Chapter 3 Research Methodology

3.1. Introduction

This chapter aims at describing the research methodologies adopted in this research study. This chapter starts with introduction to chapter 3.1 followed with discussion on the research problem, which provides quick view on the actual research problem as we have discussed little the researcher’s journey to this research problem in Chapter 1 - Introduction. Here in this topic 3.2 Research Problem Description, the actual research problem and the importance of this research problem has been described. Then, in the next topic 3.3, it describes the Objectives and Hypotheses of the research. The objectives are detailed as main objectives and subordinate objectives which are dependent on main objectives. The research hypotheses have been stated after objectives.

The topic 3.4 Research Methodology describes the various research methodologies and the adopted methodology for this research and the reason for selecting this methodology for this research. 3.5 Research Design discuss about the research design of this research. 3.6 Sampling Method explains various sampling methods used during scientific research and which method was suitable for this research. The detail of choosing the Multi-Stage Sampling methods for this research has been described in this. It also explains the method followed for determining the population size and sample size calculation. Topic 3.7 Survey Design explains the survey method followed during this research. It explains the process followed for the research questionnaire design for the survey. The Data Analysis strategy explains coding of data, data analysis planning and methods, followed during the research with reasons for selecting a specific statistical test in the topic 3.8. The step by step research work development plan has been described using a research model and year wise research plan in next topic Research Stages. The most considerable part during research that ethical conduct of research has been described in topic 3.10 Ethical Considerations. Finally, this chapter concludes with the scope and limitations of this research, this explains about scope of the research and what are the limitations of this research study, in topic 3.12.
3.2 Problem Description:

3.2.1 Problems, Challenges and Issues in Academic Research.

Chapter 1 explains the journey of the researcher to this research problem. The researcher himself was faced different problems during research, while pursuing M.Phil. degree. He was struggled for getting information and guidance at various stages of research. So he was curious to know the challenges faced by other research scholars, during discussion with senior research scholars, research guide and new researcher he got that everyone was discussing about the challenges face during research area (Baptista, A. V., 2011). Then researcher thought that there is a scope of research to know in scientific way, the major challenges faced by research scholars. Hence the most focused primary research problem for this is, what are the challenges faced by research scholars during research? To make the base for this study, researcher has done his literature review to collect secondary data about this research question. As mentioned earlier in the chapter 2, Literature Review, the researcher tried to search various databases like google scholar, Scopus, Inderscience, IEEE, Scirus, Worldscientific, etc., and found very few white papers and research articles were seen which really focused on the study of the challenges and issues of research scholars during research (Prayuth, C., & et. all, 2014). Hence from this situation, the researcher was realized the need to focus this problem and got motivated to do this research study.

During the progress of the literature review it was need of the research to know the current status of global research of India. For the same, researcher has gone through various national level reports by Government of India, World ranking of Universities and global research reports, as it has been discussed in Literature Review; India needs improvements in various areas and research. The improvement areas, to specifically mention here includes, research procedures, standards, quality and quantity of research, applications and innovations in research, international level publications, citations and impact of research, research collaboration at international level with different Universities. These and other various factors are needed to be more focused for
improving research. In the point of view of academic research and research scholars; current age of Information technology, Communication and Knowledge Economy; researcher was curious to study the actual problems of academic researchers. This problem was again highlighted by the facts given by Thomson Reuter’s report of global research (Jonathan, A. J., & et. all. 2009). The report shows the status of Indian contribution in global research is very less, that is just 3.5%, as compared to other developing and developed countries. Hence the researcher underlined the research problem as a need of today’s academic research. It was decided to study the problems, challenges and issues of Academic Research Scholars. The literature study was focused on different challenges, issues and problems of the research scholars (Paghaleh, M. J., 2011); starting with the selection of suitable research topic for the new research and ending with the final completion and submission of thesis. Navigating the new research topic is most important challenge for the new research scholars. As compared to last few decades, the number of research scholars and their awareness about research has increased. A lot of research scholars are doing their research in India under various research institutes and universities. But still they are lacking behind in high impact research at world level. They are facing various challenges during their research like unavailability of proper infrastructures, expertise, tools, resources, knowledge gap, etc. Again apart from these, various challenges related to research environment, information sources, funds, time constraints, stress of workload, awareness about social needs, rules and regulations and many more issues might be under the scope of this research (Paghaleh, M. J., 2011). Hence to improve the India’s global research status, it was important to know about the research related problems and issues.

A next, important dimension of this research study is to know Internet usage in research. The use of Internet is helping researchers in their research or not. Information resources available on Internet are used by research scholars or not. They feel these resources are sufficient or need more information. The verification of research topic to avoid duplication of research is possible in current situation or not. The number of libraries visited by research scholars and the available research resources. These are the possible research problems of this study.
The researcher wants to know about the challenges faced by research scholars and usage of information resources available. The online resources are sufficient for research or not. But he do not want to stop here, he tried to do more study on the Knowledge Management area as a successful adopted methodology in business organizations, to improve business and innovative research. So he wants to propose a solution to tackle this research problem. Hence at last the study was focused specifically on knowing the need of Knowledge Management in university research for research community, to propose the KM Model and KM System for the university or institute level research community.

3.2.2 The need of the Knowledge Management

Research has most important outcome that is the new knowledge. As per the given references in Knowledge Management Literature Review, researcher wants to explore the use of Knowledge Management in Business Organisations, research and development organizations, universities, etc. It can be deduced that the Knowledge Management is the most important field, though there are different views on definition of KM; but it's proved that the KM is playing very important and vital role in the growth and development of business organizations. The organization’s most important asset is knowledge set of the employees working in the organization. It is having the power of innovation to improve the results and to make positive growth of the organization. The Knowledge should be managed in a proper way to achieve this goal of an organization, that means there is a need of Knowledge Management System, using ICT or without it, to manage and deliver the highly desired output. So far, in last few decades, the KM is mostly used for the development and growth of the business organizations. Now days, it has taken an important place in various organizations; especially in Research & Development organizations. In literature review, it has been seen that, all top most research organizations like NASA, ISRO, DRDO, etc. have implemented KM Systems for the total knowledge management of research organization. In the new global era of UNO: Socio-Economic Development and Knowledge Based Economy, all countries are
trying to use knowledge management in various fields as an important tool for their overall development.

