# Chapter 3

**Research Methodology**

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3.1 Introduction:
The research study is conducted in two phases. The first phase dealt with developing an appropriate research framework with facts and theories accessed from literature survey on Knowledge Management, the library and archives of BSP, various journals and books and through internet access, keeping in view the differences in approach for a knowledge intensive firm and a heavy manufacturing industry like Bhilai Steel Plant. The behavior pattern of the knowledge workers under the existing complexities in BSP, the diversity of work requirements depending upon the department or sub-unit for whom these people are working are also kept in mind. The aim was to develop the framework, which then was used to meet the research objectives.

In the second phase of the study, people from various departments of BSP have been approached with framed questionnaire. Initially people from executives and non-executives levels have been approached. But then the large work force at unskilled and semi-skilled level was not able to comprehend due to educational limitations and a host of other such reasons. Hence the selection of the sample was limited to senior executives (E-5 to E-8), executives (E-0 to E-4) and top most grade of N-11 people in the non-executive level. Research approach was Survey Research, through structured questionnaire and Interviews.

For preparing the questionnaire, some of the questions available in the book “The Knowledge Management Fieldbook”, authored by Wendi R. Bukhowitz and Ruth L. Williams were taken as the basis.

3.2 Problem statement:
KM has become one of the most important tools in the present day business world for ensuring continual success. KM intensive companies like software and IT industries obviously realized this much earlier, but the same was not the case with heavy and labor intensive industries. Especially this is the case with steel industry. While the impact and effect of knowledge drain in small companies like software and IT industries are immediately and evidently noticeable this is not so with large and heavy industries, largely due to the inbuilt redundancy in manpower. The negative impact of knowledge drain is felt much later and by that time it would be too late to take any
remedial steps. Inspite of manpower redundancy, each person has a certain level of perception that is unique and limited to him. Unless that quality from the person is tapped, which is tacit in nature, there shall be certain loss to the company on account of loosing the said person. This can be taken care of only by recoursing to implementation of KM practices where upon tacit knowledge from the person can be suitably tapped and kept in repositories.

Integrated steel plant like the one in study, that is, BSP, being in the category of heavy industry, it faces this problem and hence needs to be addressed suitably. For this reason, the concerned subject was chosen for study.

3.3. Research Objectives:

The objective of the present research is to carry out a study of KM practices adopted at BSP with a view

- To analyze the practices of KM at BSP
- To analyze the performance of KM at BSP
- To ascertain the sufficiency within the plant to meet to the fast paced future challenges.
- To identify the factors those were responsible for successful implementation of KM.
- To identify gaps if any.
- To suggest steps for improvement.
- BSP being a part of SAIL, the results arising from the above points could subsequently be applied to other units of SAIL as well.
- For carrying out above mentioned jobs suitable hypotheses were framed. Subsequently, questionnaire were created covering all the points of hypotheses with the objective of obtaining responses from the selected sample population, tabulate the data of responses, apply suitable statistical tools to get the outcomes that can enable and lead us to draw conclusions

The relevance of the present research is both from industry and academic viewpoints.

The idea behind this research is keeping in mind the following objectives as well:

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As has been mentioned in the earlier chapters, KM has not made that much of inroads into steel industry as it has in other fields. Tata steel started adopting KM practices by the turn of the century. Bhilai Steel Plant followed the suit. Being one of the major steel plants, it always vied for the fore-runner position in the country for all innovative activities and also has been one of the most successful profit earning plants. It was felt that the methods adopted by this plant particularly for the subject under reference, namely, knowledge management, could throw some light and guidance for others to emulate.

The objective shall also be to identify and highlight the factors that lead to successful KM implementation at BSP.

As the name of the topic of research, “A Perspective Study of Knowledge Management at Bhilai Steel Plant, Bhila.”, suggests, it can be seen that elaborate efforts were required to be put in, to understand various aspects of KM, how BSP collective understood about the subject, how they followed it and how they implemented it and finally what the present position of KM is and whether anything is required to be done for its further enhancement on a continual basis and finally whether it is required at all for such an organization as large as BSP, where the manpower primarily consists of larger numbers of unskilled and semi-skilled workers. Obviously, these efforts have to consume good amount of time and devotion to be able to derive outcomes that go a long way in giving results driven solutions.

