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CONTENTS

Modern Approaches in the Collection Development and Effective Implementation of Management Polices in Academic Libraries

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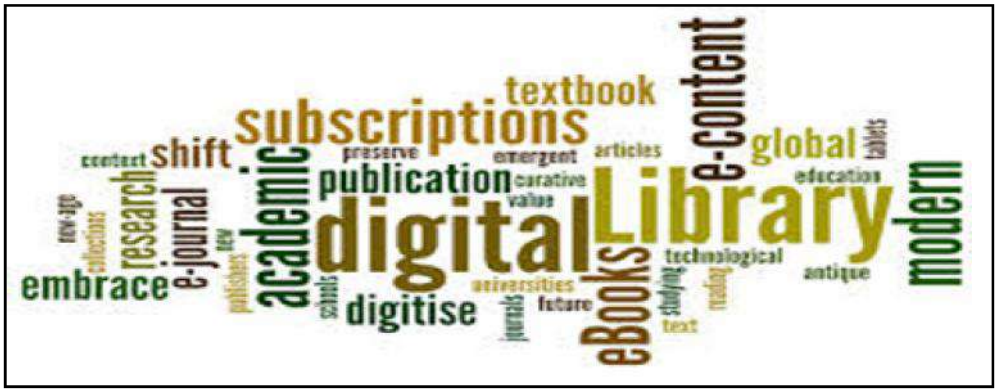
Abstract

Librarians working at academic libraries in the 21st Century are vested with the responsibility to build and shape collections that not only demonstrate present time pertinent, but are Sufficiently responsive to the information needs of tomorrow's scholars "The academic libraries are ready to present information to anyone, anywhere, anytime and anyhow". As Open Access resources increase the demand of libraries, particularly academic libraries, tackle with the challenge to manage Open Access resources in an appropriate and to endure reasonable way. As a matter of truth, the huge emphasis placed by libraries on advocacy and access to open Access collections has postponed the problem to find strategies to best develop and manage Open Access collections. Even though Open Access collections are normally toll free, or mainly toll free Open Access collection and if there are relevant differences into 1) Open Access collection development; 2) Open Access collection management; and 3) Open Access collection preservation.

Keywords: *Collection development; Open Access collection development; Library Management*

1. COLLECTION SCOPE

Library collections is to provide books contributive the university's curriculum grows, adapts, and otherwise make changes in relation to the world and human knowledge, so the monograph collection must evolve. Collections related to the undergraduate courses should be as broad and deep as the monographic budget allows. Secondary importance are the graduate courses, faculty research areas, and the larger body of published knowledge that has no direct connection to the university's to give directions to instructional programs. Purchases in these areas will be highly selective. Resource formats are selected based on the consideration of constant, utility, accessibility, and appropriateness to content. Formats collected include:



1.1 Reference Collection

The Library collects materials in a variety of formats and maintains several collections, attempting to match data format with departmental compulsory and ease of access. The Reference collection is a key component of the library's collection, as and such, development of that collection should follow the general guidelines set out in the Library's Collection Development Policy Statement.

The Reference Collection Policy is aimed at further definition of the collection and key procedures in building and maintaining that resource.

1.2 Special Collection

There is no simple, catch-all definition of Special Collections. However, at the University of Manchester

Library our Special Collections consist of several categories of material:

i Printed books and journals regarded as special because of their age, rarity, fragility, provenance, association and/or financial value. Spanning in date from the 15th century to the present, they range from luxury books printed on vellum and beautifully illustrated, to ephemera, cheap broadsides and other forms of street-literature.

ii Manuscripts: generally individual, hand-written items, including codices (volumes), scrolls and single-sheet material. Because they are hand-written all manuscripts are unique. They include religious, ritualistic, literary, historical, administrative and legal texts, and life-writings. Many are beautifully illuminated.

iii Archives: documents which were created or received, accumulated and used by an individual or institution in the course of their daily activities, and preserved for their continuing value. Archives provide us with *primary evidence* of the transactions, processes and events they record. They often have a complex structure, and can contain a huge variety of material.

iv Visual collections, including works of art, photographs and objects.

v Secondary literature that supports the Special Collections, in areas such as book history and manuscript studies.

1.3 Subscriptions

The right to receive issues of a magazine or journals in exchange for money.

1.4 Theses and Dissertations

The thesis of this dissertation is that managing and accessing the Structured Web poses unique difficulties which neither traditional database systems nor search engines address.

1.5 Monographs

Monographs are still a good way to communicate; libraries will continue to buy them as long as they are published. Some task force members wondered whether university presses have moved away from monographs because they are finding it increasingly difficult to sell books. Libraries may be the last market for highly specialized monographs. On-demand printing of monographs may become increasingly important in the next few years. Many task force members regret the decline in the publication of the monographic series but recognize that the current economies of monographic publishing are discouraging.

1.6 E-books

As you can imagine, many librarians and information professionals enjoy writing books about their profession. This page provides links to some recent books and ebooks that may provide helpful. Books and ebooks can be found by searching our online catalog.

1.7 Serials

A “serial” is defined as any publication issued in successive parts which are intended to be continued indefinitely. These publications may be issued in print, non-print, and/or electronic format.

1.7.1 Common Types of Serials Include

- Abstracts and Indexes
- Almanacs and Yearbooks
- Annual Reviews and Proceedings
- Directories
- Electronic Databases
- Newsletters
- Newspapers
- Popular Magazines
- Research Journals
- Trade Publications

1.8 Videotapes

Library science is the study of library administration. Libraries have always served communities as a place to borrow books and research information. Thanks to the growth of electronic media, libraries now readily supply information through DVD, CD, video technology, Internet and other mediums. Librarians are responsible for organizing and overseeing these sources and making sure that they are easily accessible to the public. Besides helping people find the information they need, librarians keep up to date with new technologies, new information sources and the most recent publishing trends. Librarians also promote reading through various programs and order supplies, including of course, the books that are still the life blood of libraries today.

1.9 Music Scores

Classical Scores Library is the largest and most comprehensive online scores database in the world to support teaching and research in classical music. This multi-volume resource provides online access to more than **one million pages** of classical scores on one optimized, easy-to-use interface. Works come from the world's greatest classical composers and content partners and are relevant to a broad range of studies, including music history, appreciation, performance, analysis, composition, and theory.

1.10 Compact Discs

The Library of Congress has a large collection of audio content on compact discs, dating from the earliest days of CD manufacture. The CD-DA (Digital Audio) and CD-ROM (Read-only Memory) formats are structurally identical. The data is molded into the disc at the time of manufacture and cannot be changed. Unfortunately, these media are machine-dependent, and continued access to the digital content is contingent on the availability of compatible hardware and software. Additionally, these media are subject to deterioration just like any other material.

1.11 Electronic Databases

An e-database is an organized collection of information, of a particular subject or multi-disciplinary subject areas. The information of an e-database can be searched and retrieved electronically.

1.12 Electronic Journals

Electronic serials may be defined very broadly as any journal, magazine, e'zine, webzine, newsletter or type of electronic serial publication which is available over the Internet. Within this broad definition, the titles can be electronically accessed using different technologies such as the World Wide Web (WWW), gopher, ftp, telnet, email or listserv. Of course, virtually all modern electronic journals are mostly available via the Web. This site primarily includes e-journal sites as they are offered by the publisher.

2. COLLECTION DEVELOPMENT

i. Advance the missions of the university and library through the implementation of relevant activities and programs.
ii. Build a collection that meets the instruction, research and information needs of students, faculty and the university community.
iii. Coordinate collection development activities with Library Liaisons and Department Representatives, with special emphasis in promoting involvement of teaching faculty.
iv. Recommend and implement collection development policy.
v. Modify collection development policy and programs in response to changes in the curriculum.
vi. Spend the materials budget allocation to achieve the greatest benefit possible.
vii. Manage the collection so as to accommodate budget changes, space needs and new trends in curriculum and research.
viii. Maintain the fiscal accounting and bibliographic systems used to administer collection development activities.
ix. Conduct periodic evaluations of the various collections and correct deficiencies, including weeding the collection, purchasing materials to fill gaps, and replacing missing materials as needed.
x. Pursue cooperative and coordinated collection development with the Orbis-Cascade Alliance libraries.

2.1 Purpose of the Collection Development Policy

The Collection Development Policy of the Bibliotheca Alexandrina (BA) is a public document that describes existing collection strengths and future collecting activity in order to inform users, potential donors, and funding authorities of the principles that govern the selection and retention of library holdings and of the library's collecting priorities. Furthermore, it demonstrates the commitment of the BA to support the wide range of teaching, learning, and research goals for which it was founded. Because the development and management of the library's collections relies on cooperation between library personnel, academics, professionals, and the public, this policy is also a means of facilitating such cooperation both within Egypt and throughout the world.

The Collection Development Policy is also an internal library document. As such, it is meant to:

i. Guide the library's staff in making decisions regarding the selection, management, and preservation of library materials.
ii. Assure the continuity and consistency of collection development over time.

iii. Assist with focus on patron needs.and aid in the induction and orientation of new staff.
iv. In order to maintain currency and accuracy, the Public Services Section will periodically update this policy document. This policy statement and the collecting levels of intensity represent an ideal that must be tempered by the reality of fiscal resources, staff expertise, and the constraints of time and space. There is, however, no attempt to define these considerations within this document.

2.2 Responsibility for Collection Development

To best coordinate collection development with the mission of the library and needs of the library's patrons, the collection development section is given primary responsibility for developing and maintaining the library's collections. The collection development staffs, hereafter referred to as selectors, are expected to provide attentive and proactive leadership in:

i. evaluating the library's holdings;
ii. maximizing the benefit of acquisitions to the entire collection while staying within the limits of the overall budget;
iii. selecting library materials that anticipate demand;
iv. controlling orders in relation to the availability of Library materials funding;
v. identifying materials for de-selection;
vi. planning and instituting procedures to coordinate collection building in interdisciplinary fields;
vii. and overseeing the orderly and systematic growth of the library's collections.

Each selector will be assigned to work with a specific broad area of the collection by the head of collection development, based in part on any special knowledge that selector has in those subject areas. Because no one individual can have special knowledge of the many subject areas each selector will be responsible for, the selectors are expected to work closely with the reference staff and with outside or internal subject specialists. To ensure that patron needs are being met, the head of collection development, working with the heads of public services and reference and instruction services, will assign reference librarians having special knowledge of, or experience with, specific subjects to work with the selectors. The selectors are also expected to cultivate relationships with both external and internal subject specialists who may, from time to time, be recommended by the head of collection developments or by other unit heads or library administrators.

Once the selectors have made their decision based on the all of the criteria in this document and their professional judgment, they will submit them to the Acquisitions Section. The Acquisitions Section carries out the actual placement and processing of orders. Ultimate responsibility for the collection rests with the Chief Librarian.

