Chapter - 7

Research Methodology

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References
Research Methodology

Research Methodology is the science of understanding and doing the research in a systematic and scientific way. The research methodology in a research thesis explains the way researcher has systematically progressed in the research. It includes not only the research methods/techniques but also the logics behind those methods and techniques. It includes all those steps that researcher has adapted in understanding the problem and in finding solution for that. The research methodology in this thesis explains all necessary steps, logics and methods used to understand the research topic and also to identify the problem and systematically approaching towards a scientific solution.

7.1 Research Gap and Problem Definition in the Light of Literature Review:

The basic purpose of literature review is to understand the research related concepts and find the research gap which will be helpful in defining the problem. The related concepts have been explored through the literature review in detail but before defining the problem, the summary of literature review is appended below to link with the problem definition.

Summary the Literature Review: The literature review is the very important part of any research work. The literature review helps to understand the basic concepts of the research work and the research gap for the purpose of defining the problem and making appropriate design to reach at the conclusion. The challenge before this research is to understand the concept of –

(a) Organisational Effectiveness
(b) Collaboration and its importance in Organisational Effectiveness
(c) Groupware ( IT tool to help collaborative work through digital process)
(d) Identifying the research gap and Defining the problem

Finally, studying the role of Groupware in enhancing Organisational Effectiveness.
In this research work, the literature review is carried out for the following two purposes:

(1) Understanding the concepts and principles in context of this research
(2) Understanding the research gap through previous research works in this field

The literature review in this research was concerned with achieving both the objectives mentioned above. The concepts, understood through the literature review, are summarized below for the purpose of this research work:

(i) **Organisational Effectiveness**: It is worth mentioning three approaches, through literature review, to understand the concept of organizational effectiveness in context of current research. Firstly, Peter F. Drucker explains the Organisational Effectiveness as “If one cannot increase the supply of a resource, one must increase its yield. And effectiveness is the one tool to make the resources of ability and knowledge yield more and better results.”\(^1\) Here, effectiveness is considered as a tool which yields better results. Secondly, Krun Krumov et. al. have explained the term differently when they say “Organisational effectiveness is a “relational product or derivate” of actually existing personal, organizational and social phenomena.”\(^2\) This means, it cannot be measured directly but to be measured and understood through some other factors that may in turn result in organisational effectiveness. And the third approach where Charles Araujo stress upon necessary capabilities for creating effective organisations. He says “To create an effective organization, you must identify those practices or elements within your current organizational capabilities that are hindering your ability to fulfill your mission. With these gaps identified, you can develop a plan to build the necessary capabilities.”\(^3\) He has identified six such capabilities\(^4\):

(a) People  
(b) Management  
(c) Knowledge  
(d) Organization  
(e) Process  
(f) Technology
In this approach, the necessary capabilities are required to be identified and need to develop them for creating an effective organisation.

(ii) **Collaboration:** In the words of Thomas Kayser “Collaboration is not a pipe dream; it is a difference maker in terms of business effectiveness.”

“Collaboration is a mutually beneficial and well-defined relationship.”

Having high degree of collaboration among team/group members is one of the most important factors in achieving team/group goals. The literature has described various ingredients of collaboration. For the purpose this research following ingredients are important which have been understood from literature review:

(a) Shared Goal
(b) Interdependence and complementary skills
(c) Accountability
(d) Effective communication
(e) Commitments
(f) Focus on Result

(iii) **Groupware:** Groupware is a modern digital tool that helps in collaboration. The process of communication, coordination and information sharing among the team members have been made easy with various facilities in the Groupware. The mostly used facilities of groupware for collaboration are: E-mail, Video Conferencing, Scheduling Meeting and Appointments, Calendaring, E-meeting, Discussion Forum, Electronic White Boarding, Document Management Software, Group Decision Support Systems etc. In Literature, there are number of definitions of groupware. For the purpose of understanding this research work two definitions are important to mention:

Firstly, which explains groupware as “software that accentuates the multiple user environment, coordinating and orchestrating things so that users can “see” each other, yet do not conflict with each other.”

And secondly, PC magazine encyclopedia defines as “groupware is an evolving concept that is more than just multiuser software which allows access to the same data.”
Groupware provides a mechanism that helps users coordinate and keep track of ongoing projects together.”

CSCW (Computer Supported Collaborative Work) is another term which has been used in literature for the Groupware. At some places Groupware has been considered as part of CSCW and at some other places both terms have been used as synonyms. Though both terms are related to each other but are different in concepts. The difference can be understood from the work of Beaker- “We define computer – supported cooperative work (CSSW) as computer–assisted coordinated activity such as communication and problem solving carried out by a group of collaborating individuals. Groupware is the multi-user software supporting CSCW systems.” For the purpose of this research, both terms have been conceptualized as strongly related but are different in meaning. The CSCW is taken as field that is concern with the continuous development of tools and technologies to support group work environment and the Groupware is application software which is developed out of CSCW work. Tom Gross has described CSCW as “The field of CSCW aims to achieve a deep understanding of work and other types of social interaction and to develop adequate technical concepts and tools for social interaction in groups and communities.”

