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## Chapter III: Research Methodology

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Chapter III - Research Methodology

3.1 Introduction

The topics covered by the term research design are wide ranging. Research design is defined as “the plan and structure of investigation so conceived to obtain answers to research problem”. This chapter elaborates the overall scheme of the research.

Following paragraphs outline the efforts taken by the researcher to plan and create structure of the research for the subject under study for this doctoral research in the most scientific manner.

3.2 Purpose of the study

Variety of literature studies and research published earlier, have elaborated advantages of application of Information Technology in the business organisations and claimed that it helps improvement in business processes in these organisations. However, these conceived advantages and benefits of Information Technology need to be percolated to the small and medium scale sector business.

The purpose of this research, therefore, is to study the relationships amongst variables which affect or impact on improvement (or deterioration) of business processes due to usage (or non-usage) of Information Technology, in these business organisations.

3.3 Type of research

The researcher has chosen to use empirical method of study for this project. Empirical research is defined as “a way of gaining knowledge by means of direct and indirect observation or experience”. While, “Empirical
evidence (the record of one’s direct observations or experiences) can be analyzed quantitatively or qualitatively”.

3.4 **Objectives of the research**

To assess this impact, the researcher had laid down the following objectives of the study:

a. **Usage of Information Technology in small and medium scale sector.**

   Mere investing in Information Technology would not be sufficient, but its meaningful usage and deployment would be important to assess its impact on business processes. Hence, during the research it would be important to study level of usage of Information Technology.

b. **Reasons for usage / non-usage of Information Technology**

   Since, all businesses are driven by the objectives of maximising the profits through enhancing the performance and the continuity of the business; it would be necessary to understand what would be the driving factors for these units to use or not to use Information Technology.

c. **Advantages / disadvantages because of Information Technology**

   Advantages / disadvantages accruing due to any technology highly vary depending upon the perception of expectations compared with that of actual. Citing any common example of extent usage of technology in our day-to-day lives tells us trends of its adoptability in future. Similarly, the study of advantages / disadvantages accruing due usage of
Information Technology in these units would decide future of this technology in these units.

d. Effects on business processes

Ultimately, it would be interesting to investigate the effect or impact on improvement (or deterioration) of business processes due to usage (or non-usage) of Information Technology, in these business organisations.

e. Level of computerisation in these organisations

The computerisation within the organisations can be divided into 4 stages: Functional Improvements, Cross Functional Integration, Process Redesign, and lastly Business Re-engineering. These are progressive steps which finally results into a full-fledged Information Technology enabled organisation. The researcher wanted to understand these levels of computerisation the sample units had reached.

f. Reasons which prohibit these organisations from investing in Information Technology

In spite of the perceived and actual benefits and advantages of computerisation to the small and medium scale sector organisation, entrepreneurs / owners of these organisations might be prohibited from usage of Information Technology. The researcher wanted to find out these reasons.

3.5 Hypotheses
The role of hypothesis in the research especially is undisputable. It gives direction to the study, though it may be proven or not proven. In this study, the researcher has developed following hypotheses to give direction to the study and to develop a questionnaire as an instrument for collecting the primary data.

\[ h_1: \] The Information Technology has become an essential tool for SME sector.

\[ h_2: \] There is no desired large-scale impact of Information Technology on the SME sector for improvement of business processes.

\[ h_3: \] Non-realisation of desired advantages/ benefits by adoption of Information Technology act as a de-motivating factor in its large scale usage in SME sector.

Figure 3.1 on page number 123 depicts hypotheses graphically. The pictorial presentation of Hypotheses reveals that, Information Technology management suite required by any of the business organisation basically have 3 components and many sub components:

- Information Technology Infrastructure and its management
- “Information” management
- Business process management

Vertical bars on the right of the diagram indicate the extent of computerization and its usage in large, medium and small sector organizations.
3.6 Scope of the study

Geographical

The research was intended to be carried out in small and medium scale sector units situated in the Industrial areas falling within boundaries of district of Pune, namely,

a. Pune City
b. Bhosari – Pimpri - Chinchwad Industrial area

Industrial map of Pune district indicating locations of MIDCs is given on page number 128.