2.3 Collection Management and Maintenance - General Guidelines

i. Location and organization of materials
ii. Duplicates
iii. Replacements
iv. Acquisitions for new courses, research programmes
v. Disinvestment
vi. Gifts and donations
vii .Short Loan collection
viii.Loan of Research Grant material
ix. Binding
x. Classification and reclassification
xi. Inventory control and shelf maintenance

2.4 Collecting Levels / Selection Criteria

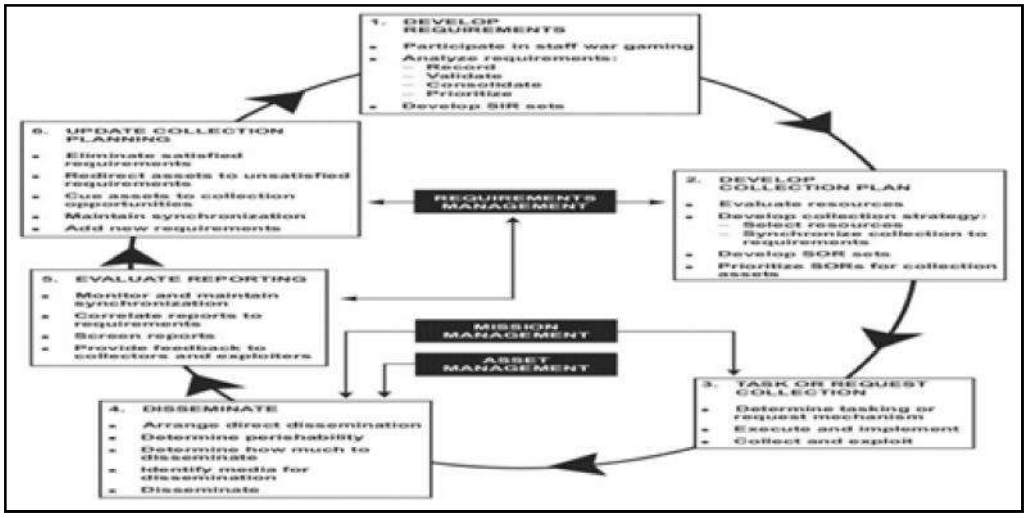
Criteria differ from one subject area to another, but in general the following factors should be considered in the decision to purchase a library resource. The following criteria are used to determine whether items are purchased. Their importance and application will vary from one collection to another according to criteria relevance:

i. Availability of copies in other university system libraries or other research institutions in Georgia
ii. Cost
iii. Degree of specialization (whether the resource is likely to serve multiple interests or a more narrow range of users)
iv. Intended audience (scholarly vs. popular; university vs. lower-level, etc.)
v. Language
vi. Physical condition (for older materials)
vii. Projected need based on use patterns of similar material already in the collection
viii. Relevance to curriculum
ix. Popular interest
x. Community need and potential use
xi. Currency
xii. Authority and reputation of author, publisher, producer or illustrator
xiii. Physical format

xiv. High quality presentation
xv. Literary merit (Awards/shortlist items)
xvi. Long term relevance
xvii. Suitability for different age levels
xviii. Local emphasis
xix. Favorable reviews
xx. Availability in other libraries
xxi. Relationship to items already in the collection
xxii. Representative of cultural diversity
xxiii. Supplier recommendation
xxiv. In general books are purchased only if they have been published in the last 3 years. Exceptions to this may include the replacement of damaged or lost items, classic titles or core items as required.

2.5 Additional Selection Criteria For Electronic Resources are

i. Content
ii. Statistics
iii. Vendor support
iv. Technical considerations (in particular, authentication)
v. Community need and potential use
vi. Ease of use
vii. Technical features
viii. Age of resource and frequency of updates
ix. Selection criteria for new and emerging formats include:
x. Level of community receptiveness and demand
xi. Impact on library space and storage
xii. Durability of format for library use
xiii. Technical quality
xiv. Compliance with industry standards
xv. Suitability for circulation
xvi. Cost



2.6 Collection Development and Intellectual Freedom

All librarians have the responsibility to uphold intellectual freedom-the right of people to access and use information. It has been said that a good library will have something to offend everyone, and this is true. People sometimes get upset by material that the library owns.

College and university librarians share the professional concerns of faculty members. Academic freedom, for example, is indispensable to librarians, because they are trustees of knowledge with the responsibility of ensuring the availability of information and ideas, no matter how controversial, so that teachers may freely teach and students may freely learn. Moreover, as members of the academic community, librarians should have latitude in the exercise of their professional judgment within the library, a share in shaping policy within the institution, and adequate opportunities for professional development and appropriate reward."A strong intellectual freedom perspective is critical to the development of academic library collections, services, and instruction that dispassionately meets the education and research needs of a college or university community. The purpose of this statement is to outline how and where intellectual freedom principles fit into an academic library setting, thereby raising consciousness of the intellectual freedom

context within which academic librarians work. The following principles should be reflected in all relevant library policy documents.

1. The general principles set forth in the Library Bill of Rights form an indispensable framework for building collections, services, and policies that serve the entire academic community.
2. The privacy of library users is and must be inviolable. Policies should be in place that maintains confidentiality of library borrowing records and of other information relating to personal use of library information and services.
3. The development of library collections in support of an institution's instruction and research programs should transcend the personal values of the selector. In the interests of research and learning, it is essential that collections contain materials representing a variety of perspectives on subjects that may be considered controversial.
4. Preservation and replacement efforts should ensure that balance in library materials is maintained and that controversial materials are not removed from the collections through theft, loss, mutilation, or normal wear and tear. There should be alertness to efforts by special interest groups to bias a collection though systematic theft or mutilation.
5. Licensing agreements should be consistent with the *Library Bill of Rights*, and should maximize access.
6. Open and unfiltered access to the Internet should be conveniently available to the academic community in a college or university library. Content filtering devices and content-based restrictions are a contradiction of the academic library mission to further research and learning through exposure to the broadest possible range of ideas and information. Such restrictions are a fundamental violation of intellectual freedom in academic libraries.
7. Freedom of information and of creative expression should be reflected in library exhibits and in all relevant library policy documents.
8. Library meeting rooms, research carrels, exhibit spaces, and other facilities should be available to the academic community regardless of research being pursued or subject being discussed. Any restrictions made necessary because of limited availability of space should be based on need, as reflected in library policy, rather than on content of research or discussion.
9. Whenever possible, library services should be available without charge in order to encourage inquiry. Where charges are necessary, a free or low-cost alternative (e.g., downloading to disc rather than printing) should be available when possible.
10. A service philosophy should be promoted that affords equal access to information for all in the academic community with no discrimination on the basis of race, age, values, gender, sexual orientation, gender identity, cultural or ethnic background, physical, sensory, cognitive or learning disability, economic status, religious beliefs, or views.
11. A procedure ensuring due process should be in place to deal with requests by those within and outside the academic community for removal or addition of library resources, exhibits, or services.
12. It is recommended that this statement of principle be endorsed by appropriate institutional governing bodies, including the faculty senate or similar instrument of faculty governance.

Libraries provide access to information, ideas and works of imagination. They serve as gateways to knowledge, thought and culture.

- Libraries provide essential support for lifelong learning, independent decision-making and cultural development for both individuals and groups.
- Libraries contribute to the development and maintenance of intellectual freedom and help to safeguard basic democratic values and universal civil rights.
- Libraries have a responsibility both to guarantee and to facilitate access to expressions of knowledge and intellectual activity. To this end, libraries shall acquire, preserve and make available the widest variety of materials, reflecting the plurality and diversity of society.
- Libraries shall ensure that the selection and availability of library materials and services is governed by professional considerations and not by political, moral and religious views.
- Libraries shall acquire, organize and disseminate information freely and oppose any form of censorship.
- Libraries shall make materials, facilities and services equally accessible to all users. There shall be no discrimination due to race, creed, gender, age or for any other reason.
- Library users shall have the right to personal privacy and anonymity. Librarians and other library staff shall not disclose the identity of users or the materials they use to a third party.
- Libraries funded from public sources and to which the public have access shall uphold the principles of intellectual freedom.
- Librarians and other employees in such libraries have a duty to uphold those principles.

- Librarians and other professional libraries staff shall fulfill their responsibilities both to their employer and to their users. In cases of conflict between those responsibilities, the duty towards the user shall take precedence.

3. CONCLUSION

This work meets most of its aims: it provides a comprehensive coverage of the topic, and despite the potentially dull nature of the subject is written in an accessible manner. Despite the problems I mentioned with the text, I am glad to have read the book and I feel better informed about collection development than I did. So perhaps my initial expectations were too high. I would recommend that anyone interested in the subject should read the book. However I would not necessarily recommend the book be read in its entirety; instead I would recommend using it as a reference book, dipping in and out of the relevant sections as necessary.

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Embedded librarianship - An over view

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Abstract

This paper gives an overview of Embedded librarianship , giving details regarding the present scenarioin the libraries , explains the concept of embedded librarianship and its features, the difference between the traditional and embedded librarianship , areas where librarians can embed themselves in the academic community, qualities required for embedded librarian ,challenges before them and tips for successful embedment.

Keywords: Academic libraries, Embedded librarianship, Traditional library.

1. INTRODUCTION

Librarianship is changing and has to change. Librarians need to master new techniques and technology for managing and delivering information. It is essential to establish new relationship with information users and the community in which we practice. The name given is embedded librarianship. (Schumaker 2012.)

2. PRESENT SCENARIO IN THE LIBRARIES

In today's research environments, librarians are challenged to demonstrate their connections to the mission of their institution is more essential than ever before. Academic librarians must be comfortable with facilitating instruction in multiple content areas, while at the same time, teaching basic library research skills. Many non-library administrators have this belief that because so much information is being disseminated electronically 24 /7, and access is possible without any geographic barrier there is no longer a need for the traditional brick and mortar space and users have isolated themselves from the physical libraries. A great deal more has to be done to prove that libraries are needed.

The traditional libraries have failed Information Literacy challenges i.e to enable the students to think critically, the ability to determine the need for information, retrieve it effectively and efficiently and then evaluate it for its relevance, accuracy, authorship, timeliness, bias, and its ethical use. The student community relies on the library and the librarians to infuse this content into the curriculum. This is done by supporting student learning and faculty instruction.

3.CONCEPT OF EMBEDDED LIBRARIANSHIP

Embedded Librarianship takes a librarian out of the context of traditional library and places him or her in an onsite setting or situation and collaboration with researchers or teaching faculty in an institution. Embedded Librarianship involves the delivery of highly customized and highly valued information and knowledge service to a customer group with well defined needs.
The idea behind the embedded librarianship model is to enable librarians to demonstrate their expertise as information specialists and to apply this expertise in ways that will have a direct and deep impact on the research, teaching, or other work being done. Through embedded librarianship, librarians move from a supporting role into partnerships with their clientele, enabling librarians to develop stronger connections and relationships with those they serve.

Embedded librarians are perhaps the best resource an academic institution can have as it will enhance the school's curriculum, and support professional development for teaching faculty, and introduce the students to a myriad of resources that support retention. Embedded librarianship is one step forward towards modern librarianship, whose transformation in the role of librarian from mere custodian of information sources and services to embedded librarian.

A librarian can embed themselves in any number of academic programs or departments on a college campus, each with its own mission, goals, and objectives; the way in which the librarian enhances the program can be just as individualized as the program itself. The same concept of embedding holds true for the traditional model, where the librarian collaborates with a subject faculty member

in a team-teaching endeavor. Ideally, academic librarians who wish to embed themselves will have similar objectives, the most prominent will be to infuse information literacy into the curriculum which can involve: partnering with subject faculty, developing an ongoing relationship with a student or group of students to deliver individualized instruction, or participating in committee work to influence the academic administration to support library embedding initiatives .Embedded librarian involves revamping and re-shaping the role of librarians that involves developing a new framework in providing library service that exceeds user's expectations.

4. EMBEDDED LIBRARIANSHIP

The term "embedded librarianship" was coined by Dewey (2004), and it refers to the act of embedding oneself in the population being served, acting as to achieve a deeper level of integration within the group, which requires "more direct and purposeful interaction than acting in parallel" with them. Shumaker and Talley describe embedded librarianship as involving a focus "on the needs of the one or more specific groups, building relationships with these groups, developing a deep understanding of their work, and providing information services that are highly customized and targeted to their greatest needs" (2009).

5. FEATURES OF EMBEDDED LIBRARIANSHIP

i. Librarians act as a node in networks attuned to perpetual learning
ii. There is no one size that fits all models of embedded librarianship
iii. Embedded librarianship comes in many varieties and forms
iv. Librarian plus the learning community is embedded librarianship
v. The common thread: creating and sustaining conversations for learning
vi. Relationships are the cornerstone of libraries and participation.
vii. Embedded Librarianship is scalable to the needs of the learning community
viii. Embedded Librarianship is specialized service instead of general service
ix. Shifting of physical location, the physical presence counts a lot in this approach.
x. Service provided by the embedded Librarianship is specialized, highly focused and much more concentrated.
xi. It is highly customized and value added contribution to the users.
xii. Knowledge sharing and commitment to information user group goals and objectives.