In short the research problem can be summarized as - the researcher is focusing his study on challenges, problems and issues faced by academic researchers, especially in management science research practices, and to study the need of Knowledge Management System in researchers’ point of view. Further the researcher wants to focus the research study on the actual challenges, problems, issues and actual needs suggested by researchers, based on Knowledge Management point of view. Then if suitable, researcher wants to study and design the KM Model for Research Knowledge Management System for academic research community at University or Institute level as a basic solution for the Research Scholars’ challenges (Bhanoji Rao, Nov. 2011).
3.3 Objectives and Hypothesis of the Research

The overall aim of this research is to study the challenges, issues and problems faced by researchers in management science research practices, to study the need of the Knowledge Management System in researchers’ point of view. If Knowledge Management System is a requirement of the Academic Research Community then it is required to search and develop an integrated KM model in order to help Research Community and make better use of knowledge in their research stream and to improve quality, quantity and research performance. It is anticipated that this will aid the implementation and application of Knowledge Management System that may have an economic impact by eliminating wasteful time and resources of reinventing solutions that have already been invented elsewhere in the other Universities or Institutions. It will also have a social impact, as KM will act as a catalyst for improving research culture and promoting knowledge sharing and teamwork. Specific objectives have been formulated and methodologies have been followed in order to achieve the stated aim. The specific objectives of the research are as follows:

3.3.1 Research Objectives:

3.3.1.1 Main Objectives:

1. To study the challenges in Management Science Research Practices.

2. To study the role of online information resources and publications in Management Science Research Practices.

3. To study the need of the Knowledge Management in Management Science Research practices.

3.3.1.2 Subordinate Objectives:

I) To review current practices of KM in the Institutes and University. A critical review of important KM literature is carried out to highlight technological,
cultural and managerial aspects of KM implementation and application in the context of academic research.

II) To analyse and evaluate existing models of KM in the University or Institute, and discuss problems those negatively affect the successful implementation and application of KM in the academic research context.

III) To develop a new conceptual KM model that enables ideas and suggestions of research scholars.

IV) The proposed KM model formulates a strategic framework for KM System.

V) To recommend the future development, implementation and application of KM System at University and Institute levels.

3.3.2 Research Hypothesis:

H 1 - Research scholars are facing challenges during their research Practices

H 1 - a) Research Scholars are facing key challenges like time constraints and stress of workload.

H 1 - b) Research scholars are suffering from lack of information resources and facilities.

H 1 - c) Review of Literature, Primary data collection, Secondary data collection and Research Methodology Selection are the major hurdles faced by the research scholars during their research process.
H 2 - Research Scholars are not aware about using online research tools in their research process.

H2 – a) There is a significant relationship between use of online research applications and number of online research publications.

H2 – b) Research scholars are unable to get current research status of their research topic on Internet.

H 3 - There is a significant need of Knowledge Management System for Research scholars.

H 3 - a) There is a need of online system to share idea and knowledge among research scholars.

H 3 - b) There is a need of online system for direct interaction with expertise for guidance during research process.

H 3 - c) There is a need of online system for research scholars to search and access various types of research publications.

H 3 - d) There is a need of online System with Online Group Formation facility from various universities / Institutes.

H 3 - e) There is a need of online system with national level Unique Research Scholar Identification Number facility for research scholars.

H 3 - f) There is a need of online training on Research Methodology and Research Tools (IBM SPSS, R, Mat Lab, etc.) for Research scholars.

H 3 - g) There is need of online system to help research scholars in their research process and to improve the quality and quantity of the research.
3.4 Research Methodology

3.4.1 Role of Research Methodology in Research

A methodology is used to provide a research framework that provides guidance regarding the all components of the investigation. This gives the researcher a framework and guideline for organising logistics and procedures to be followed. This makes the reader understand the research perspective and logic of the researcher. It provides a control for how to collect data and make a scientific inquiry (Creswell, 2003; Kumar, 2005). The research methodology is a guide to context, explaining relationships, evaluating the information and its validity, and helping develop theories, strategies, or actions required to address the problem (Ritchie & Lewis, 2003; De Vos, Schurink & Strydom, 1998). The research methodology will help to show the link to the theoretical framework that informs this research.

3.4.2 Conventional Research Methods

There are two conventional approaches of research methods, namely, qualitative and quantitative. These differ significantly, upon the way to generate knowledge through the type of inquiry undertaken. A qualitative approach is one in which the inquirer often makes knowledge claims based primarily on constructivist perspectives or participatory ones, or both. The key to understanding qualitative research lies in the saying that deduction is socially constructed by individuals as they interpret the world in which they live (Merriam, 2002; Schurink, 1998). In the quantitative approach, the researcher uses post positivist claims for developing knowledge, using experiments and surveys to produce data that is eventually used to test a hypothesis (Creswell, 2003; Schurink, 1998). The combination of both approaches - qualitative and quantitative; is known as a mixed method. The comparative characteristics chart of these approaches is explained in the table 3.1 below.
Overview of Quantitative and Qualitative Research Characteristics

