

Study of Use of Information Technology for Research in Basic Sciences

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Abstract—The research aims to find the extent of use of Information Technology (IT) amongst researchers for Basic Sciences in Metropolitan cities. Research is a cyclic process which varies in terms of the number, type and complexity of activities depending upon the question(s) posed, methodology used and outcomes expected. In this paper, discussion is limited to two major groups of research activities—identifying the background knowledge base for a research project in basic sciences and understanding the data that result from the undertaking using IT .

To do research with an improved and better IT infrastructure, a survey was carried out in different college in and around Mumbai. This paper intends to understand Indian scenario of research in the fields of Basic Sciences, the problems faced when doing research, to find the extent of use of Information Technology for conducting ethical research and finally to come up with better and more feasible solutions using IT to solve current problems faced by researchers when performing research.

Index Terms— Research, Basic Sciences, Information Technology (IT),research tools.

1. INTRODUCTION

Research is a cyclic process which varies in terms of number, type, complexity of activities depending upon the number of questions posed, methodology used and outcomes expected. This paper intends to show the use of IT in relation to how researchers find and access previous work upon which their thoughts and activities build.

Information Technology (IT) is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data, often in the context of a research and data analysis. IT has done much to remove the constraints of speed, cost and distance. On the whole IT has lead to improvements in research. The amount of data that can be analyzed has expanded manifold as has the complexity of analyses. Now using IT the researchers can collaborate more widely and effectively.

Different basic science disciplines use IT differently. In various disciplines of basic sciences, experiments generate millions of data from observations per second basis. For these disciplines, high end computers and IT tools can be used to store and analyze the data and finally arriving at a consistent result.

To understand and find that how much conversant the current research fraternity is with the use of different IT tools and high end computers and softwares a survey was being taken up by TIMSCDR faculty members.

2. AIMS AND OBJECTIVES

In this research paper an attempt has been made to understand the extent of IT and ITES used in research and development activities among researchers of basic sciences in Mumbai.

Following are the objectives of the survey:

- To understand the Indian scenario of research in the fields of Basic Sciences
- To understand the problems faced when doing research

- To find the extent of use of Information Technology to perform good and ethical research
- To come up with better and more feasible solutions using IT to solve current problems faced by researchers when performing research.
- To find latest software applications currently used for research in basic sciences.

3. PLANNING AND EXECUTION

The literature review does not give sufficient data to understand the use and awareness of IT amongst researchers of basic sciences in Indian context. So a research survey was conducted at various colleges of Mumbai. We included colleges from varied domains like biology, physics, mathematics, statistics etc. Care was taken to make sure that selected respondents were experts in their respective fields and were actively involved in research and development in their respective areas.

To achieve the defined objectives, the survey process was limited to Basic science colleges based in Mumbai metropolitan region. The survey was conducted in 35 different colleges over the span of three months. We had targeted research scholars, i.e. those who are doing any kind of research for their M.Phil, Ph.D or Post doctoral programmes. We were able to survey 120 research scholars in different disciplines such as Physics, Microbiology, chemistry ,electronics and telecommunication, Statistics, Commerce, Biological Sciences, Organic Chemistry, Molecular biology and Plant Biotechnology, Mycology, Applied Microbiology, Geology , Systems , Operations , Marine Science ,Signal Processing fuzzy logic with testing Maths and programming etc.

4. CONDUCT OF RESEARCH

While conducting research, all researchers are involved in activities such as writing proposal, collecting and analyzing data, developing theoretical knowledge etc. IT has important effect on all these activities. Through the survey we want to illustrate various aspects of research such

as data collection, data analysis, information storage and retrieval and we also want to determine to what extent Information technology is useful in various discipline.

5. METHODOLOGY

The research survey was conducted at 35 different colleges of Basic Sciences Mumbai metropolitan region. As the literature review does not support sufficient data to understand the use and awareness of Information Technology amongst researchers in Basic Sciences area, Quantitative approach was implemented to understand the same. Survey method was used to get data. Questionnaire and Face-to-face Interviews were conducted to get appropriate information from the respondents. The relevant sample size was calculated to 120.