6. DIFFERENCE BETWEEN TRADITIONAL LIBRARY SERVICES AND EMBEDDED LIBRARY SERVICE

Traditional	Embedded
Nature Of The Service Is Responsive	Anticipatory and proactive in nature
Individual customer	Team of collaborators
Standardized	Customized and flexible
Single transactions	Multiple transactions
It is service oriented	You become a partner / collaborator
Service for all the users	service specialized to the ongoing projects
Generally funded from the library budget	Funded by the projects
Physically based on the library	Relocation is the demand

7. CHARACTERISTICS OF EMBEDDED LIBRARIAN

7.1 Build Strong Relationships with User

Embedded librarian starts with building relationships and developing trust towards users and to translate these qualities into the team, group or department level. Emphasis on building cohesive and collaborative relationships between academicians-librarians is must. Thus, embedded librarian is a process which builds strong relationship so that they can gain deeper insights into what users are doing and how they would utilize the information provided by the library.

7.2 Focus on Understanding their Work and Information Needs

Embedded librarian must have a sound knowledge of the area/research is taking place and harmoniously work to achieve the desired group goals. Furthermore, embedded librarian should anticipate and suggest ways of accomplishing tasks that others on the team wouldn't think of-ways that save the time and effort of the team

7.3 Share their Goals and Actively Contribute to the Achievement of those Goals

Embedded librarian must be seen as a person who capable of customised, active and high value contribution towards achievement of the team and organization common goals.
Nevertheless, embedded librarian is not working in isolate, but must work in team and collaborate with other members so as to achieve team's efforts instead of individual interests.)

7.4 Develop Skills to Face the Situations

Embedded librarian also demand a high generic skills such as communication and interpersonal skills, critical thinking, problem solving and teamwork which allow individuals to function not only in disciplinary or subject domains but also in employment and social situations.

8. ACTIVITIES THAT CAN BE EMBEDDED

i. Performing complex search
ii. Teaching basic search skills
iii. Teaching advanced search skills
iv. Assisting students with presentation, assignments
v. Providing information literacy
vi. Partnership with the faculty in the instruction design process and curriculum development
vii. Co teaching with faculty
viii. Help in preparing tutorials , study guides, and in preparation of research reports
ix. Suggest resources to meet the needs of the user and set up training sessions
x. Push pertinent information to the course community.

9. CHALLENGES FOR EMBEDDED LIBRARIAN

i. Workload and pressure on embedded librarian could be overwhelming
ii. Dealing with multiple collaboration could be challenging especially when there are disagreements.
iii. Keeping abreast of latest technology and information will be daunting
iv. No additional or extra benefits or recognition

10. SUGGESTIONS FOR AUGMENTING EMBEDDED LIBRARIANSHIP

i. Move out of your comfort zone
ii. Start with a pilot program and make changes based on the assessment of the program
iii. All collaborators should have a clear understanding of each others role and responsibility at the same time and willing to adjust those roles in response to the needs of the learning environment,
iv. Translate library science to other disciplines
v. Start small
vi. Build an existing relationship first
vii. Think outside the box and act
viii. Be realistic about time and energy
ix. Regular and clear communication is a must
x. Assess the project (formative and summative)

11. CONCLUSION

In today's research environment librarians are challenged to demonstrate their connections to the mission of their institution. The embedded librarian model offers the potential for librarians to apply their knowledge and expertise in new ways that can influence the value proposition of librarians. The barriers may seem daunting, but surmounting the challenges of becoming embedded can be extremely beneficial to the skill sets of librarians, as well as leading to a circle of fulfillment between librarians, research personnel, and upper management. Embedded librarianship is a powerful way to show the impact that librarians can and do have beyond the traditional functions of the library, and why librarians are needed now more than ever leading to a circle of fulfillment between librarians, research personnel, and upper management.

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Library and Information Science Research Trends in India

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Abstract

The study attempts to trace the research trends in library and information science in India during the period Jan 1990 - June 2010 as reflected through scholarly journals. Co-word analysis is used to identify the core research areas by quantifying the frequency of occurrence and the analysis of co-occurrence of 4735 descriptors assigned to 1408 journal articles of Indian authors indexed in Library and Information Science Abstracts (LISA) database. The Kamada-Kawai algorithm is used for constructing the network of relations between descriptors and making spatial distribution of these. The result shows a research trend focusing on library practice, user services, cataloguing, user studies, university libraries, public libraries, information retrieval, library education, citation analysis, bibliometrics; and moving towards copyright, library technology, digital libraries, institutional repository, CD-ROM databases, and electronic periodicals. The findings indicate that open access, Web 2.0, World Wide Web, Internet, access to information, etc are some of the new areas of that LIS researchers are interested in.

Keywords:

1. INTRODUCTION

Research is a means of continuously developing a discipline. It endows a discipline with the ability to utilize the knowledge generated in other disciplines. It makes use of scientific methods. In other words, research means systematic investigations to establish facts and reach new conclusions. In the context of library and information science, Tejomurthy and Kumar defined research as the collection and analysis of original data on a problem of librarianship done within library schools according to scientific and scholarly standards.

Libraries and library schools in India have been carrying our research activities on varied topics of library and information science. DR.S.R.Ranganathan, the father of library science laid the foundation of research in India with his pioneering efforts. He introduced formal education in library and information science discipline in universities. However, the need of dedicated research centres to carry out specialized research has been a subject of discussion. Kanbur felt the need of a centre of advanced study to investigate all aspects of library and information science. Mathew while examining the management, operation, and services of libraries, proposed the establishment of an Indian council of library and information services, research and training to improve the university librarianship courses for managing and operating libraries efficiently. Subba Rao also called for the information of an Institute of Advanced Studies in Library Science which can start and coordinate research in libraries. Bhagi proposed an act for providing an integrated system of library, archives and information services and for the establishment, maintenance, organization and development of institutions, departments and centres in each state.

Sardana and Kumar examined the need doctoral research in Indian library schools. They argued a case for carrying out library and information science research in universities and provisioning adequate financial resources and coordinating research activities in India. Mangla and Ranganathan traced the recent trends and key factors contributing to the development of research in India and identified the areas that required attention of researchers.

To strengthen research in library and information science in India, among other things, It is also necessary to know about the areas of research currently being focused on and also identifying emerging areas of research.

There are many ways to identify the core research areas in library and information science. Several studies have been carried out on the research productivity in library and information science. Bibliometric study of research output is the most commonly used research method in India. Most of these studies used bibliometric techniques such as citation analysis to analyze library

and information science research. One of the well known relational bibliometric methods is co-word analysis.

Co-word analysis projects a specific visual representation of the data. It is known that keywords of an article describe its content. Two keywords co-occurring within the same article indicates a link between the topics to which they refer. The presence of many co-occurrences around the same word or pair of words points to a locus of strategic alliance within articles that may correspond to a specific theme. Thus, co-word analysis, an example of a graphical modeling technique illustrates associations between keywords by constructing multiple networks that highlight associations between keywords. Co-word analysis reveals patterns and trends in a specific discipline by measuring the co-occurrence of keywords representative of relevant publications produced in this area.

In this study, co-word analysis method is used because collection of descriptors can provide an overview of the characters of general contents in the particular field and inter-relationship of topics in the field. Therefore, a network has been constructed for reflecting the relations between these descriptors and their spatial distribution. The study does not reflect the quality of research as it is based on the co-word analysis of descriptors assigned to research articles published in journals. The analysis would examine to what extent the research has been done in India and identifies the most prominent area of research, core as well as arid research areas in India, and present an updated view of research areas to interested persons, researchers, professionals, etc.

2. LITERATURE REVIEW

Many research studies have used co-word analysis as an important method to construct conceptual network in different fields. While there are many international studies on co-word analysis, here the focus is only on Indian studies.

Over the last decades, there have been many studies on research productivity in several disciplines viz., agriculture, physics, chemistry, etc. Research studies in library and information science have attracted many library and information science researchers. Most of the studies investigated the general trends and characteristics of theses and dissertations. There has been an increasing interest in using bibliometric information for assessing or monitoring research activities. Assessment of research activity is necessary for measuring research performance. Doctoral dissertation is one of the indications of research productivity.

Research trends of doctoral research programmes in library and information science and related topics in Indian universities have been analyzed from the year 1950 onwards to find out the growth pattern, productivity of the universities, types of work, research areas, etc. Varalakshmi analyzed doctoral research programmes by subject to assess the contributions to the development of a body of theory and applied aspects of the profession. Subject analysis revealed doctoral programmes oriented towards library practice resulting in the stagnation of the theoretical base of the discipline. This shows a need for future library and information science research in India to concentrate on theoretical issues Satija identified major as well as arid areas of research and observed the irrelevance and lack of use of research results in library schools and libraries. This was attributed to a low quality of research work because of lack of cooperation and resources for research.

Several bibliometric studies of research papers have been carried out from time to time from different point of views. Suriya and Kalavathi studied the impact of library resources on the research output using log-linear regression model. Maharana et al measured the amount of web resources used for scholarly contributions in library and information science to study the dependency of library and information science professionals in India on web sources. Barooah attempted bibliometric study of research papers to evaluate the collection development program of Regional Research Laboratory library, Jorhat. Nazim and Ahmad studied bibliometric analysis of scientific output in information literacy to trace research trends.

Bhattacharya and Basu used co-word analysis for mapping a research area at the micro level. Suitable co-word pairs were constructed using words extracted from the titles in the condensed matter physics discipline. The word and co-word pairs were explored to understand their linkages with each other through network analysis methods.

The review of the literature shows authors investigating research trends and characteristics in library and information science have mostly used doctoral theses and dissertations for their study and bibliometric techniques for data analysis. The review reflects that

not many studies have been carried out using co-word analysis to study the LIS research trends in India. Therefore, there is a need for such type of studies.

3. METHODOLOGY

Library and Information Science Abstracts (LISA), an international abstracting and indexing tool covers all areas of library and information science. The data for the study was downloaded from LISA database by executing a search on June 30, 2010. In quick search option, all the fields are being searched. The quick search in LISA database using the word "India" and date range from "earliest to current" resulted in 4489 records. The search records were first limited to articles published by Indian authors and further limited to published journal articles eliminating the papers presented in conference proceedings. All the refined result records were saved in tab-delimited text file and imported to Microsoft Excel 2003 for analysis. Finally, 1408 records pertaining to the period 1990 – June 2010 was used for the study. In general, co-word analysis is based on frequency analyses of co-occurrence of keywords extracted from titles, abstracts or text. But in this study, descriptors are selected from the descriptor field found in the records of LISA database.

Descriptor is the keyword/word used to describe the topics in the published literature. Eight hundred and sixteen descriptors in the 1408 bibliographic records indexed in LISA are analyzed. The absolute frequency of each descriptor and analysis of their co-occurrence are studied. An algorithm is applied to ignore descriptors with a frequency of co-occurrence less than ten so that analysis can be focused on most intense relationships. Ninety seven descriptors with frequency equal or more than ten are chosen for co-word analysis. The Kamada-Kawai algorithm is used for constructing the network of relations between the descriptors and making the spatial distribution of these. It would be in order to mention a limitation of the LISA database. The records from India but that do not have the term 'India' mentioned in any of the fields of the LISA database would not have been captured in the search and consequently, some of the papers of Indian authors might have been missed due to limitation of indexing system of LISA database.

4. DATA ANALYSIS

This is observed that 1408 journal articles of Indian authors are indexed with 4735 descriptors. The range of descriptors for each record varies from one to eleven. Table 1 shows the 97 most frequent descriptors assigned to these journal articles indexed in LISA.

From the Table 1, it can be seen that areas such as libraries, library collection, library practice and publication output have the focus of research in comparison to areas such as online catalogues, user training, etc.

The analysis of data shows a research trend focusing on libraries, periodicals, library technology, information technology, traditional library science, bibliometrics/ scientometrics and moving towards library materials, professional education, digital library, networks, and so on. Some new areas have emerged such as World Wide Web, Internet, information seeking behavior, online database, electronic publishing, knowledge management, searching, etc.

The analysis of co-occurrence frequency of descriptors identified 21 core research fields. Table 2 shows the list of core research fields with the main descriptors with which these are linked.

Table 2 shows that research studies are being carried out on bibliometrics/scientometrics/informetrics, library technology and public libraries extensively and moving towards areas such as information technology, digital libraries, library automation, distance learning, online information retrieval and knowledge management. Other areas of interest to researchers include agriculture, science & technology and research connected with scientific publications based on bibliometrics, scientometrics, informetrics or webometrics approaches.