Identifying Research Gap: The Literature is full of research work for enhancing organizational effectiveness. There are various parameters defined for achieving organizational effectiveness. Tools for measuring effectiveness are also defined. Same way the literature is full of research on Collaborative work and there are large numbers of research papers on issues related to groupware uses. It includes implementations issues, problem solving, design of groupware etc. The literature review has helped to identify the following research gap:

- **Role of Groupware:** Through the extensive literature review it is identified that limited research has examined the “role of Groupware in enhancing the organizational effectiveness.”
Some of the related problems as mentioned below have also attracted only few studies:

- **Awareness**: The awareness about need of collaboration
- **Challenges**: Challenges faced in the process of collaboration
- **Utilization**: Availability and usage of digital tools for collaboration

This research work is taken to examine the role of Groupware in enhancing organizational effectiveness and a limited approach has been adopted to study the rest three areas identified as research gap. To examine the role of Groupware the data collection has been done from the Fertilizer Industry. A limited study of fertilizer Industry has been done to understand the products and structure of the Industry for the purpose of data collection and research design for this research.

**7.2 Research Hypothesis:**

H<sub>0</sub>: “Use of Collaborative tool (Groupware) does not have a significant role in enhancing the Organisational Effectiveness”

H<sub>1</sub>: “Use of Collaborative tool (Groupware) has a significant role in enhancing the Organisational Effectiveness”

The research is concerned with examining the role of Groupware in organisational effectiveness. There are twelve factors that have been identified as important in achieving organisational effectiveness. There are some other factors that are also important in the success of organisation such as solutions for the challenges faced in collaboration, awareness on need of collaboration, utilization of time etc. If role of Groupware is established as important in these factors the null hypothesis is rejected & the alternate hypothesis is accepted else the null hypothesis is accepted and alternate hypothesis is rejected. To examine the role of Groupware in these factors sub hypothesis are developed and tested using Chi-Square (X<sup>2</sup>) test. There are total eighteen sub hypotheses that are developed as followings:

(i) Two sub hypothesis on examining the Role of Groupware in enhancing Awareness for Collaboration.
(ii) One hypothesis on Examining the role of Groupware in saving the time that is spent on Collaboration.

(iii) Two hypothesis on examining the role of Groupware in finding solutions to challenges faced in Collaboration.

(iv) One hypothesis on examining the usefulness of collaborative tools.

(v) Twelve hypothesis on examining the Impact of Usage of Collaborative Tools

7.3 Research Design:

“The function of a research design is to ensure that the evidence obtained enables us to answer the initial question as unambiguously as possible.” The research design includes all steps, and methods that are used in this research work. The research followed a systematic approach right from problem definition through literature review, identifying research gap, data collection, and analysis and research findings. The steps followed in this research work are mentioned in the following figure:

Exhibit 7.1: Research Process Flowchart

7.3.1 Population:

The examination of role of Groupware on effectiveness has been done based on the data collected from the fertilizer industry in India. Chapter 5 and chapter 6 of this thesis include the limited study of Indian Fertilizer Industry. Chapter 5 includes the products, structure and current status of the Indian Fertilizer Industry. Chapter 6 includes the identification of collaborative needs of fertilizer Industry for the purpose of this research. The study of fertilizer Industry reveals that it is a composite of three different sectors: Public, Co-operative and Private Sector. All the three sector companies work under the policy of Department of Fertilizers under the Ministry of
Chemicals and Fertilizers, Government of India. The population for this research includes all the companies in the fertilizer industry. Therefore, the population is inclusive of all the companies of the Fertilizer Industry. The role of Groupware has been planned to be examined as comparative study of two companies one that uses the Groupware and another that does not use the Groupware but depends upon the traditional tools. Therefore, fertilizer industry can be divided into two separate populations where one is that uses Groupware and another that do not use it.

7.3.2 Sampling Units and Sample Size:

Sample is a part of population: Sample can be an individual element or group of elements drawn from the total population. It is a subset of the total population and it should represent the whole. The sample should be such that it is suitable for research in terms of cost, convenience and time. Samples are taken from the sampling frame. Sampling frame is the list of elements from which the samples are drawn. Sampling unit is that basic element which has been considered for selection in some stage of sampling.

