret data, but also presents the philosophical framework within which the research project develops. Consequently, it is about the procedural framework within which the research is conducted. The appropriate scientific methods should be used as a requirement of a research, and there are many research methodologies available which are related to social sciences research (Buckley & Ching, 1975). However, one of the important stages in this thesis is selecting the most appropriate research methodology. An appropriate research methodology will result high quality outcome.
A selected research methodology for a particular research cannot be said as right or wrong straightway. The methodology selection depends on its usefulness depending on the nature of research. Altameem (2007) found that the selection of appropriate research methods was influenced by several factors such as the following:

- The nature of the problem and research topic.
- The research questions being posed and research objectives.
- The training and experience of the researcher, such as statistical or text analysis skills.
- The time allocated for the conduct of study.
- The availability of a suitable research sample.
- The comfort of the researcher with guidelines and rules for conducting the research.

A non-experimental quantitative research design was used for this research study to assess the influence of the different enabling factors of BPR. A qualitative research was also conducted in selected cases. The experimental design could not be used in this research as the researcher has no control over the independent variables. A non-experimental quantitative design was more suited for assessing the relationship among the variables of interest in this research study. The relationship is established by the assessment of whether or not two variables vary together, the variables co vary or correlate with each other (Cozby, 2009)

4.3. Research Design:

The research design attempts to highlight overall strategy that chooses to integrate the different components of the study. It provides an operational frame, within which the facts are placed, processed through analyzing procedures and the valuable research output is produced. In the research design, the important sources and type of information are specified to answer research questions. The research design is the connection between research questions, empirical data
used, and different techniques applied for both collecting and analyzing the data, and finally making inferences (Yin, 1994). The research design and methodology for this study is shown in the following figure (Figure 4.1).

4.3.1. Preliminary Interviews:
The interview method of data collection involves presentation of oral-verbal stimuli and reply in terms of oral-verbal responses (Kothari, 2009). This method can be used through personal interviews or through telephone interviews. Personal interview method requires a person known as the interviewer asking
questions generally in a face-to-face contact to the other persons. This type of interview may be in the form of direct personal investigation or it may be indirect oral investigation.

The method of collecting information through personal interviews is carried out in a structured way. This kind of interview can be called as structured interviews. This structured interviews involve the use of a set of predetermined questions add of highly standardized techniques of recording. Telephone interview on the other hand is the method of collecting information where respondents are contacted on telephone itself (Kothari, 2009). Tull & Hawkins (1988) stated that personal interview is the best technique when the interview is likely to be fairly complicated and the period involved is lengthy. Willing (2001) narrated that in this method the interviewer approach the investigator, puts questions and records the replies usually not bringing to the notice of the respondents. In this system, there is a direct contact between the respondent and the informant.

For the purpose of the study, the names of potential interviewees were drawn upon the recommendations given by the key informants and interview appointments were arranged over the telephone by the researcher. Introductory letters explaining the parameters of the interview were sent. Interviewees were given a sample questions. The in-depth interviews for the cases proceeded in a semi-structured format. Although there a suggested set of questions given to the interviewee before hand, supplementary questions occasioned by the flow and content of the interview. Hence the interview questions were open-ended, yet focused. Use of a sample set of questions which include a series of open-ended questions ensures external validity (Yin, 1994).

4.3.2. Quantitative Methods:
The quantitative method of research focuses on numbers or quantities. The quantitative studies have results that are based on numeric analysis and

statistics, which allow the verification of the pre-stated hypotheses. Since the problem is already structured, the questions of quantitative methods tend to be quite rigid and seek broad information regarding the macro aspects of the situation. It is applicable to phenomena that can be expressed in terms of quantity. The techniques used in this method are surveys and questionnaires. A quantitative research design has always been concerned with defining an epistemological methodology for determining the truth-value of propositions, and allows flexibility in the treatment of data, in terms of comparative analysis, statistical analyses, and repeatability of data collection in order to verify reliability.

4.3.3. Qualitative Methods:
The qualitative method of research is concerned with qualitative phenomenon, i.e., phenomena relating to or involving quality or kind. For example, when we are interested in investigating the reasons for human behavior (i.e., why people think or do certain things), we quite often talk of ‘Motivation Research’, an important type of qualitative research (Kothari, 2009). The qualitative method produces descriptive data and no numbers are assigned. This type of research involves the use of qualitative data, such as interviews, documents, and participant observation data to understand and explain social phenomena. Qualitative researchers can be found in many disciplines, using a variety of approaches, methods and techniques.