<table>
<thead>
<tr>
<th></th>
<th>Quantitative Research</th>
<th>Qualitative Research</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of data collect</td>
<td>Numerical data</td>
<td>Non-numerical narrative and visual data</td>
</tr>
<tr>
<td>Period of data collection</td>
<td>Shorter period</td>
<td>Longer period</td>
</tr>
<tr>
<td>Research Problem</td>
<td>Hypothesis and research procedures stated before</td>
<td>Research problems and methods evolve as understanding of topic deepens</td>
</tr>
<tr>
<td>Manipulation of context</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Research procedures</td>
<td>Relies on statistical procedures</td>
<td>Relies on categorizing and organizing data into patterns to produce a descriptive, narrative synthesis</td>
</tr>
<tr>
<td>Participant interaction</td>
<td>Little interaction</td>
<td>Extensive interaction</td>
</tr>
<tr>
<td>Underlying belief</td>
<td>We live in a stable and predictable world that we can measure, understand and generalize about</td>
<td>Meaning is situated in a particular perspective or context that is different for people and groups; therefore, the world has many meanings</td>
</tr>
</tbody>
</table>

Table 3.1 An Overview of Quantitative and Qualitative Research.

3.4.3 Justification of Paradigm and Research Methodologies

This study is an empirical and descriptive research study. This is a combination of qualitative and quantitative research has been adopted to investigate the challenges and issues during research in management science research practices and also to study the need of KM System for Research Community. The research starts with the understanding and analysis of various recent literatures on academic research, current status of academic research in the India, use of knowledge management in research organizations and universities, to provide a foundation for this study. The review of literature helps to support the research with other previous research publications to provide more understanding and strength to the research topic and provide other examples to make the research more credible. Existing research in the domain will be reviewed and analysed. The stages of the research and problems related to it and the current KM models will be studied in order to search for appropriate solutions of problems. This provides a theoretical basis for the research.


3.5 Research Design

The development of an appropriate research design is the most important factor of the research. A research design, as a main function of the research objectives, is defined as “…a set of advance decisions related to research that makes up the master plan specifying the methods and procedures for collecting and analyzing the needed information” (Burns & Bush 2002, p.120). An appropriate research design of the research is essential because it determines the type of data collected, selection of data collection technique, the sampling methodology, the time schedule of research and the budget. At primary level, it helps researcher to align the planned methodology to the research problems (Churchill & Iacobucci 2004).

There are different research design frameworks available and it can be categorized into three traditional classes: exploratory, descriptive and causal (Aaker et al. 2000; Burns & Bush 2002; Churchill & Iacobucci 2004). This study applies these research designs as to achieve the research objectives. In turn, information obtained from a descriptive study may help the researcher to design a causal experiment.

The main aim of this study is to investigate the challenges faced by academic research scholars; and their need of KM during research. To achieve these main objectives, the research design of this study has been conducted in two phases. Phase one dealt with an exploratory study and the latter involved both descriptive and causal research. These phases are discussed next.

3.5.1 Exploratory Research

An Exploratory research was conducted to develop initial insights and to provide direction for any further research needed (Parasuraman 1991). An exploratory study is essential when a researcher needs to define the problem more precisely and identify any specific objectives or data requirements to be addressed through additional research. Indeed, the academic research and its related research publications are not mostly focused
by research scholars. Very few research publications are available on study of academic research. Although the number of researchers working on this subject is not increasing, there is little empirical evidence to help research scholars to fully understand what actual problems, issues and challenges are faced by research scholars. To explore these problems and identify issues, to investigate variable relationships and to formulate specific research objectives, exploratory research is required.

The outcome of the exploratory study helped in developing the scales for the survey instrument in the subsequent descriptive research (phase two). For example, information on the types of research activities, challenges related to these activities, research scholars and their research publications. The survey should not be specifically focused on the problems of the research scholars but it should also consider the suggestions, opinions and proposed solutions for their research. In brief, based upon the literature review conducted, the consequent survey allowed refining the subject matters.

### 3.5.2 Descriptive Research

Having obtained some primary knowledge of the subject matter by an exploratory study, descriptive research was conducted next. Contrary to an exploratory research, a descriptive study is more rigid, preplanned and structured, and is typically based on a large sample (Churchill & Iacobucci, 2004). The purpose of this descriptive research is to describe specific characteristics of the academic research using existing research publications; it is used to determine the frequency of occurrence of phenomena like Internet usage, number of national and international level publications, number of library visited and so on; on a sample from the population. In addition, it helps to provide data that allows identifying relationships or associations between different variables (Aaker et al. 2000). As many researchers have noted, descriptive research designs are mostly quantitative in nature (Burns & Bush 2002; Churchill & Iacobucci 2004; Parasuraman 1991). There are basic three types of descriptive research: observational methods, case-study and survey methods.
**Observational Method** - With the observational method (sometimes referred to as field observation) animal and human behavior is closely observed. There are two main categories of the observational method — naturalistic observation and laboratory observation.

**Case Study Method** - Case study research involves an in-depth study of an individual or group of individuals. Case studies often lead to testable hypotheses and allow us to study rare phenomena. Case studies should not be used to determine cause and effect, and they have limited use for making accurate predictions.

**Survey Method** - In survey method research, participants answer questions administered through interviews or questionnaires. After participants answer the questions, researchers describe the responses given. In order for the survey to be both reliable and valid it is important that the questions are constructed properly.

In a sample survey, selected individuals are asked to respond to a set of standardized and structured questions about what they think, feel and do. For the purpose of this study, a cross sectional study was the appropriate technique as opposed to a longitudinal study due to time constraints, and furthermore, this study does not attempt to examine trends (Bryman, A., & Bell, E., 2011).

