1.1. Overview of the study:

After independence in India, S&T utilization was considered as the highest prioritized area and as a tool for nation development. In every five years plan, the S&T was given its due place. Various committees, councils, Departments, Advisory boards, Collaborations at National, International as well as Centre & States levels were created for S&T development. In the latest two five years plans, the high priority was also given to the Libraries, Information systems in the field of S&T. Like other essential necessity information was also considered as the most essential commodity. At national level Information systems of S&T libraries and Information center such as NISSAT was Created. The National center for science Information was also set up by U.G.C at the Indian Institute of Science, Banglore. In the recent past, India has also made unprecedented progress in the field of Computer and Communication Technologies and made its place at the world map of Information Technology. INSDOC, DESIDOC, National Medical Library, AIIMS, IARI Library, Information Centre of Bureau of Indian Standards, National Institute of Pharmaceutical Education and Research (NIPE), All India Board of Hotel Management & Catering Technology (AIBHMCT), IISc Banglore,
BARC, TIFR, IITs, Constituents information Centers of NISSAT and few technological university libraries such as Roorkee university, JNTU (AP), BITS Pilani etc. have rich library collection in the S&T field. All these libraries & Information Centers together may be spending more than 150 Crores annually for procuring publications, journals and other documents. The users of most of these libraries are Scientists, technologists, Medical Practice nor, Pharmacist etc. For the purpose of library resource - sharing, these libraries and Information Centers are also using Library networks such as Inflibnet, Delnet, Calibnet, Malibnet, Bonnet etc.

The S&T development has many phases and milestones. The first phase was naturally basic research which was having very little direct linkage with industries. In second phase the research was end use oriented. In third phase mainly the trends of research were concerning to the multiple technologies for high industrial productivity. In the forth phase the research was concerning to the large scale manufacture and marketing. In The globalization of world trade in the early nineties opened up yet another phase in the S&T scene in India. In this new millennium efforts were made and the success achieved in the core technologies and more recently in the software market gave a confidence that India made sustained efforts to convert its educational scientific and industrial resources into strength.

The Department of Science and technology (DST) making funding to the Academic and R&D organization for both the basic as well as applied research cutting across discipline and several disciplines and barriers. DST also creating infrastructure facilities, technology development, and transfer of technology. The Industrial Policy Resolution (IPR) of 1948, the Scientific Policy Resolution (SPR) of 1958, Technology Policy statement (TPS) of 1983, (Jain, Ashok 1989) and recently launched missions by DST, 2001 such as Jai Vigyan Mission and India Millennium mission on topic of national importance as well as policies
such as Information Technology Policy etc are some of the milestone in the history of S&T in India. (Ramamurthy, 2001).

In India, in the field of S&T, there are more than 450 Central Government funded R&D Institutes. Majority of the Central Government Organizations in S&T fields, came under CSIR, DRDO, ICMR, ISRO, DST, DAE, ICAR and few other government departments. At present there are about 250 University Institutions. Of these, 161 are traditional universities which are also having different S&T departments/ Centers along with other subject field of study and research. About 34 universities provides education in agriculture including forestry and dairy, fisheries, and veterinary science. 18 universities provides teaching and research in medicine and 25 in engineering and technology including 6 IITs. In addition to this there are more than more than 800 State owned R&D institutions and about 1350 Privately owned academic and R&D Institutions. All these institutions are having a well established Library, Documentation center and / or Information Center to cater the information need of their user scientists and technologists.

It is also observed that the libraries & Information documentation Centers are also using new Information technologies in serving their users. The main driving forces (External Environment) of transformation in the S&T libraries are: i). Global economics, ii). Politics and policies, iii). enlightened population, and iv). Technology.