4.3.4. A Combined Approach - Triangulation:
In recent years, there has been a constant debate concerning the best research methodology. Many researchers have argued forcefully that qualitative methods should replace the dominant quantitative methods. This view has been strongly opposed by the researchers of quantitative methods. Myers (1997) stated that although most of the researchers do either quantitative or qualitative research, some researchers have suggested combining one or more research methods in
one study. Creswell (2009) suggested a mixed-method research is an approach to inquiry combining both the quantitative and qualitative forms of research. Feagin & Orum (1991) stated that case study is an ideal methodology when a qualitative, in-depth investigation is needed. Case studies have been used in varied investigations, particularly in sociological studies, but increasingly, in instruction. Snow & Anderson (1991) stated that triangulation can be composed by data, investigators, theories, and even methodologies. Stake (1995) viewed that the paradigm that is used to ensure accuracy and alternative explanations are called triangulation. The requirement of triangulation arises from the ethical need to confirm the validity of the processes. Triangulation is a research technique wherein multiple methods are used to analyze the same theoretical questions. This means that case studies allow researchers to understand the nature and complexity of processes by using multiple sources of data. Yin (2003) identified six primary methodologies for case study research: documentation, archival records, interviews, direct and participant observation and physical artifacts.

4.4. Research Approach:

Research approach refers to the researcher’s basic methodological choices related to both philosophical domains and the methods used in the research (Kasanen & Sfitonen, 1991). Chen & Hirschheim (2004) suggested that the overall percentages for the use of the quantitative, qualitative and mixed methodologies in journals in all categories from 1991 to 2001 were as following:

quantitative (60%), qualitative (30%), and mixed methods (10%).

This study has followed a combination of qualitative and quantitative methods. The qualitative methods involve case studies and interviews; the quantitative method is based on questionnaire based survey. Questionnaires designed considering expert views on business process reengineering and its enablers
were used for data collection. This study further employed personal interview to obtain additional information on the specific areas that the questionnaire instrument did not cover. The secondary data source is extracted from the company’s annual report, journals, textbooks and other relevant publications. Face-to-face interviews represent a primary source of data collection (Davis & Cosenza, 1993). The key informant interview coupled with complementary interviews (were in-depth interrogations of individuals who were either front line personnel or managers who initiated the reengineering efforts) were the backbone of data amassing effort. These interviews lasted from 15 minutes to 2 hours.

4.4.1. Quantitative Approach Using Questionnaire Based Survey:
The quantitative approach was conducted through a questionnaire based survey. Questionnaire based survey research is designed to ensure objectivity, generalizability and reliability by utilizing techniques for selecting participants randomly from the study population in a balanced way. The questionnaires have some indisputable advantages for data collection; they can clearly produce answers to questions i.e., how much, how many, and how often etc (Gummesson, 1993). The process of survey research involves hypothesis generation based on extant literature and/or theory, research design, instrument design, sample design, data collection, data analysis and making inferences (Bryman & Bell, 2007).

4.4.1.1. Questionnaire Design:
To obtain quantitative data, it is necessary to categorize the object of interest in ways which make easy counting. Questionnaire design involves defining the construct, generating a sample of items to operationalize each construct, pre-testing using a panel of experts’ survey, and pilot testing, before using the instrument for actual data collection (Churchill, 1979). A questionnaire can be either structured or unstructured. Structured questionnaires are those
questionnaires in which there are definite, concrete and pre-determined questions. Structured questionnaires may also have fixed alternative questions which responses of the informants are limited to the stated alternatives. Thus a highly structured questionnaire is one in which all questions and answers are specified and comments in the respondent’s own words are held to the minimum. The structured questionnaires are simple to administer and relatively easy to analyze. The provision of alternative replies then helps to understand the meaning of the question clearly. But for this type of question there are some problems also i.e. wide range of data and that too in respondents own words cannot be obtained with structured questionnaires. They are equally not suitable when a problem is being first explored and working hypotheses sought. In such situations, unstructured questionnaires may be used effectively.