Inclusion criterion for small and medium scale sector

Ministry of Industries, Government of India and the Government of Maharashtra defined small and medium scale sector based upon turn over as well as the investment in infrastructure in the year 2000. This definition would be taken for the purpose of this study.
Figure: 3.1 Pictorial Presentation of Hypotheses
3.7 **Methodology of research**

3.7.1 **Source of primary data**

The most popular method of the research utilised in research is survey method. The survey of the respondent’s unit helps gathering data about describing, finding and interpreting the phenomenon of impact of Information Technology on business processes on small and medium scale sector units. To undertake the survey and to gather relevant data; a survey instrument need to be developed in the form of a questionnaire. The following sections narrate the details of development of a questionnaire required for this research project.

3.7.2 **Designing the draft questionnaire**

The draft questionnaire was prepared based on preliminary interviews and discussions with decision makers and industry experts as well as observations made during the visits to the selected small and medium scale sector units.

The detailed designed questionnaire is given in Appendix I.

Considering the objectives and hypotheses, to yield correct and adequate information the questionnaire was developed which had 8 specific sections:
### Table: 3.1 Data desired to be received

<table>
<thead>
<tr>
<th>Question nos.</th>
<th>Data desired to be received</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 to 6</td>
<td>Details about computer infrastructure in the respondent’s unit</td>
</tr>
<tr>
<td>7 &amp; 8</td>
<td>Expenditure on Information Technology and sales turnover of the respondent’s unit</td>
</tr>
<tr>
<td>9 &amp; 10</td>
<td>Extent of computerisation in the respondent’s unit</td>
</tr>
<tr>
<td>11 to 13</td>
<td>Effect of Information Technology on business processes in the respondent’s unit</td>
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<td>14 to 17</td>
<td>Decision making on usage and investment in Information Technology in the respondent’s unit</td>
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<tr>
<td>18 to 24</td>
<td>Data about the details of the respondent’s unit</td>
</tr>
<tr>
<td>25</td>
<td>Information Technology manpower deployed in the respondent’s unit</td>
</tr>
<tr>
<td>16 to 30</td>
<td>Basic information about the respondent</td>
</tr>
</tbody>
</table>

#### 3.7.3 Testing of the questionnaire (Pilot survey)

Pilot testing of the questionnaire was carried out to find out:

a. Relevancy of the questions enlisted in questionnaire  
b. Interest and willingness of respondents to share information  
c. Time taken by respondents to respond to questions  
d. To check and modify questions for better understanding of respondents  
e. Understanding of the questions and the expected responses among the available answers

#### 3.7.4 Finalisation of questionnaire

To ensure variability of the instrument used on extensive study of literature related to the study. Experts’ opinions were solicited before the finalising
the questionnaire. The final questionnaire was framed and adopted after incorporating appropriate suggestions.

Considering all the facts mentioned above, the questions were designed to have multi-choices / scaling as answers. However, in few questions, residual choices as “No opinion” or “Do not know” also were used, so as not to bias the respondents with choices they would not be comfortable to express.

3.7.5 Determining questionnaire distribution and interviewing process

During the pilot survey it was found out that mere distributing the questionnaire to the respondent’s unit would not yield desired result as the respondents were unfamiliar with subject and also were pressed for allocation of time, from their daily routine. The researcher then decided a two-stepped approach:

a. In a first visit the respondent’s unit, identify the relevant person, give the questionnaire and brief him/her about the subject of research. The researcher also sought next appointment comfortable to the respondent, where he/she could spend adequate time with the researcher.

b. In a second visit, the researcher would spend time with the respondent, discussing each question in detail, with respondent and recording the correct answer. In few cases, for want of time, the researcher also visited the respondent's unit more than twice for follow up.

