Chapter 4

Research Methodology
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RESEARCH METHODOLOGY

Research in common parlance refers to a search for knowledge. In this context, research may be defined as the objective and systematic method of finding solution to a problem i.e., systematic collection, recording, analysis, interpretation and reporting of information about various facets of a phenomenon under study. In other words, research refers to the systematic method consisting of enunciating the problem, collecting facts or data, analyzing the facts critically and reaching conclusions based on them.

Research methodology refers to the various sequential steps to be adopted by a researcher in studying a problem with certain object in view. One of the most important uses of research methodology is that it helps in identifying the problem, collecting, analyzing the required information & data and providing an alternative solution to the problem.

4.1 Research Objectives

- To analyze the state of the Knowledge Management based Organizational Competencies.
- To study the level of the understanding and clarification in the employees related to the technological advancements carried out at the workplace.
- To scrutinize the response of employees to the various technological upgradations.
- To examine the competency level of the employees for knowledge accumulation, segmentation, processing & analysis.
- To analyze how dexterous the employees are in the usage of advanced Knowledge Management tools and techniques.
4.2 Research Design & Data Sources

This report is based on primary data, which is collected to study the trends in the Knowledge Management based Organizational Competencies. The secondary data which has been collected through various magazines, journals and websites, is also used in the project but mainly for the purpose of reference and comparative analysis.

The instrument for data collection was a structured questionnaire targeted towards people who actively make use of Information Technology based tools and techniques in their personal and professional life. Questionnaire was designed to ascertain the employees’ perception and behaviour towards the knowledge, understanding and usage of Knowledge Management based Organizational Competencies at the workplace.

The target sample includes employees of such organizations where the Knowledge Management tools and technologies are not used in a structured manner and which are in a dire need of an overhaul related to such advancements.
4.3 Questionnaire Design

A structured questionnaire was designed covering only close ended questions; to study the perception of people regarding their Knowledge Management based organizational competencies. (Specimen of the questionnaire is attached in Appendix II).

4.3.1 Merits of using Questionnaire

The questionnaire was used as a method of data collection as it claims the following merits:

- It is a low cost method and its geographical spread is wide
- It is free from the bias of the interviewer
- Respondents have more time to give well thought answers
- Large samples can be made use of and thus the results are made more dependable and reliable
- Respondents can be reached conveniently

The whole process was a form of self-assessment of respondents’ skills and confidence in practicing certain competencies successfully at their respective work place. While answering the questions, the respondents were asked to keep in mind that all the mentioned skills were work place related only (or for official purpose) and not concerned with the usage of these skills in personal life or communication.

4.3.2 Scale

The respondents were to review each competency mentioned in the questionnaire and rate their skill and confidence in practicing them. The following scale was used to measure the competencies:
<table>
<thead>
<tr>
<th>Scale No.</th>
<th>Scale Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>No knowledge about this area</td>
</tr>
<tr>
<td>B</td>
<td>I have knowledge of this competence area, but I do not exercise it in the workplace</td>
</tr>
<tr>
<td>C</td>
<td>Low skill or confidence in the competence area; over all development is needed</td>
</tr>
<tr>
<td>D</td>
<td>Average skills and confidence, but specialized development is required</td>
</tr>
<tr>
<td>E</td>
<td>Expertise in this competence area at present</td>
</tr>
</tbody>
</table>

### 4.4 Research Methodology

- The first stage of analysis comprises of analysis of individual competencies based on the responses according to the given scale.

- In the second stage, the questionnaire was further segmented for the sake of detailed analysis and different skill sets were prepared.

- The different skill sets represented the competencies related to

  - *Understanding & Clarification*
  - *Reaction to Technological Change*
  - *Knowledge Sharing*
• Searching & Organizing Information
• Analysis & Review
• Use of Advanced Tools & Techniques
• Knowledge up gradation
• Systematized Documentation
• Seriousness towards Work through Miscellaneous Skills

➢ The respondents were analyzed not only on the basis of individual competencies, but also on the skill sets.

➢ In the third stage, test of dependence of certain competencies was conducted.

4.5 Hypothesis Testing

The major purpose of hypothesis testing is to choose between two competing hypotheses about the value of a population parameter. The first step of hypothesis testing is to convert the research question into null and alternative hypotheses.

The hypothesis actually to be tested is usually denoted by the symbol $H_0$, and is commonly referred to as the null hypothesis. The null hypothesis is assumed to be true unless there is strong evidence to the contrary.

The other hypothesis, which is assumed to be true, when the null hypothesis is false, is referred to as the alternative hypothesis; and is often symbolized by $H_A$ or $H_1$. The alternative hypothesis ($H_1$) is the opposing hypothesis.