Figure 1 shows the network of relationships between descriptors. The large core research area in the centre of the network is university libraries closely linked together with a high relationship density with acquisition, electronic media, library management, collection development, periodicals, scholarly publications, libraries, librarianship, and library technology. Other core research areas are information technology, knowledge management, distance learning, digital library etc. The reason could be that either people working in academic institutions are publishing or people are selecting topics related to university libraries most frequently.

Table 1 Frequency of Descriptors Included in Journal Articles Indexed in Lisa Database (1990 – June 2010)

Descriptor	Freq.	Descriptor	Freq	Descriptor	Freq
University Libraries	132	Electronic Periodicals	34	Patents	17
Bibliometrics	110	Universities	33	Research Libraries	17
Periodicals	98	Distance Learning	30	Science	17
Libraries	94	Information Seeking Behavior	29	Faculty	16
Library Technology	89	Library Staff	29	History	16
Public Libraries	82	Theses	29	Learned Society and Institute Libraries	16
Surveys	82	Library Consortia	27	Library and Information Science Periodicals	16
Information Technology	72	Curricula	26	Organizations	16
Information Work	63	Online Information Retrieval	26	Searching	16
Scientometrics	62	Scholarly Publishing	26	Technical Services	16
Librarianship	61	Technological university Libraries	26	Collection Development	15
Electronic Media	58	Knowledge Management	25	Finance	15
Citation Analysis	53	Students	25	Institutional Repositories	15
Agriculture	52	CDS/ISIS	23	Librarians	15
Scholarly Publications	52	Rural Areas	23	Physics	15
Library and Information Science	50	Special Libraries	23	Marketing	14
Professional Education	50	Acquisitions	22	Open access	14
Library Materials	49	Digitization	22	User Satisfaction	14
Software	48	Information Services	22	World Wide Web	14
Articles	47	Scientists	22	Research Organizations	13
Digital Libraries	47	Authors	21	User needs	13
Research	46	Computers	20	Bibliographic Databases	12
Academic Libraries	44	Evaluation	20	CD-ROM Databases	12
Library Management	41	Indian Materials	20	Electronic Publishing	12
Science & Technology	41	Medicine	20	Social Sciences	12
Networks	40	Preservation	19	Community Information Services	11
Use	40	Users	19	Databases	11
College Libraries	39	Communications Technology	18	Information Literacy	11
Cooperation	39	Information Communication	18	Medical Libraries	11
Information Centers	39	Research Organization Libraries	18	Online Catalogues	10
User services	39	Author Productivity	17	User Training	10
User surveys	38	Developing Countries	17		
Internet	35	Online Databases	17		

5. DISCUSSION

An attempt is made to gain some insight in to the subject profile of research in library and information science through descriptors. The descriptors included in the records are examined to ascertain whether the published articles addressed library oriented and non library oriented research. Topics/descriptors that have terminologies related to library and information science activity such as information services, library technology, etc. are considered under library-oriented research while topics/descriptors such as scientific and professional communication under non-library oriented research. In this study, the research carried out by the Indian library professionals and researchers are structured round the following areas:

i. Bibliometrics, Scientometrics, Informetrics, Webometrics
ii. Libraries, Librarianship, Library management

Table 2 Prominent Descriptors Connected in Journal Articles Indexed in LISA Database (1990-June 2010)

Main Area	Descriptor 1	Fr	Descriptor 2	Fr	Descriptor 3	Fr	Descriptor 4	Fr	Descriptor 5	Fr
Bibliometrics	Periodicals	32	Articles	20	Research	16	Scholarly Publications	15	Science and Technology	10
Library Technology	Networks	25	Computers	15	Software	15	Surveys	9	Information Technology	8
Libraries	User Surveys	18	Use	14	Public Libraries	12	Surveys	11	University Libraries	10
Scientometrics	Scholarly Publications	15	Science and Technology	7	Scholarly Publishing	6	Research	5	Scientists	5
Librarianship	Professional Education	16	Co operation	15	Curricula	8	History	5	Library Consortia	5
Information work	Agriculture	6	User needs	6	Environment	5	Patents	5	User Surveys	5
Lib & Inf sci	Professional Education	27	Curricula	10	Research	10	Distance Learning	5	Surveys	5
Library Materials	Periodicals	12	Bibliometrics	11	Electronic Media	6	University Libraries	5	Use	5
Citation Analysis	Periodicals	19	Articles	11	Theses	10	Scholarly Publications	6	Agriculture	5
Public Libraries	Rural Areas	6	History	2	Surveys	2	Automation	1	College Libraries	1
Library Management	Finance	9	College Libraries	7	Leadership	6	Surveys	6	University Libraries	6
Information Technology	Communications Technology	8	Libraries	6	Rural Areas	4	Agriculture	2	Digital Divide	2
Library Staff	Surveys	9	University Libraries	9	College Libraries	3	Job Satisfaction	3	Manpower Planning	3
Digital Libraries	Digitization	3	Institutional Repositories	2	Technological University Libraries	2	Universities	2	Academic Libraries	1
Electronic Media	University Libraries	7	Faculty	3	Institutional Repositories	2	Internet	2	Library Consortia	2
Information Seeking Behaviour	University Libraries	4	Internet	3	Health Professionals	2	Researchers	2	Rural Areas	2
Electronic Periodicals	Library Consortia	5	Scholarly publications	3	Scholarly Publishing	3	Universities	2	Agriculture	1
Acquisitions	Periodicals	11	Prices	4	Foreign Materials	3	University Libraries	3	Medical Libraries	2
Distance Learning	Information Technology	3	Libraries	3	Competencies	2	Courseware	2	Digital Libraries	1
Knowledge Management	Information Technology	4	Information Communication	2	Communication	1	Community Information Services	1	Competition	1
Online Inf Retrieval	Internet	6	Electronic Media	3	University Libraries	3	Online Databases	2	Research Libraries	2

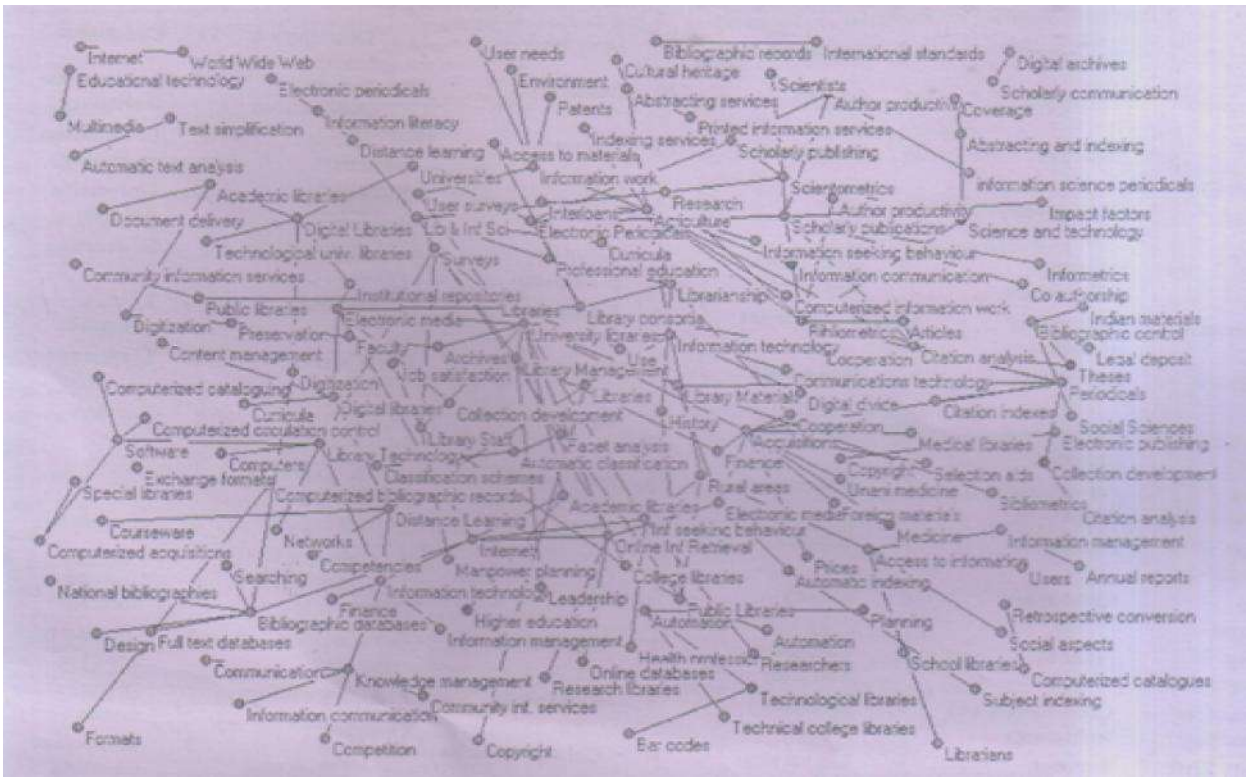

Fig. 1 Co-word network in journal articles indexed in LISA database (1990 June 2010)

i. Library technology, Information technology
ii. Information work, Knowledge management
iii. Acquisition, collection development, technical services
iv. User, User services, user studies
v. Others : Information literacy, Distance learning, copy right, educational technology, publishing etc.

The observation of the study is that a significant numeb of articles is related to library and information activities, which included acquisition, catalogues, circulation, collections, classification, information services, administration etc. There are also articles related to citation analysis, bibliometrics/scientometrics, distance learning educational technology, information literacy, information seeking behavior, etc. Bibliometrics/ scientometrics is the most frequent topic for researchers in India. This can be attributed to easy availability of bibliographic databases to researchers. Other research topics are library technology, libraries and librarianship.

It was also found that many of the studies were based on data downloaded from bibliographic databases or were historical, conceptual or survey based. Research methods such as experimental or case or action, system/ software analysis design are little used. Bibliometrics dominated the empirical research strategies followed by surveys, citation analysis and evaluation.

6. CONCLUSION

The identification of the topics of high activity has important implications for strategic planning in research. The study demonstrates the application of co-word analysis as a viable approach for identifying research trends. Co-word analysis visualizes the inter relations of the keywords. The co-word analysis results have produced a great deal more than statistical artifact. The empirical results discussed in this study demonstrate the core areas of library and information science research in India.

The results of co-word analysis indicate that there is high interest in bibliometrics/scientometrics/informetrics, library system, university libraries. The results also suggest that there exist substantial activities in digitization, digital libraries and web 2.0. The study draws attention to areas of potential research in library and information science. It is hoped that the analytical approach presented in this work may provide an effective tool to research planners in assessing and monitoring development in research and identifying the gaps and weaknesses. More such studies based on other data sources are needed for uncovering characteristics of research activities in library and information science in India.

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Evaluation of Digital Libraries: A Case Study

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Abstract

The study indicates of the A study of Evaluation of Digital Libraries in Vinayaka Mission's University, Salem A survey was carried out among the users, along with observation at the above said institutions. This was mainly about to find, to what extend the respondents use the library and about their satisfaction on the library resources. The findings of the College wise respondents' duration of library utilization bring out the fact that the respondent's above five years of utilization is their own library occupy the first position followed by 2-5 years utilization, 1-2 years utilization, 6 month – one year utilization and below 6 month utilization.

Keywords: *E-Resources and Services, Vinayaka Mission's University Professional Colleges Libraries*

1.INTRODUCTION

The recent years have witnessed an explosive growth in human knowledge in all fields. In fact the nature and functions of growth of knowledge in recent years outstrip the achievements of the past centuries. As science itself grown both extensively and intensively with the number of active scientists ever increasing, volume of literature generated by the scientific community has also increased manifold. The growth of the literature itself has caused fairly widespread alarm and the term that describes this phenomenon is knowledge explosion, also known as information explosion. Library and Information systems also need to justify the money that their parent institutions are expending on them is well used just like any of the rest of the organizational units. Particularly as a result of economic constraints leading to fierce competition for institutional budgets, more tangible and appreciable evidence is required on a continuing to devote resources to them. The old ways of talking that suggest that library and information systems are "good in themselves" no longer work, and the language and the logic of their argument should be meaningful and appreciable in the current environment in which the library and information systems can best prove that "the benefits derived are worth the expenditure" and that no resources have been wasted through data obtained from performance evaluation exercises.