For the purpose of the study, a questionnaire was developed based on variables chosen. The questionnaire contained a thorough brief and clear instruction, and was arranged to facilitate ease of response, where the respondents were advised by cover letter of the nature of the research, the researcher’s background and education, and why the research was being carried out. Respondents were informed that they would need a maximum of 30 minutes time to answer the complete questionnaire. They were further assured about confidentiality of the information provided by them. The survey questionnaire was created to obtain the necessary data that were used to analyze the hypotheses. The questionnaire was mainly divided into two parts. The first part asked the basic information about the interviewees and their organization while the second part asked the respondents on their views on the different relevant constructs of the research such as use of IT in business, Outcome of BPR, OC, role of other BPR enablers like strategy, top management and leadership and human resource. All variables were measured with multiple questions using a five point Likert scale. Most of the questionnaires were sent by post and e-mail. For some organizations the questionnaires were distributed in person to the respondents. After answering
the questions, the questionnaires were either returned by post, e-mail or asked to
collect. For the purpose of study, a total number of 400 questionnaires were sent
to five organizations viz, Mahindra & Mahindra (M&M), State Bank of India
(SBI), Income Tax Department, Govt. of India, Oil and Natural Gas Corporation
(ONGC) and Kirloskar Brothers Limited (KBL). Very less number of responses
(only four) has been received from one organization i.e., KBL and hence the said
organization has been dropped from further study. From the remaining four
organizations, the researcher has received 92 numbers of responses which are
used for analysis.

**Step1. Specify the Domain of Constructs:**

Churchill Jr. (1979); Lewis, Templeton, & Byrd (2005) stated that the purpose of
the domain specification steps is to provide a clear conceptual meaning and
definition of the construct through indicating its sub elements or dimensions.
This research has developed a model (Figure 4.1) which shows the relationship of
IT, organizational culture and other complementary BPR enablers and their
impact on BPR outcome. The proposed model indicates the different variables
that work together in enabling BPR in one hand, and the relationship of the vital
enabler and complementary enablers on the other. IT advancements permit an
ever shrinking globalization of business. There is an iterative effect in
globalization that drives technological adoption to help firms become more
competitive (Currid & Ricotta, 1995). The evolution of new technologies enables
firms to accomplish what was not possible in the past. Now change is possible
only after introducing IT. Some most useful IT tools that are widely being used
are Multimedia, Internet, CAD/CAM, Database, Client Server architecture, Cloud
Computing etc. and they help in integrating the different functional areas in BPR.

Reengineering initiatives are affected by redesigned structures that are more
appropriate for empowered employees, workgroups or teams, and employees
working within the virtual designs of some organizations. Hence, organizational
issues structural and cultural as well as human resource (HR) issues that comes with these changes; assume significance (Davenport, 1993). McAdam A. (2003) opined that a flexible organizational structure enables BPR to encourage creativity and innovativeness in the organization. That is why it is important to having a less bureaucratic and more participative structure is essential for successful BPR implementation. Salimifard, Abbaszadeh, & Ghorbanpur (2010); Crowe, Fong, Bauman, & Zayas-Castro (2002); Reijers & Liman Mansar (2005) demonstrated that the culture has been identified as an important success factor for BPR implementation. For example Coordination, employees’ involvement and friendly interactions are the standard feature of an innovative organizational culture. Strategy (ST), Top Management and Leadership (TMCL) and Human Resource (HR) these variables in the proposed model support as complementary enablers (moderating variables).

BPR initiative has great potential for increasing productivity through reduced process time and cost, improved quality, and greater customer satisfaction, better collaboration but it is often requires a fundamental organizational change. Different companies might view BPR as an initiative to keep up with the global competition. However, Business Process Reengineering initiative have some other benefits that are mainly related with information technology enabled process orientation. It is enabling parallelism, moving from a sequential structure of processes in to a parallel one reducing the cycle time. It also helps in enhancing decision making by reducing the number of levels in an organizations hierarchies and enhances the decision making process. The following Table 4.1 describes the different constructs of the questionnaire.
### Table 4.1: Different constructs of the questionnaire