Subsequent to the descriptive study, causal research was conducted. Descriptive studies may show that two variables are related but are insufficient for examining cause and effect relationships. Causal research is most appropriate when the functional relationship between the causal factors and the effect predicted on the marketing performance variable is under investigation (Leedy, P. D., & Ormrod, J. E., 2005). This study concerns the causal relationships between challenges, use of Internet and available facilities and resources. For example, use of Internet Research Tools like Research Gate, Google Scholar, etc. cause effect on challenges faced by research scholars or not. Hence, a causal experiment is appropriate to generate the type of evidence necessary for making causal inferences about relationships between research variables (Parasuraman 1991).
According to the research paradigm and research design, in this Research follows Survey Method for data collection, through Questionnaires and Interviews as tools. Researcher has planned to collect data from different Management Research Centers and University Departments within scope of Maharashtra state in India. The Maharashtra has total 43 numbers of Research Institutes and universities; from these there is one Central University, total 20 State Universities and 22 Deemed to be Universities. These are providing research facilities under University Grant Commission (UGC), Delhi - a controlling authority of Central Government of India. Among these 43 universities, 18 universities (7 deemed and 11 state universities) are providing Doctoral Degree – Ph.D. in Commerce and Management Science streams; these universities are under the scope of this research. This data has been collected from the authorised websites of the respective universities and Government of India – MHRD, AISHE, NIC, www.data.gov.in, etc. As per the study of literature review, research problem statement, analysis of reviews and opinion of research supervisor, researcher has categorised this research in Qualitative and Quantitative research as we have seen in previous paragraph. The web based and direct Survey method was selected as a research tool for collecting the empirical evidences and data collections. The details of survey have been elaborated in next topic.
3.6 Sampling Method

3.6.1 Types of Sampling Methods

There are different Sampling Methods as shown in the Figure 3.1 given below. In sampling methods, Probability and Non-Probability Sampling are the basic two categories. The Probability Sampling is again classified into six classes that is:

1. Simple Random Sampling
2. Systematic Sampling
3. Stratified Sampling,
4. Clustered Sampling,
5. Area Sampling,
6. Multi-Phase and Multistage sampling.

The non-probability sampling is classified into five classes as shown in Figure 3.1.

1. Accidental Sampling
2. Convenient Sampling
3. Judgement Sampling
4. Purposive Sampling
5. Quota Sampling

From these categories, researcher found multistage sampling as an appropriate sampling method for the research.
3.6.2 Sampling Method Selection & Sample Size Calculation.

In Multistage sampling, the process is carried out in multiple stages using small and further smaller sampling units at each stage. The research scope included overall Maharashtra with all five regions and 18 universities. Hence it was very difficult to collect data from all the 18 universities. Hence the researcher found this multi stage sampling as the most suitable sampling method. The researcher has divided the population in smaller sampling units, that is, five regions and two types of universities - State University and Deemed University. In a multi-stage sampling design, a sample of primary units is selected and then a sample of secondary units is selected within each primary unit. In similar way, in this research, the sample is divided in to five regions at first stage, then in second stage the universities under these regions are further divided in to two types (State / Deemed University).
In the first stage, researcher has categorised all 18 universities under five different geographical regions like Khandesh, Konkan, Marathawada, West Maharashtra and Vidarbha. From the Table 3.2 given below, it can be seen that, Khandesh region has only one State University, Konkan has two state and two deemed universities, Marathawada has two state universities, Vidarbha has three state universities and West Maharashtra has total seven universities where three are state universities and the other four are deemed universities.

The simplest version of multi-stage sampling is to use simple random sampling at each stage. Hence in the next stage, researcher has selected clusters, using simple random sampling method. From every region and two types of universities we must select clusters (University) randomly. But observations shows that few regions are not having Deemed Universities, hence from 11 state and 7 deemed universities, it was decided to select 6 state and 2 deemed universities as per the calculated proportion of the population. Now using simple random method, from each region the clusters are selected for the sampling as shown in the Table 3.3. Hence from 18 universities total eight universities were selected for data collection from the five regions of the Maharashtra State (45% of total number of Universities). For each randomly selected cluster, sample size is calculated using the ratio of total population and cluster’s population versus total sample size, that is, 370. The detailed table 3.3, for the cluster wise population estimation is given below. Here it is considered approximately 8 students for every research guide.

As per given table 3.2 the maximum total number of research scholars are estimated from Maharashtra. Hence the secondary data has been collected from authorised government and university websites about number of universities in the Maharashtra State and the number of universities providing Doctoral Programme (Ph.D.) under Commerce and Management science stream. The list of research guides is also collected from the same. Hence as shown in table 3.2 the maximum total researchers, doing Ph.D. in Commerce and Management stream has been estimated as 7619; considering maximum 8 seats under every Ph.D. Research Guide. The total number of research guides, 954, they are also considered as respondent for this research. The
researcher has considered Professors, Associate Professors and Assistant Professors working in the academic research from various universities as a part of the population. Hence total approximate count of the population was considered up to 10000.