2. OBJECTIVES

i. To examine the growth and adequacy of library collections in the selected professional college libraries.
ii. To analyse the recall value of the library collections in the selected colleges.
iii. To analyse the available and accessible facilities and services in the professional college libraries.
iv. To identify the type of library users in different colleges in the study area.
v. To analyse the staffing pattern in the selected colleges.
vi. To examine the proportion of budget expenditure on various aspects of library services.
vii. To analyse the frequency and duration of library visits by different types of users.
viii. To ascertain the effectiveness of library services and facilities from the point of view of different types of users.
ix. To study the users' opinion about library collection and its utility.
x. To find out the problems and defects in the existing system of functioning of professional college libraries in the study area.

3. METHODOLOGY

The present study aims at evaluating the performance and effectiveness of professional college libraries affiliated to Vinayaka Mission's University, Salem, Tamil Nadu state, India. This study is undertaken from two aspects. The first aspect of view is evaluation of performance of library services and facilities and it could be judged from library personnel. The next aspect of view is assessing the performance of library services and facilities from the points of view of the users. Hence, it is primarily an evaluatory study. However, the effectiveness of library services is anlysed with the

socio-economic background of the users. Thus, it gives an analytical orientation to this study. In general, the design of this study comes under evaluatory cum analytical method.

4. SAMPLING

Sampling was done in two ways. The first one is selection of professional colleges affiliated to Vinayaka Mission's University and the second one is that of user respondents. Vinayaka Mission has its 16 affiliated professional colleges among them there are 10 colleges selected by adopting simple random sampling method. In order to study the effectiveness of library services the user respondents were selected. From each college 50 user respondents were selected by adopting purposive random sampling method. So totally 500 user respondents were selected from the 10 colleges.

5. DATA COLLECTION

In order to collect primary data from the study units, the author has employed two different types of questionnaires. A library survey was conducted by visiting all the 10 professional college libraries. The relevant data were obtained from the library personnel by adopting well structured questionnaire method. The questionnaires were circulated to the library personnel and thereby relevant data are obtained. The effectiveness of library services is affected by collecting data from the user respondents with the help of questionnaire.

6. DATA ANALYSIS

The collected data have been coded in the computer programme, through which they have been classified and tabulated. Further, cross tabulation is made focusing on socio-economic background of the users and their views on the effectiveness of library services. Exponential growth model is applied to study the trends in the growth of library collection among the study units. It is written as antilog of coefficient-1 (100) To study inter-college variation with respect to total library collection, possession of various types of library materials and budget expenditure, the ANOVA two-way model is applied. The chi-square test is applied to study the association between user respondents' socio-economic background and their views on the effectiveness of library services and facilities. It is also applied to study the frequency and duration of library visits and utility of library services.

The general data interpretation is carried out mainly with the help of percentage analysis along with averages. Diagrammatic and graphical representations are also made according to their requirements of the study.

7. ANALYSIS AND INTERPRETATION

Table 1 presents data on year of establishment, number of departments of the selected colleges. It could be noted that out of ten colleges, Vinayaka Mission's college of pharmacy, Salem was established in the year 1981 with Nine departments, Vinayaka Mission's Sankaracharyar Dental College, Salem was established in the year 1986 with twelve departments, Vinayaka Mission's Kirupananda Variyar Engineering college, Salem was established in the year 1987 with Fifteen departments, Vinayaka Mission's Homoeopathic Medical College, Salem was established in the year 1988 with 14 departments, Vinayaka Mission's Annapoorana College of Nursing, Salem was established in the year 1991 with six departments, Vinayaka Mission's College of Physiotherapy, Salem was established in the year 1993 with Four departments, Vinayaka Mission's Kirupananda Variyar Medical College, Salem was established in the year 1995 with 23 departments, Vinayaka Mission's Medical College, Karaikkal was established in the year 1996 with 23 departments, Aarupadivedu Institute of technology was established in the year 1998 with 15 departments and Aarupadaivedu Medical College, Puducherry was established in the year 2000 with 23 departments. It could be seen clearly from the above discussion that, out of ten Colleges, four colleges were established in 1980s and the remaining six colleges were established in 1990s.

Data presented in table 2 indicate the college wise distribution of library staff strength. It could be noted that out of the 10 colleges taken for this study, Vinayaka Mission's Kirupananda Variyar Engineering College, Salem occupies the first position with 15 library staff. Aarupadai Vedu Institute of Technology occupies the second place with 12 library personnel. Vinayaka Mission's Medical College and Vinayaka Mission's Aarupadai Vedu Medical College has 10 library personnel each. Vinayaka Mission's Kirupananda Variyar Medical College has 9-library personnel. Library staff strength in Vinayaka Mission's Sankaracharyar Dental College and Vinayaka Mission's Homoeopathic Medical College is 6 respectively. Vinayaka Mission's College of Pharmacy, Vinayaka Mission's College of Physiotherapy and Vinayaka Mission's Annapoorana College of Nursing has 5 library personnel respectively.It could be seen clearly

from the above discussion that library staff strength is quite remarkable with Vinayaka Mission's Kirupananda Variyar Engineering college library and Aarupadai Vedu Institute of Technology. However, it is low in Vinayaka Mission's College of Pharmacy, Vinayaka Mission's Annapoorana College of Nursing and Vinayaka Mission's College of Physiotherapy.

Table 1 Distribution of Colleges Based On Year of Establishment and Number of Departments

Sl. No.	Name of the College	Year of Establishment	Number of Departments	Ownership
1	Vinayaka Mission's College of Pharmacy	1981	9	Private
2	Vinayaka Mission's Sankaracharyar Dental College	1986	12	Private
3	Vinayaka Mission's Kirupananda Variyar Engineering College	1987	15	Private
4	Vinayaka Mission's Homoeopathic Medical College	1988	14	Private
5	Vinayaka Mission's Annapoorana College of Nursing	1991	6	Private
6	Vinayaka Mission's College of Physiotherapy	1993	4	Private
7	Vinayaka Mission's Kirupananda Variyar Medical College	1995	23	Private
8	Vinayaka Mission's Medical College	1996	23	Private
9	Aarupadai Vedu Institute of Technology	1998	15	Private
10	Aarupadai Vedu Medical College	2000	23	Private

(Figures in Parentheses denote Percentage)

Table 2 College-wise Distribution of Library Staff

Sl. No.	Name of the College	Librarian	Asst. Librarian	Tech. Asst	Lib.Asst	Clerk	Others	Total
1	Vinayaka Mission's College of Pharmacy	1 (20.00)	1(20.00)	-	1(20.00)	-	2(40.00)	5
2	Vinayaka Mission's Sankaracharyar Dental College	1 (16.67)	1(16.67)	1(16.67)	2(33.33)	-	1(16.67)	6
3	Vinayaka Mission's Kirupananda Variyar Engineering College	1(6.67)	3(20.00)	5(33.33)	4(26.67)	-	2(13.33)	15
4	Vinayaka Mission's Annapoorana College of Nursing	1(20.00)	1(20.00)	-	2(40.00)	-	1(20.00)	5
5	Vinayaka Mission's College of Physiotherapy	1(20.00)	1(20.00)	1(20.00)	1(20.00)	-	1(20.00)	5
6	Vinayaka Mission's Kirupananda Variyar Medical College	1(11.11)	2(22.22)	2(22.22)	3(33.34)	1(11.11)	-	9
7	Vinayaka Mission's Medical College	1(10.00)	2(20.00)	2(20.00)	3(30.00)	1(10.00)	1(10.00)	10
8	Aarupadai Vedu Institute of Technology	1(8.33)	2(16.67)	3(25.00)	4(33.33)	-	2(16.67)	12
9	Vinayaka Mission's Homoeopathic Medical College	1(16.67)	1(16.67)	2(33.33)	1(16.67)	-	1(16.66)	6
10	Aarupadai Vedu Medical College	1(10.00)	2(20.00)	2(20.00)	3(30.00)	1(10.00)	1(10.00)	10
	Total	10(12.05)	16(19.28)	18(21.70)	24(28.91)	3(3.61)	12(14.45)	83

A study of data in table 3 indicates the College wise distribution of total book collection. It could be observed that Vinayaka Mission's Kirupananda Variyar Engineering College occupies the first position with respect to total books collection. It has collected 33,357 books. Among them Reference books constitute the majority portion when compared to textbooks. Aarupadai Vedu Institute of Technology occupies the next position in respect of total books collection as it has 22,067 books, but there is a shortfall in the proportion of possession of lending books when compared with Vinayaka Mission's Kirupananda Variyar Engineering College. Vinayaka Mission's Kirupananda Variyar Medical College has a collection of 9550 books and it occupied the third position among all the colleges taken in this study. Majorityof the books collection in this library are non-lending books. Vinayaka Mission's Medical College, occupies the fourth position with respect to total books collection among the colleges taken for this study. More than 50 percent of the total books collection is Reference Books. Aarupadai Vedu Medical College occupies the fifth position with respect to total books collection. This college lags behind the previous one in respect of possession of reference books. Vinayaka Mission's Sankaracharyar Dental College takes the sixth position with respect to total books possessed, that is 7550 and Vinayaka Mission's Homoeopathic Medical College takes the seventh position with respect to total books collection and this college has the highest proportion of reference Books collection.

Vinayaka Mission's Annapoorana College of Nursing occupies the eighth position with respect to total library books collection and Vinayaka Mission's College of Pharmacy occupies the ninth position and Vinayaka Mission's College of Physiotherapy the last. The computed Chi-square is 36.38, 38.99 and 58.69 for Lending Books, Text Books and Reference Books that are greater than its tabulated value at 5% level of significance. Hence distribution of college wise total collection of books is statistically identified as significant with respect to possession of total books.It could be seen from the above discussion that books collection is quite remarkable in the colleges like Vinayaka Mission's Kirupananda Variyar Engineering College, Aarupadai Vedu Institute of Technology and Vinayaka Mission's Kirupananda Variyar Medical College whereas the reaming colleges have low level of books collection.

Table 3 College-wise Distribution of Total Collection of Books

Sl. No.	Name of the College	Lending Books	Text Books	Reference Books	Total
1	Vinayaka Mission's College of Pharmacy	542 (10.00)	1695(31.30)	3179(58.70)	5416(100)
2	Vinayaka Mission's Sankaracharyar Dental College	2964(39.26)	1622(21.48)	2964(39.26)	7550(100)
3	Vinayaka Mission's Kirupananda Variyar Engineering College	2680(8.00)	7364(21.95)	23493(90.05)	33537(100)
4	Vinayaka Mission's Annapoorana College ofNursing	1273(22.57)	1405(24.90)	2964(52.53)	5642(100)
5	Vinayaka Mission's College of Physiotherapy	1300(53.21)	423(17.32)	720(29.47)	2443(100)
6	Vinayaka Mission's Kirupananda Variyar Medical College	1505(15.76)	2695(28.22)	5350(56.02)	9550(100)
7	Vinayaka Mission's Medical College	1300(15.12)	2706(31.46)	4594(53.42)	8600(100)
8	Aarupadai Vedu Institute of Technology	2990(13.55)	5167(23.41)	13910(63.04)	22067(100)
9	Vinayaka Mission's Homoeopathic Medical College	925(14.68)	780(12.37)	4599(72.95)	6304(100)
10	Aarupadai Vedu Medical College	1420(16.96)	2635(31.47)	4319(51.57)	8374(100)
	Total	16899(15.43)	26492(24.20)	66092(60.37)	109483(100)

(Figures in Parentheses denote Percentage**)**

A study of data in Table 4 indicates the college wise total collection of periodicals and other reading materials. It could be noted that out of 10 total selected colleges, Vinayaka Mission's Kirupananda Variyar Engineering College occupies the first position 5280 with respect to total periodical and other reading materials collection. Most of the periodicals are in the form of back volumes. The current periodical and Standards forms of publication

constitute a very low percentage in relation to the total periodicals and other reading materials collection. The periodicals and other reading materials collection is 2692 in Aarupadai Vedu Institute of Technology. This college comes second among the colleges taken in this study. This college has a relatively large percent of Reports, Conference & Seminar volume forms of collection. Vinayaka Mission's Kirupananda Varyar Medical College has a total of 1893 periodicals and other reading materials collection and it occupies the third position among the colleges taken in this study.The proportion of back volume collection is high in this college, when compared to the Aarupadai Vedu Institute of Technology College.Aarupadai Vedu Medical College has a total of 1834 periodicals and other reading materials collection. This institution has relatively larger proportion of back volume collection. It occupies the fourth position among the colleges taken in this study.Vinayaka Mission's Medical College, has a total of 1797 periodicals and other reading materials collection. It occupies the fifth position among the colleges taken in this study. Vinayaka Mission's Sankaracharyar Dental College occupies the sixth position in total periodicals and other reading materials collection. This college has a larger proportion of Audio Visual Aids among the total collection. Vinayaka Mission's College of Pharmacy has a total of 962 periodicals and other reading materials collection and it occupies the seventh position among the colleges covered in this study. This college has a relatively larger proportion of back volumes collection among the total collection documents Vinayaka Mission's Annapoorana College of Nursing has a total of 846 periodicals and other reading materials and it takes the eighth position among the colleges covered in this study. This college has higher percent of the collection with Back volumes, Reports, Seminar & conference proceedings and CD collections respectively. The total periodicals and other reading materials collection in Vinayaka Mission's Homoeopathic Medical College works out to 695 and it is the ninth place of selected colleges for this study. Vinayaka Mission's College of Physiotherapy comes last with respect to total periodicals and other reading materials collection.