The information technology (IT) is a generic term that covers acquisition, processing, storage and retrieval of information. IT has a much wider connotation which includes application of computers, CD-ROMs, and network technologies in the task of information handling. Information technology is a boon for mankind. It has revolutionized every facet of human being. It gives accessibility to information at the finger tips. Information rich person or a country can made more progress. IT is composed of following technologies:

• Computer Technology
- Communication Technology
- Optical /Video (CD-ROM) technology
- INTERNET & Web technologies

The New Information Technologies (IT) have also influenced every facet of library activities. The latest advances in computers, telecommunications and Internet have made circumstances more conducive for the S&T organizations to adopt IT in their libraries. Computerization remained the first preference of these S&T libraries in their policies during the decades of 80's and 90's when it finally succumbed to the superiority of Internet. A computer is effective only in reflecting and utilizing one's in-house resources whereas Internet with its worldwide connection is more powerful for the development of these S&T libraries.

The rapid development of the digital network all over the world during the last 20 years has promoted communication of information at a mind-boggling speed. This has proved comparatively more fruitful for library and information centers compared with any other organization, due to economy in storage and utility, accuracy and speed in retrieval for it. The browsers require only a few clicks on easily figured icons and link to the whole oceans of information. In the past ten years, it has been so popular that the number of Internet users has jumped from 600,000 to 1.40 million and it is expected to grow further to 350 million within the next three years.

These IT advances have brought dynamic changes in the library systems to get maximum competitive advantages, and new opportunities. Effective use of such advances in the systems provide value to their library activities by (a) allowing the organization to respond rapidly to changing library user's requests, (b) improving quality and fostering innovation, and (c) competing and serving at global basis.
With the use of new technologies, the organizations, customer, and users can make possible to perform or have their work performed quicker with better quality and at low cost. Such IT advances have opened new application areas for these libraries with great promises, high expectations, unimaginable dimensions.

1.2. Statement of the Problem:

The study deals with the use of IT mainly the Internet & Web technologies by the S&T libraries of Delhi region. The use aspects related to benefit of IT has been explored by various authors. The benefits of the IT can be measured in terms of enhanced processing speed, transmission rates, and access time (Grover V and Segars AH, 1996). The introduction of micro and mini computer has enabled greater decentralization of information systems (McKesie RB and Walton RE, 1991). Recent innovations such as LAN make possible the linking of task, groups and managerial work processes (Venkatraman N, 1991). These IT capabilities are likely to impact culture, structure and work practices (Doherty NF and King M, 1998). Among other thing IT can alter the information environment of organizations, specially leading to more informality and can overcome the constraints of time and speed. It reduces the administrative staff which results a leaner organization (Wijnhoven ABJM and Wassenaar DA, 1990). There are very few study were conducted on the extent of use of IT in S&T libraries.

Now IT are also being used by the S&T libraries in their activities - specially their processing and management functions - accessing, organizing, storing, and retrieving information (abstracts, full text online).

Though the efforts are being made from time to time to use the Computer (Information technology) and system approach techniques in the management of libraries
since the early 1970s. But in spite of these efforts, there are gaps in the use of computer in S&T Library information in comparison to the industrial or business organization. The factors responsible to theses gaps are many. Ranine (1981) identifies two major factors: i) lack of comprehensive and effective Information system (IS) framework, and ii) the library managers attitude and familiarity with the tools, techniques, and procedures to improve the existing IS. The dynamics of change in S&T libraries is affected from several interrelated factors such as organizational, human, economic, and technological. Further the process becomes more complicated because these factors involves many considerations which influence the future development of IS. Clack (1993) viewed IS as total quality management (TQM) and discussed some issues related to library environment. These issues are; Steering committee, leadership, communication, training, tools and processes, and recognition and rewards. In conclusion the managers of libraries need not only their active participation in the IS development but they also need appropriate methodologies which will aid them in development of effective computer-based IS. Inspite of these facts, there are very few Libraries who have adopted these technologies. These technologies are not being adopted uniformly and there is a gap in the extent of their use.