Selection of Companies at First Level of Sampling: The fertilizer industry is divided into three different sectors but on the basis of ‘Use of Groupware’, the collaborative tool, the same can also be divided into two categories - one, which uses Groupware and another which does not use any tool that can be term as Groupware for collaboration. There are large numbers of companies that do not use the Groupware. For the purpose of this research, two companies were selected for data collection:

(i) IFFCO: This is one of the largest companies in fertilizer industry and has international expose. This company uses “Lotus Notes”, the first commercial Groupware for more than 10 years. Out of its four plants, one at Phulpur has been selected for data collection.

(ii) NFL: NFL is one of the nine companies which functions directly under the control of Department of Fertilizers under Ministry of Chemicals and Fertilizers, Government of India. It has five plants as Nangal, Bhatinda (both
in Punjab), Panipat (Haryana) and two plants at Vijapur (MP). Nangal plant has been selected for collection of data. This company does not use the ‘Groupware”. They use e-mail and other communication systems for the purpose of collaboration.

**Selection of Second and Final Level of Sampling (Units):** All employees using the groupware in IFFCO and employees with same level of collaborative needs at NFL have been taken for filling up questionnaires. Random sampling technique has been used at this level where all employees using Groupware or employees with equal collaborative needs (if groupware not used) at a particular unit have equal opportunity for being selected. Size of sample at each unit is given below:

(i) Sample Size at NFL, Nangal : 450 Units (Questionnaires)
(ii) Sample Size at IFFCO, Phulpur : 350 Units (Questionnaires)

**7.3.3 Sampling Methods Used:**

Multistage Sampling has been used in this research. There are two stages in sampling and different sampling techniques have been followed for selecting sampling units at each stage:

(i) **First Stage:** After the population has been identified as two categories one of those using Groupware and another those not using the Groupware, two companies, one from each group, have been selected. It has been taken care that both are equal in terms of plants, production capacity and distribution. The selected plants for the data collection are as follows:

(a) NFL, Nangal
(b) IFFCO, Phulpur

(ii) **Second Stage:** At the final, random sampling method has been used for collecting the data through administering the questionnaires at the two selected units of fertilizer industry.

**Description of Random Sampling Method:** Random sampling is a probability sampling technique in which each unit has equal probability for being selected. Random sampling involves respondents who are randomly selected from a sampling
frame. The respondents for filling up questionnaire have been random at each of the two units selected. The respondent included any employee who is using groupware in IFFCO or with same level of collaborative needs at NFL (supervisor & above level).

7.3.4 Research Tools-Data Collection and Analysis Tools:

The tools in research can be divided into two categories: Data Collection Tools and Data Analysis Tools.

**Data Collection Tools:** The data collection tools are used to collect the data for the purpose of research. Data for the research is very important. The data are classified as (a) Secondary Data and (b) Primary data. The data which has been collected by someone else for some other purpose can also be used in some of the researches. These are known as secondary data. The data for which collection tools have been identified and systematically collected for the purpose of current research is known as primary data. This research uses primary data for the purpose of analysis and findings. Some of the important data collection tools used for primary data collection are mentioned below:

- Questionnaire
- In Depth interview

This research uses Questionnaire as tool for the purpose of data collection.

**Data Analysis Tools:** The data analysis tools are used to study the data for the purpose of examining the information hidden in the data and then interpretation is done on this information keeping in mind the objective of the study. The same data can be used for many different purposes therefore, it is necessary to keep the objective of research always in mind. According to the purpose of study there are large numbers of analysis tools available. Generally, the research works are related to examining the similarities or difference between two entities. Therefore, the research may use some statistical tools for finding relationship between two or more entities or comparing the two or more for understanding the differences. The present research work is a comparative study for examining the role of Groupware in organisational effectiveness. For the purpose of comparison, the sampling has been drawn from two
different companies one that is using the Groupware and another which is not using the Groupware. The Microsoft Excel is primarily used in this research to analyze the data collected from both the companies using tables and Charts and the interpretation after the analysis of data has been made on the basis of literature review on the collaboration and organizational effectiveness. The nature of data for analysis is non-parametric and therefore, Chi-Square ($X^2$) test has been used for the purpose of hypothesis testing. A brief description of Chi-Square test and related issues with respect to this research are provided in the next chapter before testing the hypothesis.

7.3.5 Design of Questionnaire:

Questionnaire is a set of questions administered to the respondents for the purpose of data collection in a research. Each question in this set must generate some data towards the research objective. Design of questionnaire is the most important issue in the research design. Some important small steps are required in developing a questionnaire:

i. Understanding the information required  
ii. Defining the target respondents  
iii. Framing question contents  
iv. Putting questions in a meaningful order and format  
v. Checking the length of the questions and the questionnaire  
vi. Pre-testing the questionnaire  
vii. Developing the final questionnaire

7.3.5.1 Pre-Testing the Questionnaire:

After developing a questionnaire, it is necessary to do the pre testing of questions. It is to ascertain that the questions asked –

- are being understood by the respondents,
- collect the data as expected,
- does not take much time in answering the questions,
• data collected through the questions are fulfilling the objective of the research, and
• Each question is necessary in generating some research-relevant data.