3.4. Scope of Present work:

The present work covered collection of data from the sample BSP collective through survey and questionnaire method, based on the assumed hypotheses. The statistical tools have been applied on to the data. From the output of the statistical tools it was attempted to draw conclusions which lead to suggestions.

3.5. Methodology & Statistical Tools used:

3.5.1. Survey Instruments:

Questionnaire method was used as the instrument to conduct survey and collect data.
Hypotheses were formulated first and based on these questions were prepared. These questions were subject to statistical analyses such as ANOVA, Factor Analysis, Regression Analysis and Reliability Test. Help of Micro-soft EXCEL and SPSS-16.0 version software package was taken to get the results. Testing of hypotheses was done from the results to get results from which conclusions could be drawn.

3.5.2. Instrument Reliability:

Two sets of questionnaire were developed. For preparing the second set of questions, the questions from the book “The Knowledge Management Fieldbook”, authored by Wendi R. Bukhowitz and Ruth L. Williams were taken as guide line.

The first set of questions was prepared based on the previous studies conducted in-house by BSP and these were scrutinized by experts of BSP in the field of Knowledge Management.

This way, both the sets of questions have been put to good use for further analysis and study in the present work.

3.5.3. Design of Study:

The design of the study included following steps:

3.5.3.1. Preliminary study & observations:

A preliminary survey and study was considered necessary to determine the sample size and sample quality as the BSP work force, particularly the non-executives, which includes unskilled, semiskilled and skilled work force, are mostly and largely illiterate. More than 1100 people were approached through some dedicated volunteers who helped in an immense way and the self as well and asked simple questions like whether they know what KM is and whether they were aware of what it is. The response has been on expected lines; most of them being at illiterate level and with little or no education back-ground, they were unaware of details of KM but they said, as always, they would follow what their supervisors and leaders say. This made the course of approach to the subject change and limit it to primarily the people in executive category; however, few non executive cadres who are reasonably well educated and in N-11 category (highest grade in non-executive level) have been included in selecting the sample for the study. The number of people whose responses
were complete to the questionnaire finally worked out to be 427. The responses from about 50 odd people being incomplete (These people have left more number of questions unanswered) their responses were not taken into consideration. The sample thus collected has been divided into three categories, namely, NEs (Non-executives, 110 in number, all in N-11 grade) Es (Executives, 136 in number, in E-0 to E4 grades) and SEs (Senior executives, 181 in number, in E-5 to E-8 grades).

3.5.3.2. Determination of Data source:

For responses to the questions, data Source has been the Bhilai Steel Plant personnel themselves. For secondary data, the archives of BSP, various libraries, books, journals, internet, colleges and other such avenues were approached where the data and information was available. The sample for carrying out the analysis has been decided from the BSP people only.

3.5.3.2.1. Primary data: Survey has been conducted on different sample persons to collect Data using the structured questionnaire to understand how the BSP collective perceives the knowledge management practices and its services to the organization, the value of KM and the extent of time needed to devote towards KM and how KM benefits people and organization both. The framing of the questionnaire has been done suitably to cover all aspects of KM under study.

3.5.3.2.2. Secondary data: Secondary data such as BSP performance figures, techno-economic parameters, man-power position and variations over a period, profit figures, installation and commissioning dates of important shops, achievement highlights and activities in KM area have been collected from the library and archives of BSP and various reports, documents and journals published by the company, past and present, which subsequently were used in arriving at certain conclusions.

3.5.3.3. Sampling Plan:

3.5.3.3.1. Sampling Unit: BSP is the universe of study for this research project. It being an integrated steel plant, it has all the facilitating units for its core production units which consist of major units like Coke Ovens, Sintering Plants, Blast Furnaces, Steel Melting shops, Continuous Casting Units, Various Rolling Mills like Rail & Structural Mill, Blooming & Billet Mill, Merchant Mill, Wire Rod Mill and Plate Mill. These units have support facilities like maintenance units, Research & Quality
Control Laboratory, auxiliary units like power plants, compressed air & water supply Departments, Stores and Purchase Department, Safety and Industrial Engineering Department, Design & Drawing department, Transport & Diesel Department, Finance & Accounting, Personnel & Administration, Training & Development Department, Projects Department, Materials Management Department and so on.