Sangla, ML (1992) suggested the Nolan (1979 & 1982) stage growth Model for assessing the extent of use of IT in public enterprises. In S&T libraries there are very study where such model is used to assess the gap in the extent of use of IT in S&T libraries. With the phenomenal growth in IT in general and computerization in S&T libraries in particular, a study looking into the development of information systems in S&T libraries could prove to be useful in establishing the status of computer use in these libraries and assist the planners to formulate the long term computer use related strategies.
1.3 OBJECTIVE OF THE STUDY:

The objective of the study is to: "To explore the Organizational perceptual factors responsible for the use of computer in S&T Libraries of Delhi region & based on the literature search and experience, to design a Model of Computer-based IS for a very large and complex networking environment of S&T libraries." Following purposes guided the study:

- To review the related literature.
- To study the Growth and Development of Information Technology (IT) in the Academic as well as Research libraries in the field of science and Technology (S&T) of Delhi region.
- To study the factors associated with the use of IT in the libraries.
- To design a system methodology for growth and development of IT in S&T libraries.

1.4. Scope & Limitation of the Study:

As per the Directory of R& D Institutions (1999) and University Handbook (2001), in India, at present there are about 3000 Institutions engaged in academic, teaching and research in the field of S&T. Out of these S&T institutions there are more than 450 Central Government funded R&D Institutes, 160 traditional universities which are also having different S&T departments/ Centers along with other subject field of study and research. About 34 universities provides education in agriculture including forestry and dairy, fisheries, and veterinary science. 18 universities provides teaching and research in medicine and 25 in engineering and technology including 6 IITs. In addition to this there are more than more than 800 State owned R&D institutions and about 1350 Privately owned academic and R&D Institutions.
The study is limited to the libraries of Teaching and Research S&T Institute of Delhi region. It is also limited to the extent of Information Technology, mainly Internet by the libraries of these institute. The study is of exploratory of nature and it is limited to the perceptual and organizational factors responsible for slow or high growth of IT in these libraries. In the study efforts are made to explore the use of Information Technology by the S&T libraries of Delhi region.

In the use parameters of IT, mainly the Library networking, Internet connectivity, the conversion of bibliographic records on Internet, the Online Public Access Catalogue (OPAC), use of Internet, electronic journals, ERL based CD-ROM, Bar coding, document digitization, Web designing, Library resource sharing etc. are undertaken.

In Delhi State, there are about 174 R&D institutions in the field of S&T, out of which 13 are University level Institutes, 66 Government R&D Institutions and about 95 are privately run R&D Institutions. (Table. 1).

**Table. 1. Academic and Research Institutions in Delhi region fully or partially engaged in S&T.**

<table>
<thead>
<tr>
<th>Region</th>
<th>Deemed university</th>
<th>Institution of National importance</th>
<th>Central Universities</th>
<th>State university</th>
<th>R&amp;D Institutions</th>
<th>Private R&amp;D Institutions</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Delhi</td>
<td>6</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>66</td>
<td>95</td>
<td>174</td>
</tr>
</tbody>
</table>

![Diagram](chart.png)
S&T Libraries of Delhi region are taken as the representative sample for this study. Therefore, it will be difficult to generalize the findings of this study with other libraries of different nature available in geographically different locations. Second, the goal of this study is limited with the managers of S&T libraries, therefore, its applications are not broad in scope. All the factors associated with the use of Computer in Libraries also could not be covered. The study is limited to the use of Information technologies in libraries of the following type of S&T institutions of the Delhi State:

- Documentation Information Centers related to S & T such as INSDOC, DESIDOC, Information Center of Indian Bureau of Standards, National Medical Library, Central Library of Indian Agricultural Research Institute (IARI),

- All the higher educational Institutions related to Agriculture, Medicine & Technologies.

- Universities colleges related to the Agriculture, Medical and Engineering.

- All AICTE Technical institutions.

- All the Government Research Laboratories.

- As on June, 2001, more than 40 private S&T academic institutions in Delhi region are affiliated with the Guru Govind Singh Indraprasth University, Delhi. The growth and development of IT in all these 40 private institutions are also under taken in the study.

The following information related to the Information Technologies are to be explored in the given S&T libraries:

- Extent of Library Computerization

- Hardware and Software used

- Bar-coding

- OPAC

- Networking

- Use of Internet

- Electronic journals
The Organizational study & perceptual study of the libraries of the S&T libraries of Delhi state are to be undertaken. In the Organizational study the SWOT analysis is used where as in Perceptual study the LIKERT scale is used.