Table 4 College-wise Distribution of Total Collection of Periodicals and Other Reading Materials

Sl. No.	Name of the College	Back Volumes	Current Periodicals	Standards	Reports, Seminars& Conference Proceedings	CDs	Audio Visual Aids	Total
1	Vinayaka Mission's College of Pharmacy	384	42	-	367	169	-	962
2	Vinayaka Mission's Sankaracharyar Dental College	651	82	41	186	374	-	1334
3	Vinayaka Mission's Kirupananda Variyar Engineering College	1837	217	104	1364	1758	-	5280
4	Vinayaka Mission's Annapoorana College of Nursing	410	36	-	232	168	-	846
5	Vinayaka Mission's College of Physiotherapy	182	17	-	51	124	-	374
6	Vinayaka Mission's Kirupananda Variyar Medical College	1280	130	35	121	235	92	1893
7	Vinayaka Mission's Medical College	1210	125	30	117	229	86	1797
8	Aarupadai Vedu Institute of Technology	867	183	-	1028	614	-	2692
9	Vinayaka Mission's Homoeopathic Medical College	480	21	24	40	130	-	695
10	Aarupadai Vedu Medical College	1250	120	30	115	230	89	1834
	Total	8551	973	264	3621	4031	267	17707

(Figures in Parentheses denote Percentage)

Table 5 Presents data of college wise supply of borrowers tickets. In Vinayaka mission's College of Physiotherapy and Vinayaka mission's Homoeopathic Medical College the teaching staff are given three borrowers tickets each and two borrowers tickets given to non teaching staff. The teaching staff is given four borrowers tickets in Vinayaka mission's College of pharmacy, Vinayaka mission's Sankarachariyar Dental College, Vinayaka mission's Kirupananda variyar Engineering College, Vinayaka Mission's Kirupananda Variyar Medical College, Aarupadai Vedu institute of technology and Aarupadai Vedu Medical College and Hospital. Vinayaka Mission's Annapoorana College of Nursing the teaching staff are given two borrowers tickets. It could we seen clearly from the above discussions that most of the colleges are given four borrowers tickets to the teaching staff.

Table 5 College-wise Distribution Of Borrower's Ticket

Sl.No.	Name of the College	Teaching Staff	Non-Teaching Staff	UG Students	PG Students	M.Phil. Scholars	Ph.D. Scholars	Total
1	Vinayaka Mission's College of Pharmacy	4 (36.36)	1(9.10)	2(18.18)	4(36.36)	-	-	11
2	Vinayaka Mission's Sankaracharyar Dental College	4(26.67)	1(6.66)	3(20.00)	7(46.67)	-	-	15
3	Vinayaka Mission's Kirupananda Variyar Engineering College	4(28.57)	2(14.29)	3(21.13)	5(35.71)	-	-	14
4	Vinayaka Mission's Annapoorana College of Nursing	2(22.22)	1(11.11)	1(11.11)	1(11.11)	2(22.22)	2(22.22)	9
5	Vinayaka Mission's College of Physiotherapy	3(18.75)	2(12.50)	4(25.00)	7(43.75)	-	-	16
6	Vinayaka Mission's Kirupananda Variyar Medical College	4(33.33)	2(16.67)	2(16.67)	4(33.33)	-	-	12
7	Vinayaka Mission's Medical College	4(33.33)	2(16.67)	2(16.67)	4(33.33)	-	-	12
8	Aarupadai Vedu Institute of Technology	4(26.67)	1(6.66)	4(26.67)	6(40.00)	-	-	15
9	Vinayaka Mission's Homoeopathic Medical College	3(18.75)	2(12.50)	4(25.00)	7(43.75)	-	-	16
10	Aarupadai Vedu Medical College	4(33.33)	2(16.67)	2(16.67)	4(33.33)	-	-	12
	Total	36(27.28)	16(12.12)	27(20.46)	49(37.12)	2(1.51)	2(1.51)	132

(Figures in Parentheses denote Percentage)

Data presented in Table 6 indicate college-wise distribution of library membership. It could be observed that out of the total 10 Colleges, Vinayaka Mission's Kirupananda Variyar Engineering College occupies the first position with respect to possession of membership. Out of them, 87.69% are student members. Aarupadai Vedu institute of technology occupies the second position as it has 2026 library memberships. Vinayaka Mission's Kirupananda Variya Medical College and Aarupadai Vedu Medical College occupies the third position with respect to library membership and most of the members are students. Vinayaka Mission's Medical College, has 1702 membership and it occupies fourth position among the colleges taken in this study. Vinayaka Mission's Sankarachariyar Dental College occupies the fifth in order of possessing library membership and most of the members are students. The total membership of Vinayaka Mission's Homoeopathic Medical College is 723 and it occupies the sixth position in this record among the colleges taken in the study. Vinayaka Mission's Annapoorana College of Nursing occupies the seventh position. Vinayaka Mission's College of Pharmacy takes eighth position and Vinayaka Mission's College of Physiotherapy takes the last position with respect to total library memberships.It could be seen clearly from the above discussion that library memberships is high in some colleges like Vinayaka Mission's Kirupananda Variyar Engineering College and Aarupadai Vedu institute of technology.

Table 6 College-wise Distribution of Library Membership

Sl. No.	Name of the College	Staff Members			Research Scholars			Students			Others	Grand Total
		Teaching	Non-Teaching	Total	M.Phil	Ph.D	Total	UG	PG	Total		
1	Vinayaka Mission's College of Pharmacy	29(6.80)	13(3.04)	42(9.84)	-	-	-	325 (76.11)	60 (14.05)	385 (90.16)	-	427
2	Vinayaka Mission's Sankaracharyar Dental College	93(12.27)	32 (4.22)	125 (16.49)	-	-	-	587 (77.44)	46 (6.07)	633 (83.51)	-	758
3	Vinayaka Mission's Kirupananda Variyar Engineering College	527 (8.06)	278 (4.25)	805 (12.31)	-	-	-	5083 (77.76)	649 (9.93)	5732 (87.69)	-	6537
4	Vinayaka Mission's Annapoorana College of Nursing	46(8.44)	26(4.77)	72 (13.21)	21 (3.85)	16 (2.94)	37 (6.79)	400 (73.39)	36 (6.61)	436 (80.00)	-	545
5	Vinayaka Mission's College of Physiotherapy	33(8.87)	9(2.43)	42 (11.30)	-	-	-	250 (67.20)	80 (21.50)	330 (88.70)	-	372
6	Vinayaka Mission's Kirupananda Variyar Medical College	350 (20.08)	85 (4.87)	435 (24.95)	-	-	-	1150 (65.98)	16 (0.92)	1166 (66.90)	142 (8.15)	1743
7	Vinayaka Mission's Medical College	336 (19.74)	79 (4.64)	415 (24.38)	-	-	-	1150 (67.57)	16 (0.94)	1166 (68.51)	121 (7.11)	1702
8	Aarupadai Vedu Institute of Technology	123 (6.14)	82 (4.09)	205 (10.12)	-	22 (1.09)	22 (1.09)	1581 (78.38)	218 (10.41)	1799 (88.79)	-	2026
9	Vinayaka Mission's Homoeopathic Medical College	72 (9.96)	21 (2.90)	93 (12.86)	-	-	-	500 (69.16)	65 (8.99)	565 (78.15)	65 (8.99)	723
10	Aarupadai Vedu Medical College	350 (20.08)	85 (4.88)	435 (24.96)	-	-	-	1150 (65.98)	16 (0.92)	1166 (66.90)	142 (8.14)	1743
	Total	1959 (11.82)	710 (4.28)	2669 (16.10)	21 (0.13)	38 (0.23)	59 (0.36)	12176 (73.45)	1202 (6.55)	13378 (80.70)	470 (2.84)	16576

(Figures in Parentheses denote Percentage)

A study of data in table 7 indicates college wise respondents' order of getting information about new arrivals through library catalogue. It could be observed that out of the total 500 surveyed respondents, 18.40 percent of them rated library catalogue in the first order of priority in getting information about new arrivals, 23.60 percent of them regarded it as second order of priority and 24.20 percent of them considered it as third order of priority. Among the study colleges, Vinayaka Mission's Kirupananda Variyar Medical College occupy the first position in respect of library catalogue as the priority source of library information about the new arrival of library, as per the views of user respondents. Out of total respondents 20 percent of them consider it is the fourth order to avail information about new arrivals in the library through library catalogue and respondents of Aarupadai Vedu Institute of Technology are the main supporters of this view. Moreover, 13.80 percent of the total respondents attribute fifth order of priority for getting information about new arrivals in the library through catalogue and this view is reflected more by the respondents of Vinayaka Mission's' Homoeopathic Medical College than by those of other colleges. It could be seen clearly from the above discussion that respondents of Vinayaka Mission's Annapoorana College of Nursing and Aarupadai Vedu Institute of Technologyare least concerned with getting information about new arrivals through library catalogue.

Table 7 College Wise Respondents' Order of Getting Information about New Arrivals through Library Catalogue

Sl. No.	Name of the College	I	II	III	IV	V	Total
1	Vinayaka Mission's College of Pharmacy	8(16)	11(22)	14(28)	10(20)	7(14)	50
2	Vinayaka Mission's Sankaracharyar Dental College	7(14)	15(30)	11(22)	9(18)	8(16)	50
3	Vinayaka Mission's Kirupananda Variyar Engineering College	9(18)	13(26)	15(30)	7(14)	6(12)	50
4	Vinayaka Mission's Annapoorana College of Nursing	11(22)	10(20)	13(26)	12(24)	4(8)	50
5	Vinayaka Mission's College of Physiotherapy	8(16)	11(22)	13(26)	10(20)	8(16)	50
6	Vinayaka Mission's Kirupananda Variyar Medical College	14(28)	10(20)	12(24)	8(16)	6(12)	50
7	Vinayaka Mission's Medical College	11(22)	12(24)	14(28)	6(12)	7(14)	50
8	Aarupadai Vedu Institute of Technology	9(18)	13(26)	10(20)	14(28)	4(8)	50
9	Vinayaka Mission's Homoeopathic Medical College	8(16)	11(22)	10(20)	11(22)	10(20)	50
10	Aarupadai Vedu Medical College	7(14)	12(24)	9(18)	13(26)	9(18)	50
	Total	92 (18.40)	118 (23.60)	121 (24.20)	100 (20.00)	69 (13.80)	500

(Figures in Parentheses denote Percentage)

Data presented in table 8 indicates college wise respondents' order of getting information about new arrivals through library staff. It could be observed that out of total 500 respondents, 19.40 percent of them give the first order of priority in respect of getting information about new arrivals through library staff and 19 percent of them regard it as second in order of priority. In general, respondents of Aarupadai Vedu Institute of technology occupy the first position in acquiring information about new arrivals through library staff.Out of total respondents, 21 percent of them consider library staff as third order priority in getting information about new arrivals and 22 percent of them consider it as fourth in order of priority. The users of Aarupadai Vedu Institute of technology and Vinayaka Mission's Kirupananda Variyar Medical College are the major reporters of the fourth order priority for depending on the library staff to obtain information about new arrivals. Moreover, 18.60 percent of the total respondents gives the last order of priority in respect of getting information about new arrivals through library staff. Majority of the library users of Aarupadai Vedu Medical College comes under this order of depending on library staff to obtain information about new arrivals. It could be seen clearly from the above discussion that users of Aarupadai Vedu Institute of Technology occupy the first position in getting information about new arrivals through library staff.