<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Region</th>
<th>Type of University</th>
<th>Name of The University</th>
<th>No. of Guides</th>
<th>Total Max* Researchers</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Khandesh</td>
<td>State University</td>
<td>N. M. University, Jalgaon</td>
<td>71</td>
<td>568</td>
</tr>
<tr>
<td>2</td>
<td>Konkan</td>
<td>State University</td>
<td>University of Mumbai, Mumbai.</td>
<td>79</td>
<td>632</td>
</tr>
<tr>
<td>3</td>
<td>Konkan</td>
<td>Deemed University</td>
<td>N.M.I.M.S., Mumbai.</td>
<td>19</td>
<td>145</td>
</tr>
<tr>
<td>4</td>
<td>Konkan</td>
<td>State University</td>
<td>S.N.D.T., Mumbai.</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>5</td>
<td>Konkan</td>
<td>Deemed University</td>
<td>Amity University, Mumbai.</td>
<td>NA</td>
<td>NA</td>
</tr>
<tr>
<td>6</td>
<td>Marathwada</td>
<td>State University</td>
<td>S.R.T.M.U., Nanded.</td>
<td>13</td>
<td>104</td>
</tr>
<tr>
<td>7</td>
<td>Marathwada</td>
<td>State University</td>
<td>Dr. B.A.M.U., Aurangabad.</td>
<td>65</td>
<td>442</td>
</tr>
<tr>
<td>8</td>
<td>Vidarbha</td>
<td>State University</td>
<td>Nagpur University, Nagpur.</td>
<td>283</td>
<td>2264</td>
</tr>
<tr>
<td>9</td>
<td>Vidarbha</td>
<td>State University</td>
<td>Gondwana University, Gadchiroli.</td>
<td>66</td>
<td>528</td>
</tr>
<tr>
<td>10</td>
<td>Vidarbha</td>
<td>State University</td>
<td>Amravati University, Amravati.</td>
<td>81</td>
<td>648</td>
</tr>
<tr>
<td>11</td>
<td>Vidarbha</td>
<td>State University</td>
<td>Symbiosis International University, Pune.</td>
<td>64</td>
<td>512</td>
</tr>
<tr>
<td>12</td>
<td>West Maha</td>
<td>Deemed University</td>
<td>Tilak Maharashtra Vidyapeeth, Pune.</td>
<td>75</td>
<td>600</td>
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<tr>
<td>13</td>
<td>West Maha</td>
<td>Deemed University</td>
<td>Dr. D.Y. Patil Vidyapeeth, Pune.</td>
<td>NA</td>
<td>57</td>
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<td>14</td>
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<td>State University</td>
<td>Shivaji University, Kolhapur.</td>
<td>24</td>
<td>192</td>
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<tr>
<td>15</td>
<td>West Maha</td>
<td>Deemed University</td>
<td>Bharati Vidyapeeth, Pune.</td>
<td>NA</td>
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<tr>
<td>16</td>
<td>West Maha</td>
<td>State University</td>
<td>Solapur University, Solapur.</td>
<td>7</td>
<td>56</td>
</tr>
<tr>
<td>17</td>
<td>West Maha</td>
<td>State University</td>
<td>Savitribai Phule Pune University, Pune.</td>
<td>107</td>
<td>856</td>
</tr>
<tr>
<td>18</td>
<td>West Maha</td>
<td>State University</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td></td>
<td></td>
<td>954</td>
<td>7619</td>
</tr>
</tbody>
</table>

Table 3.2 Research Population Estimation Table (University Wise)

(NA – Not Available (Data is not available on respective universities’ authorized web site) * - Per research guide maximum 8 research students can be registered.)
Sample Size Calculations:

As per the authorised website of IEEE standard calculations (Rea, L. M., & Parker, R. A. (2012), the sample size is calculated as follows:

1. The approximately universe Population for this Research is considered as 10000.
2. Margin of Error = $\pm 5\%$
3. Beta Level Error = 50%
4. Confidence Level = 95%

5. Sample Size = 370

The Sample size 370 means, the primary data should be collected from 370 respondents from selected eight clusters (universities) from all regions of the Maharashtra. In the next stage, the sample has been divided in to the ratio of universe population to the cluster population as shown in table 3.3 below:
<table>
<thead>
<tr>
<th>Sr. No.</th>
<th>Region</th>
<th>Type of University</th>
<th>Name of The University</th>
<th>No. of Guides</th>
<th>Total Max* Research Scholars</th>
<th>Sample size per cluster</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Khandesh</td>
<td>State University</td>
<td>North Maharashtra University, Jalgaon</td>
<td>71</td>
<td>568</td>
<td>39</td>
</tr>
<tr>
<td>2</td>
<td>Konkan</td>
<td>State University</td>
<td>University of Mumbai, Mumbai</td>
<td>79</td>
<td>632</td>
<td>44</td>
</tr>
<tr>
<td>3</td>
<td>Marathwada</td>
<td>State University</td>
<td>Swami Ramanand Tirth Marathwada University, Nanded</td>
<td>13</td>
<td>104</td>
<td>8</td>
</tr>
<tr>
<td>4</td>
<td>Marathwada</td>
<td>State University</td>
<td>Dr. Babasaheb Ambedkar Marathwada University, Aurangabad</td>
<td>65</td>
<td>442</td>
<td>30</td>
</tr>
<tr>
<td>5</td>
<td>Vidarbha</td>
<td>State University</td>
<td>Sant Tukadoji Maharaj Nagpur University, Nagpur</td>
<td>283</td>
<td>2264</td>
<td>155</td>
</tr>
<tr>
<td>6</td>
<td>West Maha</td>
<td>Deemed University</td>
<td>Symbiosis International University, Pune</td>
<td>64</td>
<td>512</td>
<td>35</td>
</tr>
<tr>
<td>7</td>
<td>West Maha</td>
<td>State University</td>
<td>Savitribai Phule Pune University, Pune</td>
<td>107</td>
<td>856</td>
<td>59</td>
</tr>
<tr>
<td>8</td>
<td>West Maha</td>
<td>Deemed</td>
<td>Tilak Maharashtra Vidyapeeth, Pune</td>
<td>NA</td>
<td>57</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Total =&gt;</td>
<td></td>
<td></td>
<td></td>
<td>375</td>
<td></td>
</tr>
</tbody>
</table>

**Table 3.3 Cluster wise Sample Size**

As shown in table 3.3, the total sample size - 370 is divided in to eight clusters as per the ratio of the population and cluster population. The table 3.3 shows that, data was collected from these eight universities, from North Maharashtra University, Jalgaon – 39 respondents, University of Mumbai, Mumbai – 44 respondents, Swami Ramanand Tirth Marathwada University, Nanded – 8 respondents, Dr. Babasaheb Ambedkar Marathwada University, Aurangabad – 30 respondents, The Rashtrasant Tukadoji Maharaj Nagpur University Nagpur – 155 respondents, Symbiosis International University, Pune – 35, Savitribai Phule Pune University, Pune – 59 and Tilak Maharashtra Vidyapeeth, Pune – 5 respondents. In this way total data collection of 375 respondents was targeted in this research.
3.7 Survey Design

3.7.1 Interviews and Questionnaire

The interview is probably the most common research method in qualitative research, because it provides an easy and flexible method that can be used to capture important ideas and detailed opinions to enrich the research (Bryman & Bell, 2011). The Interviews with research scholars, head of the Department of the Universities and Institutes in the academic research community. Interviewees were asked to provide their general opinion and important aspects that need to be considered, to evaluate and to discuss the components of the proposed KM System (Bradburn, N. M., Sudman, S., Blair, E., Locander, W., & Miles, C., 1980).