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description of Variables</th>
<th>Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td>BPR Outcome</td>
<td>Business process improvement achieved as a result of BPR implementation in terms of Lower operating Cost, Increased Efficiency, Reduced Cycle Time, Greater Flexibility, Improved Communication and Better Collaboration.</td>
<td>(Green &amp; Rosemann, 2000), (Marir &amp; Mansar, 2004), (Laframboise, 1995)</td>
</tr>
<tr>
<td>Information Technology</td>
<td>Integration of Information Technology in the working of an Organization</td>
<td>(Zhang, 2005), (Laframboise, 1995)</td>
</tr>
<tr>
<td>Organizational Culture</td>
<td>Measures factors like participation, open discussion, empowerment of employees, innovation to change, task focus, type of control etc.</td>
<td>(Altameem, 2007), (Laframboise, 1995)</td>
</tr>
<tr>
<td>Strategy</td>
<td>Measures strategy and planning of an organization</td>
<td>(Laframboise, 1995)</td>
</tr>
<tr>
<td>Top Management Commitment and Leadership</td>
<td>Explain the role of top management and leadership in making the employees understand their role in achieving the goal. It includes how realistic expectation do they have, how frequently they interact with the employees etc.</td>
<td>(Laframboise, 1995)</td>
</tr>
<tr>
<td>Human Resource</td>
<td>This variable measure how frequently the employees are trained to cope up with the innovative changes made, how employees are rewarded etc.</td>
<td>(Laframboise, 1995)</td>
</tr>
</tbody>
</table>

**Step 2: Generate a Sample of Items Based** on the existing BPR literature and using the insight obtained from the preliminary exploratory study, an initial pool of 40 items were generated (see Appendix A). Specially, the preliminary exploratory study informed the development of the BPR construct of the research model, and the refinement of measurements for the BPR outcome, use of IT, organizational culture of an organization, and impact of other BPR enablers in the overall performance enhancement of organization.
The BPR outcome was operationalized with 6 initial items such as lower operating costs, better collaboration, greater flexibility, increased efficiency, reduced cycle times and improved communication were identified (Laframboise, 1995). The IT construct was based on 3 items i.e., IT is an integral part of the organization; a high degree of IT is used in the organization and top management officials of the organization use effective communication channel in transferring information (Laframboise, 1995; Zhang, 2005). Organizational culture contains 5 variables i.e., sharing culture, importance of organizational culture to the organization, support to innovative culture, flexible and task focus culture (Kappos, 2000). And other enablers such as top management commitment and leadership, human resources and strategy include 9 items. The variable top management commitment and leadership includes the role of top management and leadership in motivating employees, whether managers are having realistic expectation from the employees and frequency of managers’ interaction with the employees. By the variable human resources, the parameters which are tried to measure are: how frequently the employees are trained to cope up with the innovative changes made, whether the roles of employees are redefined or not and how employees are rewarded. The variable Strategy included the investigations like whether the organization is having business strategy for BPR success, organization’s working according to a specific plan, performance measurement of employees.

**Step 3: Pre-testing Through panel of experts**

The questionnaire was repeatedly reviewed by the researcher. Furthermore, the questionnaire was administered to several academics and members of the researcher's department who have experience on questionnaire development. In order to get their feedback after scrutinizing the questionnaire, personal meetings were held. Questionnaire was administered to staff from various strategic departments of the company. After receiving the replies, a group of four experts (including supervisor) have checked the veracity of claims made by the firms. The suggestions from the respondents which are agreed by the group of experts have been considered for incorporation to the questionnaire. Only on becoming
reasonably sure that firm has undergone reengineering through sustained interface with IT; it was selected for this study.

**Step 4: Pilot Study**
Before distribution the questionnaire, the researcher has implemented pilot testing on the questionnaire following to strengthening the content validity of the questionnaire through a Panel of Expert (POE) survey. The questionnaire was sent to a group of experts from different organizations. The purpose of the pilot test was to make sure the clarity and contextual appropriateness of the language of the statements and to assess feasibility from the respondents’ point of view. The researcher has got some comments from the experts and that helped in improving the questionnaire development.

Moreover, the researcher has distributed a trial questionnaire and was completed by a small number of respondents from different organizations. From the trial questionnaire, the researcher has got some new ideas as to whether all the areas in the research were sufficiently covered, and whether the gathered data were likely to be reliable and valid. Finally the researcher has got some comments from both experts and the trial questionnaire. The comments were on wording or format of some statements, and those were considered by the researcher for the final questionnaire (see Appendix B).

**4.4.1.2 Sampling Technique:**
A sample is a portion of the population that is chosen or identified to take part in the investigation of the study. Saunders & Lewis (2003) viewed that the sampling technique provides a range of methods that facilitate to reduce the amount of data need to collect by considering only data from a sub group rather than all possible cases of elements. This study involved companies/organizations from India which have gone through the process of BPR using IT as an enabler. Initially, with the help of Prowess database, a set of top fifty companies
organizations was selected. A questionnaire was floated among the selected companies to get some basic information. After receiving the replies, a group of four experts (including supervisor) have checked the veracity of claims made by the firms. Only on becoming reasonably sure that the firm has undergone reengineering through sustained interface with IT; it was selected for our study. As per the suggestion of the group of experts, a set of five companies were finalized from divergent sectors. The set included private sector, public sector and government department.