3.5.3.3.2. Sample Size: The sample size has been selected to cover most of the departments and people, giving a fairly closer representation of the entire universe. Based on the pilot observations, the sample constituted people from executive category and the people from the senior most non-executive cadre. For the analysis part, the sample was subdivided into three groups. Persons from Senior Manager to General Manager were taken as senior executive cadres (SEs), persons from Junior Manager to Manager Cadres were taken as executive category (Es) and persons in the grade N-11 are taken as non-executive cadre (NEs). The total strength of these three categories works out to be about 5300 and hence a sample size of about 450 to 500 persons was considered a good representation. Executive Directors and Managing Director have not been taken as they are the highest authorities and are responsible for framing of policies, rules and ensure implementation through others who are covered under this study. The final valid responses in each category worked out to be as follows: SEs = 181; Es = 136; and NEs = 110, and the total sample is 427.

3.5.2.3.3. Sampling Procedure: The sampling was based on systematic random sampling. Firstly, the names of the total population of all the departments were collected in the above mentioned categories from the BSP. The names were picked up at regular intervals. The interval was decided by dividing the total population number by the estimated sample size. The sample size was intentionally kept on the higher side, expecting some non-responses.

3.6. Research concept and hypotheses development:

3.6.1. Concept of Research Model:

A research model was developed based on the hypotheses which are in turn a representation of company’s basic tenets of functioning. Subsequently, questions
were developed keeping the hypotheses developed in mind and covering all aspects mentioned in them.

Responses from these questions were further subjected to statistical tools like ANOVA, multiple regression and factor analysis. With the results of these analyses hypotheses could be tested and then conclusions could be drawn.

The hypotheses were developed from the following three major categories. These are:

- Employee related factors,
- Organizational related factors and
- System related factors.

Further for the success of KM, following factors were considered essential and hence these were also taken into account:

- Time spent towards KM and
- Value of KM to people.

The questionnaires also by and large represented the above mentioned five aspects.

From the list of exhaustive questionnaire, certain questions were taken out that relate to above main points and further, main constructs were obtained through factor analysis that influenced above mentioned points.

3.6.2. Hypotheses development:

The following are the hypotheses developed:

a) **Hypotheses based on Employee related factors:**

1. Information Exchange among Employees is positively related to Value of KM to Employee.
2. Learning from failures in organization is positively related to Value of KM to Employee.
3. Information Exchange among Employees is positively related to Time spent on KM by Employee.
4. Learning from failures in organization is positively related to Time spent on KM by Employee.
b) **Hypotheses based on Organization related factors:**

1. Information Availability in organization is positively related to Value of KM to Employee
2. Information Availability in organization is positively related to Time spent on KM by Employee
3. Organization Support and encouragement is positively related to Value of KM to Employee.
4. Organization Support and encouragement is positively related to Time spent on KM by Employee.

c) **Hypotheses based on System related factors:**

1. IT and System Support in organization is positively related to Value of KM to Employee.
2. IT and System Support in organization is positively related to Time Spent on KM.
3. The value of KM is positively related to the Time spent.

The above points are elaborated along with their importance in the following paragraphs:

3.6.3. *Elaboration of the importance of the points in the hypotheses:*

Importance of the above hypotheses with respect to knowledge management can well be gauged by the fact that they form the very crux of the subject total. Availability of information and the exchange of the same between the users freely and creation of atmosphere for the same and arrange tools necessary for the same like support by introducing and making available the information technology are company management's basic responsibility for successful implementation of KM. This is precisely what the organization does giving its full support. Learnings from failures form an important part of lives of human beings in general and when the same is
ascertained in the company by creating congenial atmosphere, where the people’s minds are free from fear and apprehensions, the results for the company would be beneficial. In fact this represents the culture of the organization as well and that is how an organization becomes an example for others to emulate. Further following points also can be worth of notice:

1. Further, the point to note is the relationship between employee, organization and system related factors and Value of KM to Employee. It is essential that in any organization, the three basic factors that contribute not only to the successful functioning of the organization but also help it undertake any new challenges and get benefits out of them.

Firstly, role of employees is of paramount importance; it can not be undermined. Their positive frame of mind makes things that much easy for the management and organization.