The interviews follow semi-structured approach, in Appendix 1, were used in the interviews, but the interviewees were given flexibility to refer to and discuss their opinions and interests related to research activities and their problems. This also means that questions that are not included in the question list can be asked regarding details and description on things mentioned by the interviewees (Bryman & Bell, 2011). This method may help to encourage the interviewees to provide more important, valuable and detailed responses to the interview questions (Kendall, 2008).

3.7.2 Questionnaire Survey

The questionnaire survey has been conducted to capture the views of the management research scholars and investigate the challenges faced by research scholars. The questionnaire seeks the awareness of research scholars about Online research publications and information resources, problems, challenges and issues faced by research scholars, possible Online solutions in form of KM System and its related opinions and views. The questionnaire survey helps the research to study the data, to get idea about the actual status and needs of the research scholars, to get actual need of the KM System for research scholars and to reach to a final view about the facilities needed
in the KM model that can help to successfully manage knowledge in the research University and Institute (Couper, M. P., Traugott, M. W., & Lamias, M. J., 2001).

The questionnaire survey is one of the tools used by researchers to confirm, deny or enhance what was already believed or known. Survey methodology is important and popular because of its ability to define and detail various characteristics of key issues that can be important and interesting for certain readers and organisations (Chauvel & Despres, 2002). A questionnaire survey also has the ability to provide results that can be quantified and so can be easily treated and analysed statistically. It provides the ability to extend the results obtained from a sample of respondents to a larger population when it is not practical and efficient to work with the entire population. It also provides fast and straightforward results compared with other research methods to allow researchers and practitioners to act in a relatively quick and intellectually respectable manner (Chauvel & Despres, 2002).

Internet surveys are clearly going to continue to grow in popularity as the problems of coverage bias and unfamiliarity with the Internet subside. For the foreseeable future there will be people who will lack Internet access either by choice or circumstance though this will be less and less of an issue. Additionally the tools for conducting Web-based surveys will continue to grow in sophistication and ease of use as will our knowledge on how best to employ this survey methodology. At present researchers should use this technique with caution in carefully chosen populations and with an eye to learning as much as possible about how to do it better. (Solomon, D. J., 2001)

Use of the World Wide Web to conduct surveys provides enormous opportunities as well as challenges. The cost advantages of collecting large amounts of data at very little cost mean that its use will escalate rapidly. At the same time, maintaining quality, whereby the results of surveys can be generalized to a large population is far from automatic (Solomon, D. J., 2001). Respondent-friendly questionnaire design, found important to improving response to self-administered mail questionnaires, is also important for the development of web questionnaires. However, in a web context the term takes on a broader meaning. A respondent-friendly web questionnaire is one that
interfaces effectively with the wide variety of computers and browsers possessed by respondents. It also makes other aspects of the response task easy and interesting for the respondent to complete. Respondent-friendly designed is aimed explicitly at reducing three of the four types of error that typically prevent accurate surveys from being done, i.e., nonresponse, measurement, and coverage of the survey population. (Dillman, D. A., Et.Al., 1998)

3.7.3 Designing the Research Questionnaire

After finalizing the research problem, research questions, objectives, hypothesis and finalization of the Research Method and instrument. Then, this step initiates, which involves selecting appropriate measurement scales, question wording and content, response format and finally the sequence of questions. The questionnaire was written in English because it’s an International language and it is easily understood by all of the Management Science Research scholars. The Questionnaire was designed in two formats that means Hard Copy format to collect data by directly visiting the respondents; and another was Online Copy in Google Forms format to collect data by e-mailing the questionnaire to respondents. (Bradburn, N. M., Sudman, S., Blair, E., Locander, W., & Miles, C., 1980) Appendix II displays the both questionnaires

3.7.4 Measurement Scale

As this work aims to study the challenges faced by the research scholars during their research, Likert scales were deemed appropriate as it is frequently used in qualitative and marketing research to measure attitudes (Parasuraman 1991). The use of a Likert scale would ensure that the overall score, which was a composite of several observed scores, was a reliable reflection of the underlying true scores (Hayes 1998). Three types of measurement scales were used in this research: nominal, ordinal and interval. Nominal scales were used for identification purposes because they have no numeric value. For example, respondents were asked to select their research University from which they are doing their research. On the other hand, ordinal scales were used to rank their Ph.D. status, number of publications and number of libraries visited for research. These scales
Figure 3.3 Research-Questionnaire Design Process
were then assumed to be interval scales, as is commonly practiced in social science research (Perry 1998). Further, interval scales were used to measure the subjective characteristics of respondents. For example, in this study, respondents were asked about their attitudes and behaviors’ in relation to satisfaction, retention and loyalty. This scale was used due to its strength in arranging the objects in a specified order as well as being able to measure the distance between the differences in response ratings (Burns & Bush 2002; Churchill & Iacobucci 2004;).

### 3.7.5 Question content and wording

In relation to question content and wording, the questions were designed to be short, simple, comprehensible, and up to the mark, avoiding ambiguous, vague, estimation, generalization, leading, double barreled and presumptuous questions.