This study required at least one in-depth informant interview per firm followed by interviews using open-ended questionnaires with several other individuals. A non-probability sampling approach was used for the selection of participants. Every effort is made to ensure that informants represented a cross section of those involved in the reengineering process at various levels in the organizations. It was also ensured that the informants are representative mix of senior, middle and front-line staff.

4.4.2. Qualitative Approach Using Case Study:
This exploratory nature and descriptive phases of analysis of the research makes case study based research an appropriate choice. Yin (1994) viewed that a case study is appropriate when a topic is new and the researcher has no control over the events, but wishes to illuminate a set of decisions. It has identified six primary methodologies for case study research: documentation, archival records, interviews, direct and participant observation and physical artifacts. All are not essential in every case study, but the importance of multiple sources of data to the reliability of such studies has been well-established.

The primary focus of this study is "how" these firms are implementing BPR to find out its major enablers, and impact of organizational culture in BPR outcome in the context of Indian industries. The current study seeks to test multiple cases with the proposed proponents. A holistic design rather than an embedded design
is used to explore the overall business process reengineering effort in each of the cases. The interview questions used for interviewing different participants are provided in Appendix-C. It is needless to reiterate that case study methodology will permit an in-depth evaluation of the organizations making it an appropriate choice in this case.

4.4.2.1. Selection and Description of Cases:
Yin (1994) opined that qualitative case-study research should normally involve 4-10 cases. Few studies involving preliminary investigation of BPR efforts and the role that information technology plays, have been done in the past. Due to this and also time factor, four numbers of participating firms have been considered in this research.

Case 1: Mahindra & Mahindra
Mahindra & Mahindra (M&M), a leading Indian automobile manufacturer of multi-utility vehicles (MUVs) and light commercial vehicles (LCVs), has plants in four locations, an extensive supplier base and a distribution and service network across India. M&M was started in 1945 by a famous industrialist of that time. In 1994, a major restructuring exercise was initiated as part of a BPR program in that firm (Mahindra & Mahindra Website). They outlined three broad phases the client would undergo during a BPR program which are:

- Long-term Business Strategy: M&M has got help from another company to identify suitable business opportunities and craft strategies to capitalize on them, enabling it to achieve its business objectives, despite mounting competition.
- Process-Centric Enterprise (PCE) Phase I – Preparation: M&M created a plan for the client to migrate into a Process-Centric Organization.
- Process-Centric Enterprise (PCE) Phase II – Transformation: A specific company helped the client become a PCE by redesigning key business processes.

By the implementation of BPR program, M&M produced dramatic benefits that had impact in every area of the company. In the Product Management process, the manufacturer reduced new product development time by 50 percent, from 72 months to 36, while eliminating launch delays by instituting upfront planning mechanisms. In Order Management, schedule adherence for vehicle dispatch improved from 70 percent to 95 percent. And, in the spare parts department, order-to-delivery cycle times were trimmed by more than 50 percent (Mahindrasatyam website).

**Case 2: Income Tax Department, Govt. of India**

In recent time Income Tax Department has taken a number of initiatives and implemented projects aimed at providing better taxpayer service, reducing compliance burden on tax payers and improving enforcement. These initiatives have benefitted the taxpayers, there remained severe operational bottlenecks and fundamental issues of aligning people, processes and technology. The BPR project in the Income Tax Department commenced on 1st May, 2007 and was completed with finalization of 18 reports covering more than 2000 pages within a timeframe of eight months. The BPR project was undertaken in two phases- ‘As-is’ study phase and ‘To-be’ Model stage and was conducted at 15 locations which included metros (Delhi, Mumbai and Kolkata), mid-size cities (Hyderabad, Nagpur, Patna, Bhopal, Mysore, Lucknow, Guwahati, Ludhiana and Shillong) and moffusil areas (Hajipur, Mandya and Itarsi). The Business process reengineering of the Income Tax Department is first such project initiated by the Government of India (BPR Project of Income Tax Department, Govt. of India).
Case 3: State Bank of India
State Bank of India (SBI) is the largest commercial bank in India. SBI has started Business Process Reengineering in the mid-nineties and took nearly more than 5 years to implement the reengineered processes across its 9600 branches in India and abroad with McKinsey & Company as consultants (Dasgupta, 2003). The basic goal of BPR was to create an operating architecture that would facilitate service delivery of international standards. The BPR team is simplifying and redesigning process to leverage the core banking solution platform. Strategies are being evolved for migrating transactions to full set of alternate channels namely, ATM, internet and call centers (Satyanarayana & Kavitha, 2011). Moreover, by implementation of BPR the SBI has been given some strategic advantages i.e., lower operating costs, better collaboration, and greater flexibility, reduced cycle time, increased customer satisfaction, improvement in organizational culture etc.