A questionnaire comprising 31 questions was developed on the basis of needed information and the same was administered to 35 respondents of the IFFCO Phulpur, Allahabad. The pre testing questionnaire is enclosed as ‘Annexure I’ to this research report. After analyzing the data, it was found that:
• Questions are being understood by the respondents
• All questions except 6 were found relevant to the present research. These six questions were not generating the specific data required for the purpose of current research and therefore, decided to remove from the questionnaire
• Time taken by the respondents was adequate
• The analysis of questions proved each question as an important tool in generating specific data for the purpose of research.

7.3.5.2 Final Structure of Questionnaire for the Research:

‘XQ (Execution Quotient) questionnaire’ from franklincovey.com has formed the basis for understanding question setting for the purpose of collecting data on organizational effectiveness. Seven parameters were defined to develop questions according to the need of this research. It was decided to collect data on these parameters. These are as mentioned below:
1. Awareness of Collaboration
2. Time spent on communication/collaboration on an average
3. Challenges faced in the process of Collaboration
4. Awareness of Tools/Methods for Collaboration
5. Availability of tools for collaboration
6. Usage of tools for collaboration
7. Impact of usage of Collaborative tools
Questions are grouped on these parameters. Each question has a specific purpose to analyze. The flow of questions has been from understanding the collaboration through time spent, challenges faced in process of collaboration, to the role of groupware. There are 26 questions in this questionnaire. From question number 1 to question number 10 are grouped in first four parameters and are not related to digital collaboration. Last three parameters are related to digital collaboration and need some knowledge on the usage of collaborative tools (groupware). The last group of questions from Question number 15 to question number 26 is the most important for the purpose of this research. This is specially influenced by the ‘XQ questionnaire’ for generating data on organizational effectiveness. It includes parameters which determine the organizational effectiveness and the questions are framed to get the data on the role of groupware on these parameters.

The target respondents may be any employee who is using groupware in IFFCO and any employee with same level of collaborative needs (supervisor & above) at NFL. The final questionnaire is attached as ‘Annexure – II’ to this thesis.

7.3.6 Data Generation with Time of Study:

Data collection was done through the above explained questionnaire during the time period from September 2014 to December 2014 on the selected fertilizer industry units. The data has been generated for a single phase study to analyze the role of groupware on organizational effectiveness.

7.3.7 Defining Variable Relationship:

The Organisational effectiveness has been considered as dependent on the following factors of the organization:

1. Extent of achieving unit goals
2. Extent of achieving individual goals
3. Clearly understanding what an employee is supposed to do
4. Planning process in the unit
5. Process of assigning tasks and following through the plans
6. Energetic and creative communication in the unit
7. Maintaining an understanding of roles and responsibilities between and an employee and his manager
8. System of routine reporting on progress towards goals
9. Maintaining accountability for reaching to commitments on time
10. Making measures for tracking progress visible and accessible to everyone
11. Identifying and scheduling activities around most important goals of the unit
12. Taking initiative and staying on the tasks till they are completed

The organizational effectiveness is dependent on various factors in the organisation. One of the most important factors for achieving effectiveness is collaboration. The collaboration is presently well supported by the Groupware - a digital collaborative tool. The present research is an effort to measure the role of digital collaboration in achieving organizational effectiveness. Through the literature review, it has been identified that the above variables in the organisation determine the extent of organizational effectiveness and these may again be dependent on some other factors. For the purpose of this research these are considered as independent variables and the Organizational effectiveness as dependent variable.

7.3.8 Data Handling, Analysis, and Interpretation:

There were 450 questionnaires administered for data collection at IFFCO and 350 questionnaires at NFL. 304 filled-in questionnaires have been received from IFFCO, Phulpur and 207 filled-in questionnaires have been received from NFL, Nangal. The data has been considered as sensitive with respect to individual and company and therefore all care has been taken to safeguard the interest of company and privacy of respondents. The data has been analyzed using excel table and charts. The Pie charts has been used for studying the trend and percentage of respondents on each question for the data received from both the units. After analyzing the data with excel table and charts, data interpretation has been made on each question as comparative study of using the Groupware and not using the Groupware. The IFFCO employees use the Groupware and NFL employees do not use any Groupware. The data interpretation is based on the literature review on organisational effectiveness and collaboration explained in Chapter Two and Chapter Three respectively.
This chapter has sketched the map for the empirical research. All the necessary steps taken to reach at the conclusion are described in this chapter. The steps taken in research process and tools used in the next chapter for analysis are planned and discussed in this chapter.

References

4 Ibid.