Secondly, the role of organization itself plays a big and important part, as creation of a congenial atmosphere and the timely initiatives rest with it.

Thirdly, systems also play no less important role as constant vigil by management to be on the look out for not only introducing the best systems in the organization but also make provisions for the constant and regular updates.

Further, while the above factors are considered prime factors for KM practices, the following points as well are considered to have positive effect in contribution and add to the value of KM in the minds of the people. These are:

- Information Exchange among Employees. Management need to generate an environment where information exchange becomes hassle free.

- Learning from failure in organization. Big role for the organization to make employee feel not guilty of failure but learn from it such that in future the company as well other employees benefit from it.

- Information availability in organization. Information is the heart of any organization. Making the same available easily and in a quick possible way add to the value of KM in the minds of the people.
• Organization encouragement: Value of KM increases manifold once the organization devises methods to encourage employees in their deeds that involve knowledge sharing, information exchange and helping fellow employees.

• System support in organization. Role of technology and human interface in providing necessary system support that draw people towards KM is obviously an important factor that adds value of KM in the minds of the employees.

2: It is also to be noted that the employee, organization and system related factors have a positive relation with time spent on KM by the employee.

Obviously, the time allocated for KM practices and its implementation, the time spent by each individual on KM and understanding the direct relationship between value that is given to KM and time spent, all have a positive bearing on KM in an organization.

Thus we can see that:

• Information Exchange among Employees is positively related to Time Spent on KM. More time allocated for information exchange leads to more knowledge to the minds of the people themselves.

• Learning from failure in organization is positively related to Time Spent on KM. More time spent in thoroughly analyzing the reasons for occurrence of failure that include technical as well as human aspects and not in a routine way will lead to correct diagnosis and thus pave way for prevention of such failure recurrences. For such thorough analysis, a feeling of punitive attitude or fear should not be there in the minds of the people. Responsibility of management is immense here.

• Information availability in organization is positively related to Time Spent on KM. As can be seen, once more information is made available, people will have tendency to devote more time. Once this is done, commensurate benefits accrue automatically both to the people and the organization. However, once the information is available in the minds of the people gained through mutual
exchange, then the time spent can be considerably reduced, which otherwise can amount to be starting from the first principles.

- Organization Encouragement is positively related to Time Spent on KM. Organization has to take out that much extra time in creating an encouraging environment to realize the benefits out of KM implementation.

- System Support in organization is positively related to Time Spent on KM. Company needs to devote extra time to make provisions for generating system support that will enable people actively participate in KM activities.

3: It is further also to be noted that value of KM to employee is positively related with the increased time devoted on KM. Once a person understands that the value increases with the time spent on KM, he or she tends to devote more time towards KM.

Based on the above understanding, hypotheses were formulated. Having underlined the importance of the factors as above and the importance of time and value as well, an attempt was then made to relate these factors with KM success in the organization. It is thought that the factor that could possibly measure KM success on an attitudinal level is value of KM to employees and on a behavioral level, time spent by employees on KM.

3.7. Limitations of the study:

The present study has following limitations.

- The study is limited to Bhilai Steel Plant only. However, it is envisaged that the results of the study will be useful for other such plants to emulate.

- The sample of BSP collective included samples from Senior Executives (from E-5 to E8 grades), Executives (from E0 to E4 grades) and Non-executives (from N-11 grade only). Samples from people below this grade were not taken due to the educational limitations and the nature of jobs they carry out. Persons in ED grade and MD were not taken as they are the highest authorities.
• The period of study covered is from the starting point of KM implementation at BSP, that is, around year 2002 till 2008.

• The responses from the sample population have the drawbacks that usually creep in such research works, such as, the real feelings of the individuals at times get to secondary position and one gets the answer as it should be rather what as they think.

3.8. Data, Analysis and Discussion of Survey Results:

The data collected through above procedure was compiled and appropriately tabulated. For the analysis of collected data help of EXCEL and SPSS software version 16.0 was taken to use standard statistical techniques, keeping in mind overall objectives of the research. The details of analysis and discussions are placed at Chapter-5.

3.9. Findings & Conclusions:

Finally, the findings from the primary sources as well as secondary resources have been utilized keeping in view the research objectives and sub objectives to draw conclusions. The details are placed at the last Chapter-6.