1.5. Need of the Study:

As explained above computer application in libraries provides relevant, timely and cost effective information. Like other management tools and techniques, the computer application was first appeared in the industrial and business management literature and it slowly began to find their way in library literature. This has become certain that sooner or later the library managers will also adopt these technologies in the management of library activities. The need of computer application is further justified because the university libraries are moving very fast towards computerization. In the near future the Computer application will be essentially needed by them.

In spite of this that S&T libraries are having all the characteristics of a model organization where computer application is found most successful, the adoption of this management tool is not uniform in these libraries. There is a gap. Some of the libraries are in advance stage of adoption, others are in a very initiative stage of adoption. Others do not aware about the use of such computerised techniques.

1.6. Significance of the study:

The study is intended to explore the fresh approach towards the management of Computerized Library. On the basis of literature survey, and field survey, its aim is to:
• Discovers the factors responsible to the gap in adopting of the IT technologies in S&T Libraries & suggest the indicators for growth and development Computer based Systems for these Libraries.

• Analyze the existing systems and finally to design a model for Computer based Information System for S&T Libraries.

• Its investigation will substantially contribute to the applied aspect of Library and Information Science. The significance lies in the facts that:

• It provides a framework of the Information Development (IS) development & Design in S&T Libraries

• It gives some direction about the orientation of the future development of MIS in other libraries in India.

• It suggests ways enhancing the channels of communication between the library managers and IS development teams.

1.7. Organization of the Study:

The study is organized into 8 chapters. Chapter first is Introduction which provides an overview of the study, need of the study, Statement of the problem, Scope of the research, objective and significance of the study. Chapter 2 Information technology and S&T libraries, provides a brief introduction about the use of Information Technologies (IT) in S&T libraries. Chapter 3 Review of the Litature. In Chapter 4 Conceptual frame , Derivation of Hypothesis, and Criteria for Evaluation are given. In Chapter 5 the Research Design of the study is given which discusses about the nature of the study, Assumptions, Variables, conceptual frame of the study, Research design for study of Organizational study resources, Organizational culture, Derivation of Hypothesis, Procedure, Processing of
Primary Data. In Chapter 6, the Organizational data analysis was made using descriptive Statistical Methods. Chapter 7, provides the results of the Analysis of data related to the Internet use, managerial Culture, attitude, and perception. In this chapter the statement wise analysis, Chi- Squire test, testing of Hypothesis are made. In Chapter 8, the Results, and conclusion were drawn and recommendations were made based on the literature review, and on the basis of the result of organizational studies, and Perceptual studies.

In the end the References cited and four appendix are given. With each cited references its year of publication is given in bracket after main heading of entry. The references are arranged alphabetically. In appendix 1, the questionnaires is given. In Appendix 2 the Internet use questionnaire is given. The Data sheet used for Organizational and perceptual study are given in Appendix 3. In Appendix 4, a A brief Curriculum Vitae of the author is also given.
# A Schematic Plan of Study

## Research Methodology Used

### Research Topic:

"Information Technology (IT) in libraries of Science and Technology organizations. A comparative study of selected libraries of Delhi".

<table>
<thead>
<tr>
<th>Status of IT based facilities available in the libraries of proposed S&amp;T organizations</th>
<th>Review of Literature.</th>
<th>Factors associated with the Growth development of I.T. in libraries of the given S&amp;T organizations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational study</td>
<td>Perceptual study</td>
<td></td>
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</table>

### Design of Criteria of Evaluation

<table>
<thead>
<tr>
<th>Historic Methods of Research:</th>
<th>Survey Methods:</th>
<th>Survey Methods of research:</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Observations</td>
<td>- Questionnaire</td>
<td>Questionnaire</td>
</tr>
<tr>
<td>- Study of records</td>
<td>- Checklists</td>
<td>Checklist</td>
</tr>
<tr>
<td>- Interviews</td>
<td>- Observations,</td>
<td>Observations</td>
</tr>
<tr>
<td></td>
<td>- Interviews,</td>
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</table>

### Data Collection

### Data Analysis

Organizational Data: 1. Resources & SWOT related data 2. Culture, perceptions, attitude related data

### Case Study Reports of the Individual Libraries

### Summary Conclusions & Recommendations