Since the research is study of researchers of basic sciences, respondents from different levels and streams were selected. The sample respondents comprised of students and faculty members who are doing any kind of research for their M.Phil, PhD and Post Doctoral etc.

An initial consent was acquired from the Principals and Directors to carry out the well designed survey. A written communication was sent to various departments so as to carry out the survey department wise. Before the start of the survey the respondents were made aware about the study and its relevance to them in their respective domains. A proper date and time was decided to conduct survey so as to get the desired and relevant respondents.

The sample size of respondents was calculated as 120. Stratified Random sampling method was implemented to select the required respondents. The respondents comprised of students and faculty members those who are involved with any kind of research works.

A well designed pretested questionnaire was administered amongst the respondents so as to gather knowledge, about awareness and use of IT, amongst researchers. The Questionnaire had majorly objective responses. The data submitted by the respondents were fed through Google Forms so facilitate analysis work.

6. RESULT & DISCUSSION

The survey with sample size of 120 was conducted at different colleges in Mumbai Metropolitan region to conduct this study of usage of IT used by research workers from the field of Basic Sciences and a total of 107 researchers (88.6%) explained that they are using IT for their research work for searching information, email surfing etc. while only 13 researchers admitted of not using IT for their respective research work. It was also found that most of the researchers using IT for research work (88.6%) and data analysis (11.4%)(Fig. 1).

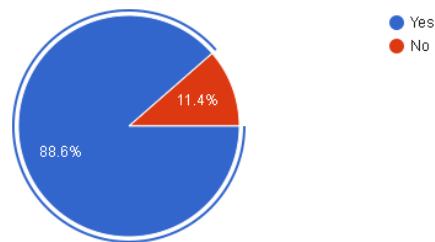


Fig. 1. Use Information Technology for your research work

It came out that most of the researchers are using IT for their research work since last 5 or less number of years. Only 10% of them are using IT for more than 10 years (Fig. 2).

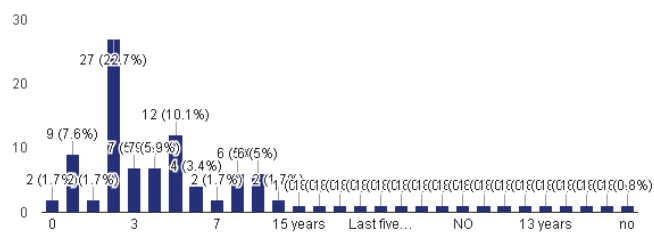


Fig. 2. Number of years researchers using IT for research work

It was also found out that most of the researchers are using IT for searching information on the Internet.

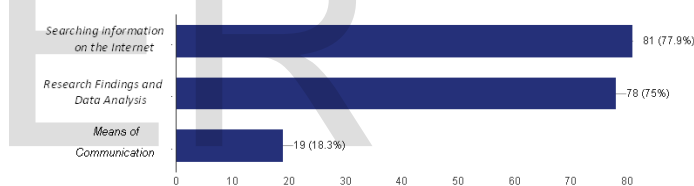


Fig. 3. Scope of IT in research work

The survey showed that more than 1/4th of the researchers those who are using IT in their work are doing research in the field of Applied and Industrial Oriented Scientific research (Fig. 4).

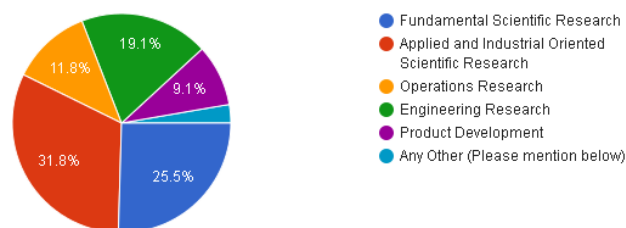


Fig. 4. Domain of Research Activities

It is observed that almost 43.7% of researchers are doing their work in self-sponsored state-of-art facilities for fundamental scientific research, while only 6.8% of the

researchers are involved in the laboratory where some kind of product development is going on (Fig. 5).