8. FINDINGS, CONCLUSION

The present study illustrates with facts and figures on the performance evaluation of information services and facilities of the professional college libraries in Vinayaka Mission's University, Salem. The findings of the present study lead to the following observations: The findings of the distribution of colleges based on Year of Establishment and Number of departments brings out the fact that out of ten Colleges, Four colleges were established in 1980s and the remaining Six colleges were established in 1990s.The findings of the college wise respondents' order of preference of books as Reading materials reveal the following fact that the respondents' of Kirupananda Variyar Medical College have given top most priority to books as major library reading materials. The findings of the collegewise respondents' order of preference of Journals as Reading materials reveal the

following fact that the Journals as major library reading materials takes the major attention among the respondents of Vinayaka Mission's Medical College. The findings of the collegewise respondents' choice of Newspaper as a chief reading materials bring out the fact that the respondents of Aarupadai Vedu Institute of Technology give top priority to Newspapers as the main reading materials.The findings of the college-wise respondents' order of priority in the library reading materials in the form of Reports, Seminar papers and conference proceedings bring out the fact that the respondents' of Vinayaka Mission's Annapoorana College of Nursing and Vinayaka Mission's Kirupananda Varyar Medical College are less in favour of reports, seminar papers and Conference proceedings as reading materials than those other colleges.

Table 8 College-wise Respondents' Order Of Getting Information about New Arrivals Through Library Staff

Sl. No	Name of the College	I	II	III	IV	V	Total
1	Vinayaka Mission's College of Pharmacy	8(16)	10(20)	9(18)	12(24)	11(22)	50
2	Vinayaka Mission's Sankaracharyar Dental College	9(18)	9(18)	11(22)	10(20)	11(22)	50
3	Vinayaka Mission's Kirupananda Variyar Engineering College	11(22)	8(16)	13(26)	8(16)	10(20)	50
4	Vinayaka Mission's Annapoorana College of Nursing	10(20)	7(14)	11(22)	12(24)	10(20)	50
5	Vinayaka Mission's College of Physiotherapy	10(20)	12(24)	9(18)	11(22)	8(16)	50
6	Vinayaka Mission's Kirupananda Variyar Medical College	9(18)	11(22)	12(24)	13(26)	5(10)	50
7	Vinayaka Mission's Medical College	8(16)	8(16)	13(26)	10(20)	11(22)	50
8	Aarupadai Vedu Institute of Technology	15(30)	10(20)	9(18)	14(28)	2(4)	50
9	Vinayaka Mission's Homoeopathic Medical College	11(22)	8(16)	7(14)	12(24)	12(24)	50
10	Aarupadai Vedu Medical College	6(12)	12(24)	11(22)	8(16)	13(26)	50
	Total	97 (19.40)	95 (19.00)	105 (21.00)	110 (22.00)	93 (18.60)	500

(Figures in Parentheses denote Percentage)

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Scientometrics of Nonlinear Dynamics Research in India during 1989-2016

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Abstract

This paper highlight the different impact indicators such as Citation Score, Highly Cited papers, Self Citations, Average Citation Per Article, H-index of authors and H-type Index of Journals. An analysis of 3065 publications published by Indian scientists and indexed by web of science online database indicates that Nonlinear Dynamics in India picked up during 1989-2016. The Indian output in the field of laser research forms an integral part of the mainstream science as reflected by the pattern of publications and their citations in the international literature. The publication output is concentrated among few Institutions (IITs(785), IISc(286), Jadavpur University(84), Bharathidasan University(83), NITs(76) and Anna University(62)). The study indicates that the proportion of mega authored papers increased during 1989-2016 and the international collaboration is mainly with the USA, Germany, France, Italy, UK, Canada, Peoples R china, Japan and so on. It reveals upward trends in the number of articles published. Publications received 33273 citations with h-index of 68. The average citation per article is 10.86. 188 publications are from Open Access Journals out of 3065 publications.

Keywords: *Citations; Self Citations, H-index, Nonlinear Dynamics, Scientometrics.*

1. INTRODUCTION

Citations are count data, with an, as a rule, skewed distribution over the papers in a publication set: on the one hand there a few highly cited papers and on the other a large quantity of papers which are rarely, if ever, cited. Since the end of the 1990s, bibliometrics has been looking at this small group of highly cited papers particularly closely. There is a "shift from bibliometric impact scores based on average values such as the average impact of all papers published by some unit to be evaluated towards indicators reflecting the top of the citation distribution, such as the number of 'highly cited' or 'top' articles**" (van Leeuwen, Visser, Moed, Nederhof, & van Raan, 2003, p. 257).** *Citation* and referencing are important for academic writing. The purpose of a citation is to provide the reader with information to find the source of the author's facts or ideas. The information in a citation includes, at the very least, the title, author, source of publication and date of publication.

2. ABOUT CNLD AT BHARATHIDASAN UNIVERSITY

The Centre for Nonlinear Dynamics was created in recognition of the excellent contributions made to the field of nonlinear dynamics at the international level and in recognition of the S. S. Bhatnagar prize (nation's highest science prize) in Physical Sciences awarded to Prof. M. Lakshmanan (at present Professor of Eminence in the Centre for Nonlinear Dynamics, School of Physics) in 1990 to promote research in that area. In the subsequent years, it was liberally supported by the Department of Science and Technology (DST) and the Department of Atomic Energy (DAE), Government of India towards the development of infrastructure, manpower, library and computational facilities. Today, the Centre is recognized as one of the top-ranking Centres of excellence in Nonlinear Dynamics at the National and International levels. About 33 research scholars have obtained their Ph.D. degree in Nonlinear Dynamics so far and at present 22 students are pursuing their research towards Ph.D degree. More than 25 post-doctoral fellows have worked at the Centre. In addition, the Centre receives a regular stream of visiting scholars and scientists from within India and abroad for collaborative research and for discussion.

3. OBJECTIVES

i. To study the year wise distribution of publications and Citations
ii. To study the author wise distribution of publications, Citations, H-index, Average Citations Per Article and Self citations.
iii. To study the source wise distribution of Publications, Citations and H-type index.

iv. To study the institution wise distribution of publications and Citations.
v. To study the country wise collaboration of research (Publications and Citations)
vi. To study the highly cited papers (Open Access Journals and Subscribed)

4. METHODOLOGY

All publications on Nonlinear Dynamics (keywords used: "Nonlinear Dynamics") having 'India' in address field were downloaded from Science Citation Index. The data were exported and processed in the HistCite and VOSViewer to find out the contribution of Indian institutions, Authors, Citations in the field of Nonlinear Dynamics research during years 1989–2016. The year of publication, Citations, Self Citations, journals and authors were analyzed and displayed in tables using HistCite and visualize the citations using VOSViewer. The Global Citation Scores and Local Citation Scores are examined to identify the pattern of research contribution on Nonlinear Dynamics.

5. ANALYSIS AND INTERPRETATION

5.1 Year-wise Distribution of Publications

The below table represents the year-wise distribution of articles published in the field of Nonlinear Dynamics indexed in web of science online database. It shows that deals regarding the distribution of 3065 articles were published in 1989-2016. Maximum 324 (10.60%) was published in 2015 and minimum number of contribution i.e. 3 (0.1%) in the year 1989 and reveals an upward trends in the number of articles published. Publications received 33273 citations with h-index of 68. The average citation per article is 10.86. 188 publications are from Open Access Journals out of 3065 publications.

5.2 Ranking of Authors Based on Publications

Table 2 lists the top 10 most prolific authors in the field of Non linear dynamic. Heading the list based on number of appearances are the following top ten: Sharma, Ghosh, Lakshmanan, Porsezian, Sharma, Kavitha, Daniel, Sinha, Chatterjee and Ramaswamy. Among those Sharma from IIT Bombay has ranked at first with 64 publications and the author Ghosh from Vikram University has ranked at second with 50 publications and the third ranked by author Lakshmanan from Bharathidasan University shared with 46 publications and followed by scientists. Out of ten authors from the table 2 shows that four authors from Tamilnadu and 3 authors from Bharathidasan University and affiliated college.

Table 1 Year-wise Distribution of Publications

Sl.No.	Year	Records	%	TLCS	TGCS
1	2015	324	10.6	17	232
2	2014	310	10.1	70	958
3	2013	252	8.2	50	1225
4	2012	218	7.1	86	1426
5	2011	198	6.5	73	1533
6	2009	184	6.0	113	2169
7	2010	184	6.0	71	1548
8	2008	172	5.6	121	2545
9	2007	139	4.5	75	2647
10	2006	135	4.4	87	2425
11	2016	123	4.0	0	16
12	2005	107	3.5	112	1409
13	2004	97	3.2	81	1681
14	2003	77	2.5	63	1518
15	2002	69	2.3	47	1250
16	2000	57	1.9	93	1626
17	1999	55	1.8	73	1355
18	1997	53	1.7	48	719
19	2001	51	1.7	58	939
20	1996	48	1.6	60	1143
21	1998	47	1.5	42	727
22	1995	46	1.5	40	914
23	1991	29	0.9	33	318
24	1994	29	0.9	30	564
25	1993	27	0.9	63	624
25	1993	27	0.9	63	624
26	1992	24	0.8	29	289
27	1990	7	0.2	18	130
28	1989	3	0.1	2	41

5.3 Ranking of Authors based on Citations

Table 3 counting the number of times cited by other works to measure the impact of a author. The analysis by citations found that Sharma accounted for 64 publications with 1995 citations followed next by Ghosh with 1111 citations for 3 publications, Pal with 1097 citations for 4 papers and Lakshmanan with 850 citations for 46 papers.

Table 2 Ranking of Authors based on Publications

Author	Institution	Records	TGCS	H-index	Average Citation Per Article	Self Citation
Sharma A	IIT Bombay	64	1805	22	28.20	141
Ghosh S	Vikram University	50	246	8	4.92	14
Lakshmanan M	Bharathidasan University	46	855	16	18.59	59
Porsezian K	Pondicherry University	44	489	11	11.11	29
Sharma RP	IIT Delhi	43	149	8	3.51	57
Kavitha L	Central University, TN	34	257	10	7.59	40
Daniel M	Bharathidasan University	27	398	12	14.78	38
Sinha S	CSIR	24	365	10	15.21	15
Chatterjee A	Jadavpur University	26	570	12	21.92	12
Ramaswamy R	Govt College for Women, Kumbakonam	26	543	11	20.88	26

Table 3 Ranking of Authors based on Citations

Author	Institution	Records	%	TLCS	TGCS
Sharma A	IIT Bombay	64	2.1	132	1795
Ghosh SK	Inst Phys Bhubaneswar	3	0.1	0	1111
Pal T	IIT Kharagpur	4	0.1	0	1097
Lakshmanan M	Bharathidasan University	46	1.5	111	850
Sen A	Inst Plasma Res Bhat, Gandhinagar	23	0.8	20	589
Prasad A	JNU, New Delhi	25	0.8	16	578
Kargupta K	IIT Kanpur	9	0.3	36	577
Ramaswamy R	Govt College for Women, Kumbakonam	26	0.8	39	539
Bhattacharyya S	Tata Institute of Fundamental Research	3	0.1	0	503
Minwalla S	Tata Institute of Fundamental Research	2	0.1	0	492

5.4 Source-wise Distribution of Publications

The study found that the total research output of the Nonlinear Dynamic for the study period published in various journals. As the major portion of the research publications 145 covered by highly impact factor journals and impact high h-type index also. The journal "Physical Review E" topped with 145 publications with the Global Citation Score of 2023, next to "Physics of Plasmas" 89 publications with the Global Citation Score of 624 and followed by Pramana, Physics Letters A and Nonlinear Dynamics.