The most important objective of BPR initiative at SBI is to increase customer satisfaction and serve the customers effectively. Customer focus play a vital role on getting feedback on customer service delivery and value added services required to meet the demand for new or improved products and services. Therefore, establishing long-term customer relations through superior service is critical for SBI to remain competitive. It is expected that customer’s satisfaction level increases with BPR, since it results in undergoing rapid and radical changes driven by technology, innovation in products and services and ever expanding customer expectations.

Case 4: Oil and Natural Gas Corporation
Oil and Natural Gas Corporation (ONGC) is one of the premier industries in India. ONGC operates up stream sector of the petroleum industry. ONGC is the only company from India in the Fortune Magazine’s list of the world’s most admired companies 2007. In ONGC top managements have always had the interests of the multidiscipline workforce and have been aware of the
significance of friendly industrial relations. There is an associative and innovative culture in ONGC (Company Profile, ONGC Ltd: AN Overview, 2013).

In the year 2000, ONGC started project ICE (Information Consolidation for Efficiency) with an aim to achieve global standards in operations and introduce new business processes. This was called One Organization, One Data, One Information. The move towards ERP package was to enable the availability of information on a real time basis and the elimination of duplicate activities across business processes by capturing data at the source point. This will, in turn, facilitate decision support, better operation control, and efficient cost management. ONGC is a public sector enterprise and India’s highest profit making corporate, achieving the record of being the first Indian corporate to register a five digit profit figure of Rs.10, 529 crore in the year 2002-03 (Annual Report, ONGC Ltd.).

4.5. Data Collection:

In research, usually two types of data are used viz. primary data and secondary data. Secondary data helps the researcher to know the topic in detail and helps the researcher to confine his study and also guides to the core issues that are researchable (Kothari, 2009). Yin (1994) viewed that case studies allow researchers to use various kinds of method of data collection. In case of most of the qualitative studies, case studies attempt to discover and portray the multiple aspects of the subjects in detail. In order to do so, it is not unusual for such studies to use more than one technique to collect data.

4.5.1. Procedure for Data Collection:

Interviews: Personal interview method requires a person known as the interviewer asking questions generally in a face-to-face contact to the other persons. This type of interview may be in the form of direct personal investigation or it may be indirect oral investigation. Data may be collected using
structured interviews using a set of predetermined questions. Tull & Hawkins (1988) stated that personal interview is the best technique when the interview is likely to be fairly complicated and the period involved is lengthy.

For the purpose of the study, the names of potential interviewees were drawn upon the recommendations given by the key informants and interview appointments were arranged over the telephone by the researcher. Introductory letters explaining the parameters of the interview were sent. The in-depth interviews for the cases proceeded in a semi-structured format. Although there was a suggested set of questions given to the interviewee beforehand, supplementary questions, occasioned by the flow and content of the interview. Hence the interview questions were open-ended, yet focused. Use of a sample set of questions which include a series of open-ended questions ensures external validity (Yin, 1994).

**Questionnaires:**
In this method, a questionnaire consisting of a number of questions printed or typed in a definite order on a form or a set of forms is sent to the person concerned with a request to answer the questions and return the questionnaire. After receiving the questionnaire, the respondents are expected to read and understand the questions and write the reply in the space meant for the purpose in the questionnaire itself.

**Observation Visits:**
The observation method is the most common method of data collection. Observation is way of gathering data by watching behavior, events, or noting physical characteristics in their natural setting. Under the observation method, the information is sought by way of investigators own direct investigation without asking from the respondent. The main advantage of this method is that subjective bias is eliminated, if observation is done accurately and the information obtained under this method relates to what is currently happening;
it is not complicated by either the past behavior or future intentions or attitudes (Kothari, 2009). This method is independent of respondents’ willingness to respond and is relatively less demanding of active cooperation on the part of respondents as happens to be the case in the interview or the questionnaire method.