### 3.7.6 Response format

The response formats used in surveys vary depending on the type of question being asked. Responses can be as simple as a choice between “Yes” or “No” or as complex as choosing an answer among seven response options. The response options for each question in the survey may include a dichotomous, a three-point, a five-point, a seven-point or a semantic differential scale (Bradburn, N. M., & et. al., 1980). Each of these response scales has its own advantages and disadvantages, but the rule of thumb is that the best response scale to use is the one which can be easily understood by respondents and interpreted by the researcher.

In order to obtain information pertaining to respondents’ demographics and a dichotomous close-ended question format was used. In addition, as to obtain respondents perception towards online their research challenges and future solutions for their research, for this research, rating scale that is labeled Seven Point Likert scales were appropriate to measure responses. Again to know about the number of publications, library visited, etc. continuous scale (0 to 10+) was appropriate to know approximate numbers.
3.8 Data analysis strategy

Data analysis involved steps such as coding the responses, cleaning, screening the data and selecting the appropriate data analysis strategy (Churchill & Iacobucci 2004; Sekaran 2000) as detailed below.

3.8.1 Coding of responses

This task involved identifying, classifying and assigning a numeric or character symbol to data, which may be done in two ways: pre-coded and post-coded (Wong, 1999). In this study, most of the responses were pre-coded except few questions, which required post-coding. Taken from the list of responses, a number corresponding to a particular selection was given. This process was applied to every earlier question that needed this treatment. Upon completion, the data were then entered to a statistical analysis software package, IBM SPSS, for the next steps.

3.8.2 Selecting a data analysis strategy

The final step of the research was the selection of the appropriate statistical analysis technique. To do this, research elements, namely the research problem, objectives, research hypothesis, characteristics of data and the underlying properties of the statistical techniques are considered. To meet the purposes of this study, descriptive and inferential analyses were applied. Descriptive analysis refers to the transformation of raw data into a form that would provide information to describe a set of factors in a situation that will make them easy to understand and interpret (Sekaran 2000). This analysis gives a meaning to data through frequency distribution, mean, and standard deviation, which are useful to identify differences among groups.

The binomial test is useful for determining if the proportion of people in one of two categories is different from a specified amount. For example, if the respondents are asked to select one of two categories, for example mobile networks used either 3G or 4G, and it required to determine if the proportion of people who selected a 3G is different from 4G. Hence in this research if hypothesis testing needed to compare the proportions then Binomial Test has been used for the analysis.
The chi-squared one-variable test serves a purpose similar to the binomial test, except that it can be used when there are more than two categories to the variable. Thus, it’s required to determine the number of people in each of several categories differ from some predicted values, the chi-squared one-variable test is appropriate. For example, if it is required to test the numbers of respondents interested in various five different areas are equal or not. Then it can correspond to the AREA variable in the sample data set. SPSS assumes the numerical variable only. But in the sample data set, the AREA variable corresponding to the question is a string variable. So it should be recoded to numeric data form before performing the chi-squared test that means AREANUM. Here in this research we have recoded the seven point Likert scale in to two categories that is 1 as disagree (≤ 4) and 2 as agree (> 4).

The Friedman test is also a non-parametric test alternative to the one-way ANOVA with repeated measures (Keselman, H. J., 1998). It is used to test for differences between groups when the dependent variable being measured is ordinal. It can also be used for continuous data that has violated the assumptions necessary to run the one-way ANOVA with repeated measures (E.g. data that has marked deviations from normality).

Inferential analysis refers to the cause-effect relationships between variables. Correlation analysis was used to test the existence of relationships between variables being studied. The difference between “univariate” and “multivariate” analyses is that, a “univariate” analysis has only one dependent variable (with any number of independent variables / predictors). A “multivariate” analysis, on the other hand, has many dependent variables (again, with any number of IVs). The goal of our analysis is to look for an effect of one or more IVs on several DVs at the same time. Therefore, here it was planned to use a “multivariate” analysis of variance (MANOVA) using SPSS 21 (Stevens, J. P., 1980).

Hence in this research, as per the sample data set, the objectives, the hypothesis and the data analysis strategy has been defined. Hence the non-parametric tests like Binomial Test, Chi-Squared Test and Friedman Test were selected for the data analysis.
and hypothesis testing. The parametric test MANOVA was also selected for one hypothesis testing (Shana, J., & Venkatachal, T., 2011).

3.9 Research Stages

The methodologies and stages followed during the research life-cycle are represented in the following Figures. The Figure 3.4 shows the Research Model followed for this research. Through the continuous reviewing of literature the background for the research has been made. Hence the definition of problem statement has been prepared. According to the problem statement appropriate Research Title was framed for this research. As per the research problem and secondary data collection, the research methodology was selected and then the research design was completed. Survey, as research method, was finalized for data collection. Then design and administration of survey has been planned using web-based and manual data collection. Then questionnaire survey was conducted with research scholars, and the achieved results were presented and published in scientific journals and conferences. After the data collection, as per the planned data analysis strategy, the hypothesis testing has been completed. Finally, the challenges and problems faced by research scholars have been investigated and their need of KM has been explored in the data analysis chapter. The required KM Models, KM Systems, and KM tools for the research community has been planned to design through the literature study. The data analysis chapter aided the researcher to identify key challenges faced by research scholars, the required features expected by research scholars and to design and propose the future KM model for the academic research community. From the outcomes of this research and the available literature related to research and development in KM, the researcher planned to identify the important characteristics of the proposed conceptual KM Model based on the HOTS concept. The details of this model are explained in chapter 5. Then following the KM Model the KM System architecture has been proposed for the research community in the same chapter.
3.4 Research Model
<table>
<thead>
<tr>
<th>Year</th>
<th>Year</th>
<th>Year</th>
<th>Year</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>2013</td>
<td>2014</td>
<td>2015</td>
</tr>
</tbody>
</table>

**Literature Review**
- Challenges, Issues and problems in Academic Research
- Current status of Academic Research and Higher Education in India
- Use of Knowledge Management in Academic Institutions and Universities
- Implementation of KMS and its KM Models used in Research & Development Orgs.