The alternative hypothesis is a claim of “a difference in the population”. It is important to keep in mind that the null and alternative hypotheses refer population values, and not observed statistics. Both the null and alternative hypotheses are stated before any statistical test of significance is conducted.
After examining the distribution of each of the variables, the next task is to look for relationships among two or more of the variables. The type of analysis that is being chosen depends on

- The research design
- The characteristics of the variables
- Shape of the distributions
- Level of measurement

Testing of Hypothesis is applied for testing the association/dependence of the following competencies

**Set I**

- Frequent and main use of cloud computing based resources for data storage
- Good effort on knowledge applications to produce substantial or result oriented work

**Set II**

- Organizing, categorizing and storing the work related data and information properly
- Search for new tools and technologies on the internet for new ways to collect and store knowledge

**Set III**

- Emphasizing the use of reports, databases and other electronic forms of information, for taking any decision rather than through the relationship based communication or oral communication
- Ability to identify the knowledge analysis techniques used at work place
Set IV

➢ Regular attendance of workshops/seminars related to work and performance-enhancing IT skills
➢ Regular review of work related activities in terms of progress

Set V

➢ Any kind of information or knowledge is provided in a structured manner
➢ Structured knowledge is always shared via e-media and technologies, i.e. by the use of emails, bulletin boards, etc.

4.6 Test for Association/Dependence

➢ As the variables used were in the form of attributes or skills, hence the test for Association/Dependence was conducted to test the dependence of certain competencies.

➢ In such a case, the null and alternative hypotheses to be tested are:
  • H0 : There is no association or dependence of one factor on the other
  • H1 : There is association or dependence of one factor on the other

➢ Such hypothesis is tested with the help of Chi-square test ($\chi^2$ test).

4.6.1 Chi-square Test

The chi square distribution is a theoretical or mathematical distribution which has wide applicability in statistical work. The chi square test of independence allows the researcher to determine whether variables are independent of each other or whether there is a pattern of dependence between them. If there is dependence, the researcher can claim that the two variables have a statistical relationship with each other.
The data obtained from the sample are referred to as the observed numbers of cases. These are the frequencies of occurrence for each category into which the data have been grouped. In the chi square tests, the null hypothesis makes a statement concerning how many cases are to be expected in each category if this hypothesis is correct. The chi square test is based on the difference between the observed and the expected values for each category.

The chi square statistic is defined as

\[ \chi^2 = \sum_{i=1}^{k} \frac{(O_i - E_i)^2}{E_i} \]

where \( O_i \) is observed frequency of category \( i \), \( E_i \) is the expected frequency of category \( i \) and \( k \) is the number of categories. This chi square statistic is obtained by calculating the difference between the observed number of cases and the expected number of cases in each category. This difference is squared and divided by the expected number of cases in that category. These values are then added for all the categories, and the total is referred to as the chi squared value.

The chi square statistic, along with the chi square distribution, allows the researcher to determine whether the data is distributed as claimed. If the chi square statistic is large enough to reject \( H_0 \), then the sample provides evidence that the distribution is not as claimed in \( H_0 \). If the chi square statistic is not so large, then the researcher may have insufficient evidence to reject the claim made in the null hypothesis.

**Chi-Square Test Requirements**

1. Quantitative data
2. One or more categories
3. Independent observations
4. Adequate sample size (at least 10)
Characteristics of the Chi-Square Distribution

[1] It is not symmetric.
[2] The values of $\chi^2$ are non-negative (i.e $\chi^2 > 0$).
[3] The chi-square distribution is asymptotic to the horizontal axis on the right-hand-side.
[4] The shape of the chi-square distribution depends upon the degrees of freedom, just like Student’s t-distribution and Fisher’s F-distribution.
[5] As the number of degrees of freedom increases, the chi-square distribution becomes more symmetric.
[6] Total area under the curve is equal to 1.0.

4.7 Sampling

4.7.1 Sampling Procedure

The sample comprises of people who are professionals with a fairly good proficiency in computer science. The respondents are from different vocational sectors including government employees, private sector employees, etc.

4.7.2 Sample Size

The sample size of the project is limited to 210 people. The sample comprises of people from various states namely Rajasthan, Punjab, Uttar Pradesh, Gujarat, Bihar, Maharashtra, Madhya Pradesh and NCR.
4.7.3 Data Presentation & Design

Data has been presented with the help of diversified tables, multiple bar graphs, pie charts, line graphs, etc. All these presentation tools and techniques are instrumental in comparative analysis of the variables included in the research.

4.8 Demographic Segmentation

*Age: 21 and above; divided into four age groups:*

- 21-25 Years
- 26-30 Years
- 31-35 Years
- >35 Years

![Classification of Respondents (Based on Age)](image_url)

*Figure 4.1: Classification of Respondents (Based on Age)*

54 % of the respondents belonged to the age group 21-25, 37% belonged to the age group 26-30, and 6% & 3% were of the age groups 31-35 and >35 respectively.
Gender Ratio:

Figure 4.2: Classification of Respondents (Based on Gender)

62% of the respondents were male and 38% were female respondents.

Occupation: Government employees, Private sector employees & others

Figure 4.3: Classification of Respondents (Based on Occupation)

87% of the respondents were employed in Private Sector, 4% were Government Employees and the rest 9% were Others.