Despite its advantages this methods have some limitations also. For example the most limiting factor in the use of observation method is the inability to observe such things such as attitudes, motivations etc. Secondly, it is an expensive method. Observational data are more expensive to obtain than other survey data. The observer has to wait doing nothing, between events to be observed. The unproductive time is an increased cost.

For the present study, the researcher was given a chance to visit the firm for interview purpose so as to have a firsthand view of the operation in progress and thus facilitating an understanding of the reengineering process to the researcher. This would also help in verifying the veracity of the claims made by the participating organizations.

**Documentation:**

Documentation regarding the reengineering initiative was gathered during the key-informant interviews. Also additional printed text/reports provided by the firms were utilized for documentations. For each firm, the type of documentation is different.

**4.5.2. Data Collection Method:**

A combination of both primary and secondary data was used for the purpose of the study. Questionnaire and personal interviews were used as primary data source and documentations such as company’s annual report, journals, textbooks, organizations websites and other relevant publications were used as secondary data source.
Questionnaire is used as the main instrument for collection of data. All items in the questionnaire were measured on a Likert scale. The questionnaire was mailed to the respondents who are expected to read and understand the questions and write the reply in the space meant for the purpose in the questionnaire itself.

After indicating the sample for this study; the researcher contacted all the organizations. The researcher sent both hard and soft copy of the questionnaire together with a covering letter which stated the purpose and the aims of the study, and asked for the help of the participants. The total number of 400 questionnaires was sent to the selected organizations in July 2009. For every organization, 20 questionnaires were sent to each group of employees’ with designation equivalent to office staff, Asst. Manager, Manager an Deputy Director or onwards. The researcher has made a follow up e-mail in the month of October 2009. After a period of five months, (July 2009 to November 2009), a total of 92 responses were received. The researcher has distributed and collected the filled in questionnaire personally in order to increase response rate.

4.6. Data Examination and Preparation:
For conducting multivariate analysis, it is important to understand the fundamental properties of the data and examining that data to meet the essential statistical requirements. The data examination and preparation involves assessing the impact of missing data, identifying and handling outliers, and testing the data for serious departures from normality, non-respondent bias and common method bias (Straub, Boudreau, & Gefen, 2004).

4.6.1. Data Entry and Data Screening:
The data were collected through questionnaire survey from various Indian firms/organizations which have implemented BPR. Initially, questionnaire was sent to the respondents by the researcher by mail. After the initial mail out in early July 2009, to encourage response, a number of follow-up efforts were undertaken both in e-mail and by phone until the end of October 2009. After a five month period, 96 responses were received. Out of 96 initial responses, 4
incomplete cases were identified. In these responses, there are some missing data and those responses were excluded. For further analysis the remaining 92 cases were used. For analyzing these data, a software tool, Statistical Package for Social Science (SPSS v17.0) is used. When the data are entered into the SPSS, all essential care were taken to avoid data entry error through utilizing SPSS’s feature of defining acceptable values and labels for each variable.

4.6.2. Missing Value Analysis:
Missing value is a value that indicates that no data value is stored for the variable in the current observation.) The missing data refers to a situation in which valid values on one or more variables are not available for analysis (Hair Jr, Black, Babin, Anderson, & Tatham, 2010). There are four step process for identifying missing data and applying remedies. The first step is to understand the type of missing data involved in the dataset. Whether the missing data are part of the research design, whether they are ‘ignorable’ or whether the causes and impacts are not known with precision and the missing data are ‘not ignorable’. The second step becomes important when the missing data are not ignorable, making further assessment essential. The third step involves diagnosing the randomness of the missing data processes. For example whether the missing data processes are missing at random or are non-randomly distributed. The fourth and final step is the selection of the appropriate input method. For example whether to replace the missing data with values. If the missing data are to be replaced, it also needs to be decided whether to replace them by known values or by values calculated from the valid data.