This approach had definitely yielded good results to the extent possible in the given circumstances.
3.7.6 Sources of secondary data

Secondary data for this research work was available from various sources, which are described as follows:

**Institutions**

Pune have number of Institutions:

- a. Marhatta Chamber of Commerce, Industries and Agriculture (MCCIA)
- b. Indo-American Chamber of Commerce
- c. British Business Group
- d. Confederation of Indian Industries
- e. Entrepreneurs’ club
- f. Pune Management Association
- g. Computer Society of India
- h. Pune Chartered Accountant’s Association
- i. Industrial Finance Banks

**Government**

Numbers of Government organisations play an important role in regulating / controlling the small and medium scale sectors:

- a. Registrar of Companies
- b. Ministry of Industries, Government of Maharashtra
- c. District Industrial Centres
- d. Employment exchange
- e. Universities in Pune
- f. Municipal Corporations
- g. Zilla Parishad
Figure: 3.2 Geographical Map of Pune District

- Industrial Estates
3.7.7 Sampling design

The basic idea of sampling is that by selecting some of the elements in a population and observing parameters under study, we may draw conclusions about the entire population for selected parameters.

Of course, to draw an adequate sample we need to define population very well. In the research study, as has been mentioned earlier, the population were consisting of small and medium scale sector units in Pune.

In last four decades, Pune and peripheral area has emerged as manufacturing hub populating many major industries. There are many multi-national companies who have established their manufacturing plants in Pune. Amongst them are British, Germans, Italians, Swedish, Americans, and Japanese companies. In fact most of them are engaged in manufacturing of mechanical engineering products.

Over the period of time, all these companies have encouraged local expertise to set up ancillary units who can manufacture the mechanical components required by the multinational companies. The central, state and local governments' policies also helped these units to stabilise in light of the employment generation.

However, the growth of these ancillary units is highly dependent on the growth of the ‘hub’ unit and of course competition. Consequently, in last few years these ancillary units, though grown to the certain extent, have remained in small and medium scale sector only.

The list of elements in the sampling frame is available from various sources, viz. Industrial directory of Marhatta Chamber of Commerce,
Industries and Agriculture (MCCIA), District Industrial Center of the Government of Maharashtra, Department of Excise, Yellow pages, etc.

Theoretical calculation of adequate sample size would yield a very large number and would prove to be unviable for handling by the researcher alone in terms of time, money and efforts. Hence, the researcher under the guidance decided to take a sample of two hundred fifty small and medium scale sector units for this study as an empirical sample. These units, however, were selected randomly from the sampling frame. In the nutshell:

- **Sample Extent:** Industrial areas nearby Pune city
- **Sample Size:** 250 Units of Small and Medium Scale Sectors
- **Sample Element:** Managers/ Owners of Small and Medium Scale Sectors
- **Sample Unit:** Units of Small and Medium Scale Sectors
- **Sampling Technique:** Simple random Sampling of Units of Small and Medium Scale Sectors Industrial areas nearby Pune city

3.7.8 Data preparation & Analysis

The researcher used a famous statistical tool – SPSS – for the purpose of analysis. Hence data received was coded as required by this tool. It was decided that since the questionnaire had thirty multi-choice questions, the coding and data entry was done as and when the completed questionnaires flows in; so as to keep them ready for data analysis.

The researcher after reviewing of objectives and hypotheses along with questions decided to use specific statistical techniques for analysis. Various statistical techniques were used with various questions to achieve objectives and verify hypotheses.
3.8 Limitations of the research

The limitations of this research work are as listed below:

- Knowledge level of the respondents: Most of the small and medium scale sector units are operated personally by the promoter-entrepreneur. This entrepreneur is an expert in his/her field and focuses on day-today technicalities concerning with design and production as these earn him daily bread and butter. Hence, s/he has little knowledge of Information Technology and its capabilities.

- Availability of time for interview and giving information: Because of the same reason, the respondents were busy and could not give information in one sitting. The researcher had to visit these units number of times to get the information completely.

- Absence of documentation: Many of the units did not keep systematic documentation related to their computerisation and gave answers based upon their memory.

- Population of small and medium scale sector is vast: In the district of Pune, there are a large number of small and medium scale sector units engaged in different segments of business. Scientific sampling would have given a large number to be surveyed. However, because of extent of time, money and efforts involved; the researcher had to limit to only two hundred fifty sample elements; which were applicable to small and medium scale units only.
• Few of the respondents were reluctant to give information initially as they could not see any benefit in this research study. However, after persuasion they agreed, but a lot of time was wasted in this process.