**Development of Work**
- Identification of Research Topic
  - Thesis Title, Objectives, Aims, Goals, Hypothesis.
  - Data Analysis, Interpretation, Conclusion, Study of KM Model for Design & Suggestions

**Empirical Work**
- Research Design – Methodology, Sampling, Calculation of Universe, population, Sample.
  - Developing and Conducting a Survey using Questionnaire to investigate Academic Research, Challenges; Current Status and Suggestion of Solutions.
  - Selection of Statistical Methods for Data Analysis & Interpretation for generalization of research.

**Publications**
- Paper 1
- Paper 2
- Research Hand Book Chapter 1
- Paper 3

*Figure 3.5 Year Wise Research Plan*
The year wise plan for this research has been shown in Figure 3.5, given figure shows the how research work has been progressed from starting point in year 2012 to the end of the research in year 2015. This plan is divided in four parts that is Literature Review, Development of Work, Empirical Work and Publications. The Literature Review starts for searching research problem or interest area study to choose the research problem and it continuously required up to writing the thesis. In literature review it can be seen that researcher was started with searching of white papers, thesis and literature related to academic research, challenges in academic research, current status of India in global research, Knowledge Management and it’s use in universities and Higher Education and Research and Development Firms. Researcher visited various libraries and searched various online information sources and data bases for this literature review.

The second part of plan is development of research work. During the literature review on interested area of research, researcher found few research problems which were significant to current situation of academic research. Then he was selected research topic from the same. Depending upon the study of research topic and importance of the study and available literature, researcher formatted research title, objectives and hypotheses. As per the research requirements and valid references from literature review the selection of research methodology, research design, survey design, pilot survey and final survey has been designed and completed as per the planning. The development of research has been started in early of year 2012 to middle of the year 2015.

Third important part of this research plan is empirical work. This stage of research work has been started at end of year 2012 and progressed up to year 2015. The research design, sample design, administration of survey, data collection, forming data analysis strategy and interpretation were the major activities progressed during this research under this work development phase. The last part of this research plan shows the white papers publications and presentations of this research in journals and conferences. The list of the published and accepted papers and research chapters at international journals and conferences is provided below the research plan.
3.10 Ethical Considerations

It is important to consider the proper conduct of the research. The researcher accounted the responsibilities to protect the sponsor’s interests and the respondents’ and the research users’ privacy. This research is sponsored by Dr. Babasaheb Ambedkar University, Aurangabad. With regards to the survey respondents, no one was coerced for responding this survey. The respondents were asked to fill up the questionnaire on their own freewill. They were informed of their rights not to participate or to end their participation if they so wished (Kumar, S., & Phrommathed, P., 2005). The respondents were briefed about the purpose of the study and how they were chosen as respondents for this research. As such, respondents were free from dishonesty or stress that might arise from their participation in this research. The respondents were assured protection through inconspicuousness and all information that may reveal their identity were held in strict confidence. The potential users of this survey were management science research scholars from Maharashtra, who may be interested to understand the challenges faced by research scholars and the need of the Knowledge Management (Bell, E., & Bryman, A., 2007). Specifically, the research institutions and universities that have greatly helped this survey by allowing access to their list of users shall be treated with utmost care and respect to their reputation. The identities of these users will not be revealed and data obtained from these users will be kept strictly confidential. Furthermore, the purpose of this research study was enlightened to them and they will be informed about the findings or outcomes of this research if they so request later.
3.11 Research Publications

The researcher has published his three research papers related to this research work, in two international journals. The detail of the publications has been given in Appendix – 3. The two research publications are under the process of publication, from that two research papers have got primary level acceptance by editors and these are under the review process. The book chapter related to this research, entitled – “Need of the Research Community: Open Source Solution for Research Knowledge Management” has been submitted to the reputed research publisher – IGI Global, USA, for the research hand book, entitled – “Handbook of Research on Open Source Solutions for Knowledge Management and Technological Ecosystems”. This research hand book chapter got positive remarks by reviewers’ and editor’s publishable status. This would be published within next two-three months.

The encouraging achievement of this research work, researcher want to mention here is that, the researcher has signed a contract as an editor, with the reputed international publications that is IGI Global, USA, for a research hand book project. The IGI Global team working for international research publications on various disciplines approved the research hand book project focused on a topic, which is very parallel to this research. The research hand book is entitled as – “Handbook of Research on Knowledge Management Principles in Academic Research”. Hence it can be understood that the importance of this research topic is comprehensively accepted.
3.12 Scope and Limitations

The study focuses specifically on the research challenges of management science research practices, which might not reflect the same result for the all disciplines. Every research discipline might have different challenges and issues. The use of Internet and online resources might be differ discipline to discipline and awareness of the research scholars. Hence this study has limited scope of commerce and Management science stream.

The study is especially on the universities within state of Maharashtra. It might be differ as per the different states demographic status and development status. This might not represent other states exactly. From Maharashtra only eight university data as a representative sample data has been collected so might not represent exact picture of research challenges and KM needs.

Developing and proposing a new KM Model and KM System as per the requirement of the research community and research organization, is a complicated task because it can involve fundamental study of KM and its related tools, case studies and so on. It can also require studying the structure of organizations, fundamental changes, such as organisational culture, work practices and technological infrastructure. This requires a considerable amount of time (perhaps years) to be accomplished, and substantial courage from organisational management. Thus, this cannot be achieved within the limited time extent of this research.