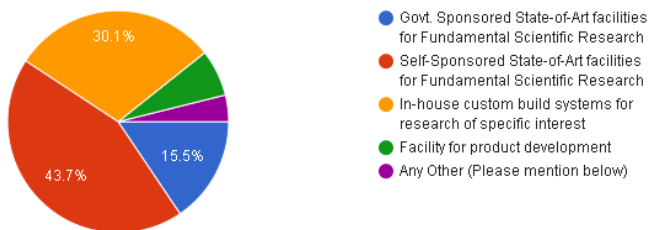


Fig. 5. Laboratory facility in Institute/Organization for research work

During the survey half of researchers admitted that using IT has made their research work more convenient to some extent only. About 72 researchers admitted that most of the times their research related problems got solved by using IT tools (Fig.5). Half of the researches acknowledged that due to use of good and user interactive GUI they found the use of IT tools much easier though they may not be from IT background.

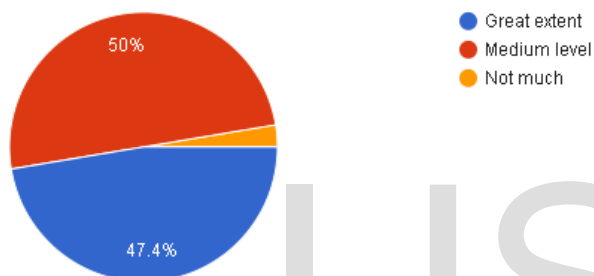


Fig. 6. Extent the use of IT to do research work more conveniently

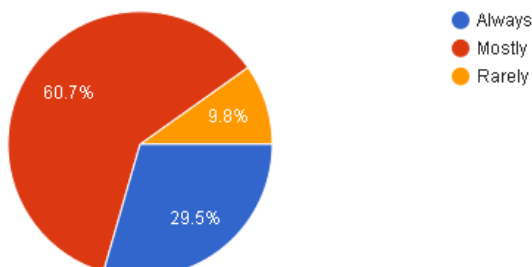


Fig. 7. Usage of IT tools to solve research problems

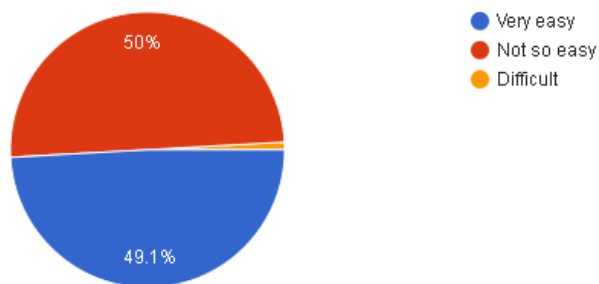


Fig. 8. Easiness of using IT tool.

By survey it was found that most of the researchers use MExcel tool for their storage, analysis and report generation whereas other statistical tools such as MATLAB and SPSS are having equal weightage for research work (Fig. 9).

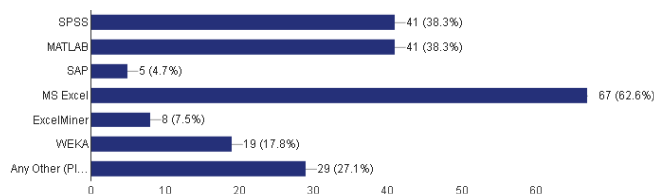


Fig. 9. Software applications used for research work

It was observed during the survey, that around 37 researchers found that analysis using present IT tools is difficult compared to manual process. Many of researchers also expressed that the present IT tools are not having very user-friendly and interactive GUI (Fig. 10).