The above mentioned four-step process was followed to analyze missing data. All the missing data arises because of non-response by the respondents. The missing data is considered to be not ignorable and hence further analysis was done. The overall missing data was calculated variable as well as case wise. Table 4.2 and Table 4.3 explain the missing data; variable and case wise respectively.
### Table 4.2: Pattern of Missing Data by Variables

<table>
<thead>
<tr>
<th>Percentage of missing values</th>
<th>No. of Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>0%</td>
<td>22</td>
</tr>
<tr>
<td>1%</td>
<td>3</td>
</tr>
<tr>
<td>1.3%</td>
<td>3</td>
</tr>
<tr>
<td>2%</td>
<td>1</td>
</tr>
<tr>
<td>2.3%</td>
<td>2</td>
</tr>
<tr>
<td>3%</td>
<td>2</td>
</tr>
<tr>
<td>3.3%</td>
<td>4</td>
</tr>
<tr>
<td>4%</td>
<td>1</td>
</tr>
<tr>
<td>4.3%</td>
<td>2</td>
</tr>
</tbody>
</table>

In total, 1.29% values are missing and 98.71% data values are available in the data sheet. The variable wise analysis shows that out of the total 40 variables, eighteen (48%) are having missing values whereas twenty two (52%) are not having any missing values. On the other hand, 32.17% cases are having missing values and no missing values are available in 67.83% cases. Similarly, analysis of the missing data by case shows that the there is no missing data for 62 cases and there is one missing for 20 cases, two missing for 5 cases and three missing for 5 cases.

### Table 4.3: Pattern of Missing Data by Cases

<table>
<thead>
<tr>
<th>No. of Missing values case wise</th>
<th>No. of cases</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>62</td>
</tr>
<tr>
<td>1</td>
<td>20</td>
</tr>
<tr>
<td>2</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>5</td>
</tr>
</tbody>
</table>

### 4.6.3. Estimating Non-Response Bias:

The non-response may cause sample bias and it can create complexity in generalizing research findings to the population. The non-response bias was assessed using two alternative methods such as the justification of non-response and differences between early and late respondents. The reason for the examination is given for not participating, shows no concern about the results since they are expected given the characteristics of the population targeted, in the
questionnaire based survey method. The most common reasons for not participating were the lack of time. Even some organizations did not feel valuable or relevant for the research. In addition, it was remarkable that while in the pilot study none of the organizations claimed that the questionnaire was too long or complex, there were four organizations in the final questionnaire based survey that found it too comprehensive. Non-response bias is estimated based on the mean of IT, Organizational culture and other enablers, mean of BPR outcome those participants that responded earlier and later. The first twenty and last twenty replies were identified and two sample t-test was performed to observe significant difference between these two groups if any. However it was found that there is no significant difference between the two considered sets.

4.7. Reliability and Validity:

Questionnaire validation is a great concern for the researcher. Because validity permits the researcher to find out if the research fits the reality and if the researcher is measuring what the researcher really wants to measure, in accordance with his/her research questions, objectives and purpose of the study. There are two types of validity such as internal and external. The internal validity refers to the accurate attribution of observed results to the factors that were supposed to be responsible for these results; external validity denotes the applicability of research results to instructional and research contexts other than the one in which the research was carried out (Chapelle & Jamieson, 1991).

The validity and reliability are properties of a measurement questionnaire that gives the research community confidence in the results of the study (Field, 2009). The reliability can be referred to the degree to which a questionnaire can generate consistent results, meaning results free from measurement errors and validity as the degree to which differences found with a measuring tool reflects true differences among respondents being tested (Premkumar, Ramamurthy & Crum, 1997). Lewis, Templeton & Byrd (2005) stated validity as the degree of accuracy with which the questionnaire is measuring the construct it is purporting to measure and the uniqueness of the measurement instrument from measures of other constructs.
Several researchers such as Straub, Boudreau, & Gefen (2004); Field (2009) stated that the most common statistic reliability is the coefficient of internal consistency (Cronbach’s Alpha). The coefficient alpha measures the average ratio of item variance to scale variance, taking into account the number of items in the scale. The value of Cronbach’s Alpha ranges from 0 (completely unreliable) to 1 (perfectly reliable). An alpha value of 0.5 to 0.6 is considered acceptable for exploratory research, but 0.7 or higher is highly preferred. For this study, the construct reliabilities (Cronbach’s alpha) are computed based on the several questions that were asked to measure each construct which is presented in the next chapter.

4.8. Conclusion:
The selection of a suitable research methodology for a particular research is very important to quality research outcome. In this research, a combination of quantitative and qualitative approach called “Triangulation approach” is adopted. The data is collected using questionnaire based survey for quantitative analysis. The personal interviews, reports, website information etc. are used as data collection tool for qualitative analysis. Before using the questionnaire for actual data collection, it was refined through different phases like defining the construct, generating a sample of items to operationalize each construct, pre-testing by a panel of experts’, and pilot testing. The collected data using the final questionnaire was examined for missing value, non-response bias and reliability and validity.
Bibliography:


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