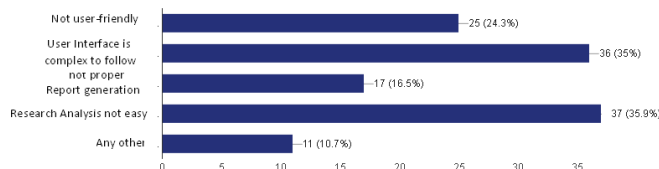


Fig. 10. Mention the drawbacks of the software application you are using for your research work

During survey it came out that most of the researchers have done mostly 2 research projects and mostly these projects are not funded by any external agency. It was observed that very few experienced researchers are undertaking projects funded by external agencies like UGC, DST, DBT,UoM(Minor research project), BARC, BMC, ICMR, AYUSH etc.,though the average budget for these research projects are mostly less than 1lac.

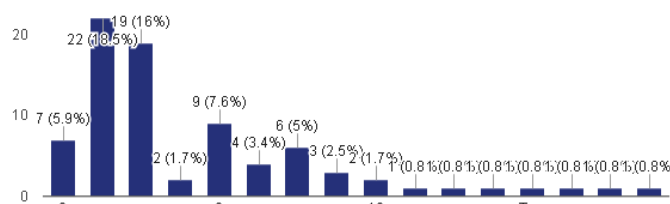


Fig. 11. Number of Research Project(s) undertaken

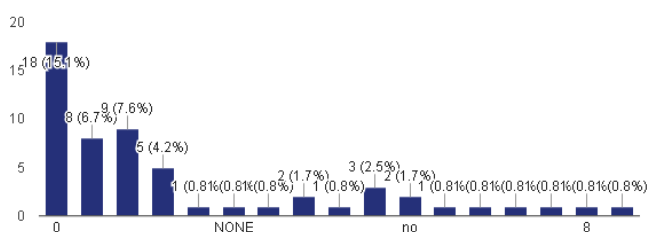


Fig. 12. Number of Research Project(s) funded by an external agency

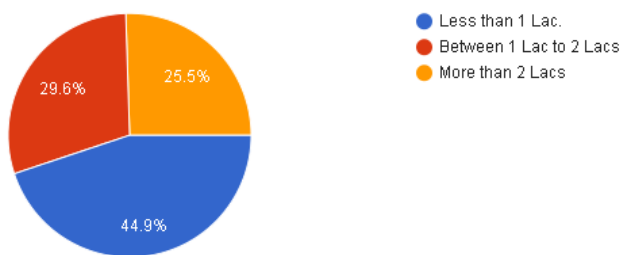


Fig. 13. Average budget for your research work

7. FUTURE SCOPE

Through the survey it came out that the basic features of IT tools expected by the researchers are that the software tool should provide easy data analysis, user friendly interface and easy compatibility with the existing system.

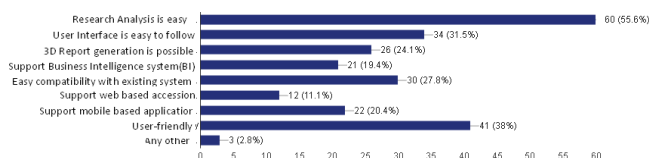


Fig. 14. Expected features of the software application for research work

8. CONCLUSION

The research finding indicates the level of use of Information Technology amongst researchers from basic science field is not very encouraging in Mumbai Metropolitan region. Though all researchers surveyed acknowledged the use of IT for their respective research work, still in spite of proven effectiveness of using IT and ITES for research activities, it is not being pervasively used in all domains. Softwares for Enterprise Resource Planning like SAP and ERP are predominantly used even in research activities, rather than tools distinctively designed for specific research interest. The cause for the same, as highlighted in the survey outcome is that respective researchers are not trained in using them. Moreover, the existing softwares lack proper analysis mechanisms and report generation features.

Another major aspect highlighted in our research was the absence of requirement of correlation between business intelligence and research activities. In order to increase the usage of IT among researchers from basic science it is suggested that software tools should user friendly with data analysis feature present there. There is a huge potential in developing mobile based software applications for research which currently are almost nonexistent.

Due to time constraints we had to restrict ourselves to Institutes located in Mumbai. This research can be extended to more streams across India to derive more accurate conclusions.

Also positive steps need to be taken by Government and private funding agencies to involve more and more people into the research.

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