5.5 Institution-wise Distribution of Publications

Table 5 indicates Institution-wise research productivity. It is noted that IIT ranks first in order by contributing 785(25.6%) and received 9442 citations scores. Indian Institute of Science records the second place in order with 286 publications and received 3370 citations and followed by Jadavpur University with 84 Publications , Bharathidasan university with 83 publications and 6 Institutions from Tamilnadu among the listed top 20 Institutions.

5.6 Country-wise collaboration of Research

The global collaboration of most productive countries in Nonlinear Dynamics with Indian Scientists (Tables 6), with highest share 294 publications coming from USA, followed by Germany with 82 publications, France with 62 publications, Italy with 60 Publications and UK with 42 Publications. Indian has collaboration with more than 70 countries in the field of Nonlinear Dynamics and its shows strength of research.

Table 4 Source- wise Distribution of Publications

Sl.No.	Journal	Records	%	H-type Index	TGCS	TLCR
1	PHYSICAL REVIEW E	145	4.7	24	2023	104
2	PHYSICS OF PLASMAS	89	2.9	14	624	18
3	PRAMANA-JOURNAL OF PHYSICS	70	2.3	7	154	53
4	PHYSICS LETTERS A	48	1.6	12	460	39
5	NONLINEAR DYNAMICS	44	1.4	12	291	24
6	JOURNAL OF SOUND AND VIBRATION	43	1.4	18	734	14
7	PHYSICA SCRIPTA	41	1.3	10	169	19
8	COMMUNICATIONS IN NONLINEAR SCIENCE AND NUMERICAL SIMULATION	40	1.3	9	184	31
9	INDUSTRIAL & ENGINEERING CHEMISTRY RESEARCH	38	1.2	11	340	37
10	JOURNAL OF CHEMICAL PHYSICS	38	1.2	16	688	32

Table 5 Institution-wise Distribution of Publications

Sl.No.	Institution	Records	Rank	%	TLCS	TGCS
1	Indian Institute of Technology	785	1	25.6	479	9442
2	Indian Institute of Science	286	2	9.3	204	3370
3	Jadavpur University	84	3	2.7	43	1023
4	Bharathidasan University	83	4	2.7	165	1286
5	National Institute of Technology	76	5	2.5	15	351
6	Anna University	62	6	2.0	29	458
7	Indian Inst Technology Delhi	61	7	2.0	25	322
8	University Hyderabad	58	8	1.9	76	842
9	Jawaharlal Nehru University	54	9	1.8	55	907
10	Bhabha Atom Res Centre	52	10	1.7	19	559
11	Saha Inst Nucl Phys	46	11	1.5	3	226
12	Indian Assoc Cultivat Science	44	12	1.4	11	295
13	University Calcutta	44	12	1.4	4	271
14	Inst Plasma Res	43	13	1.4	24	696
15	University Delhi	40	14	1.3	5	951
16	Pondicherry University	39	15	1.3	19	294
17	Inst Math Science	36	16	1.2	16	510
18	Tata Inst Fundamental Res	36	16	1.2	25	1275
19	Visva Bharati University	34	17	1.1	7	252
20	Periyar University	33	18	1.1	29	150

Table 6 Country-wise Collaboration of Research in Nonlinear Dynamics

Country	Records	TLCS	TGCS	Country	Records	TLCS	TGCS
USA	294	138	4174	U Arab Emirates	5	0	61
Germany	82	30	792	Czech Republic	4	0	33
France	62	28	1200	Finland	4	1	72
Italy	60	27	540	Kazakhstan	4	16	81
UK	58	15	1535	Oman	4	1	30
Canada	42	13	431	Romania	4	1	58
Peoples R China	32	5	243	Bangladesh	3	4	30
Japan	30	16	534	Chile	3	0	43
South Korea	29	4	211	Hungary	3	0	28
Australia	25	2	260	Vietnam	3	0	3
Singapore	25	3	146	Armenia	2	0	18
Spain	22	2	187	Byelarus	2	0	21
Netherlands	18	12	188	Eritrea	2	2	11
Malaysia	17	4	96	Fiji	2	2	18
Saudi Arabia	17	3	90	Iraq	2	0	6
Unknown	17	12	199	Morocco	2	0	22
South Africa	15	0	106	New Zealand	2	0	1
Israel	14	2	97	Pakistan	2	0	7
Poland	13	1	84	Slovakia	2	0	18
Brazil	11	9	296	Thailand	2	0	34
Belgium	10	8	186	Argentina	1	0	17
Greece	10	0	73	Azerbaijan	1	0	17
Russia	10	3	116	Benin	1	0	0
Serbia	10	5	89	Bhutan	1	0	0
Mexico	9	6	106	Bulgaria	1	0	0
Austria	8	0	96	Colombia	1	0	17
Switzerland	8	0	69	Cyprus	1	0	0
Cameroon	7	1	19	Gabon	1	0	7
Sweden	7	0	64	Ireland	1	0	42
Denmark	6	0	172	Jordan	1	0	0
Iran	6	1	68	Kuwait	1	0	10
Taiwan	6	0	244	New Caledonia	1	0	9
Turkey	6	1	43	Rep of Georgia	1	0	17
Egypt	5	0	28	Slovenia	1	0	17
Norway	5	0	147	Sudan	1	3	15
Portugal	5	0	32	Tanzania	1	0	0

5.7 Highly Cited Paper from Open Access Journals

Citations, in which one paper refers to earlier works, are the standard means by which authors acknowledge the source of their methods, ideas and findings, and are often used as a rough measure of a paper's importance. Fifty years ago, Eugene Garfield published the Science Citation Index (SCI), the first systematic effort to track citations in the scientific literature. By total number of citations, the top paper is "Excitonic transitions and off-resonant optical limiting in CdS quantum dots stabilized in a synthetic glue matrix", cited 41 times and published in 2007 (Author: Kurian from IIT Madras and other from RRI Bangalore; Source: Nanoscale Research Letters) and other papers are listed in the below table. The i10 index is 17 and it mean 17 publications are received 10 and above citations.

5.8 Highly cited Paper from Non Open Access Journals

By total number of citations, the top paper is "Interparticle coupling effect on the surface plasmon resonance of gold nanoparticles: From theory to applications", cited 1047 times (1067 Citations from Web of Science, 142 Citations from BIOSIS and 28 Citations from Chinese Science Citation Index) and published in 2007 (Author: Ghose from Raidigi College, Raidigi and Pal from IIT Kharagpur; Source: Chemical Reviews) and remaining papers are listed in the below table. The i10 index is 887.

Table 7 Highly Cited Papers from Open Access Journals

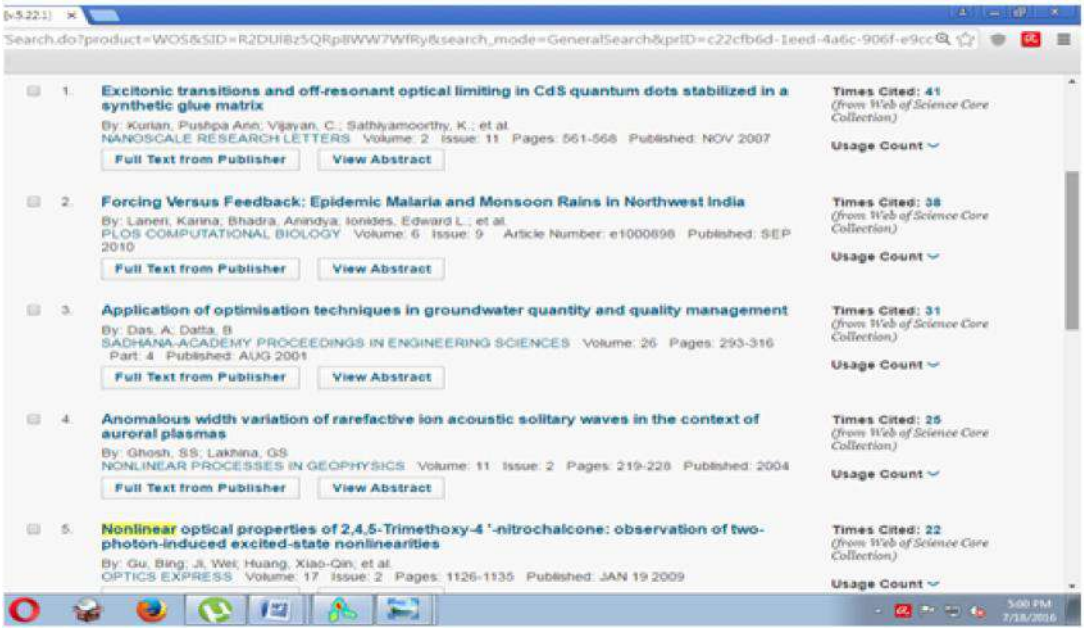
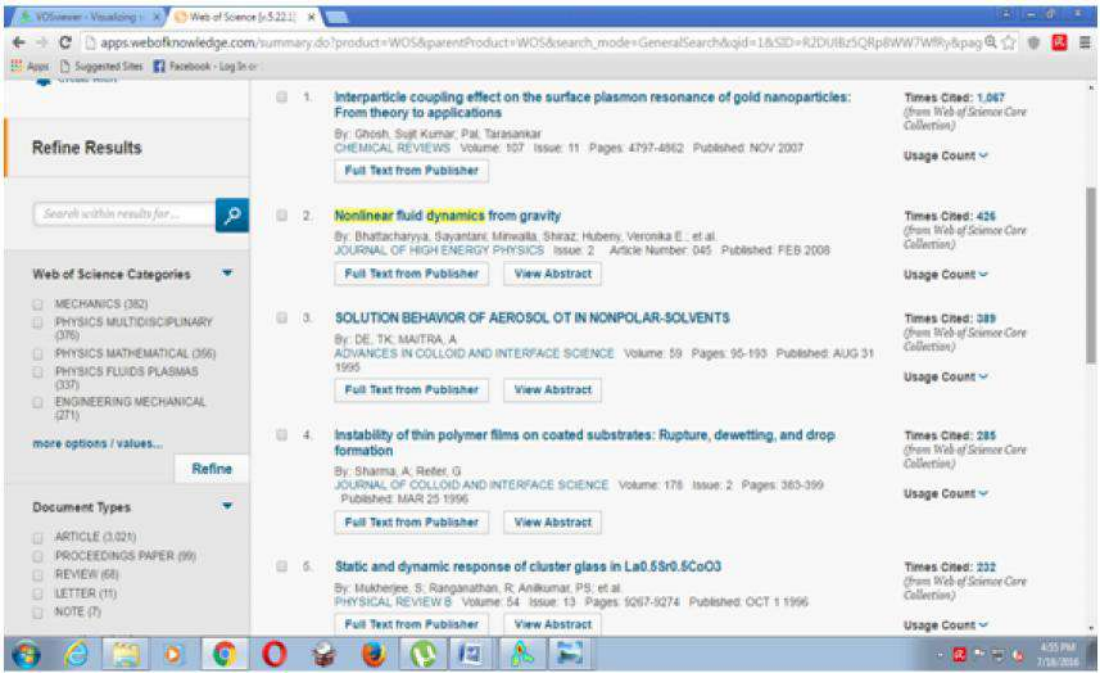


Table 8 Highly Cited Papers in Nonlinear Dynamics



6. FINDINGS AND CONCLUSION

It reveals upward trends in the number of articles published. Publications received 33273 citations with h-index of 68. The average citation per article is 10.86. 188 publications are from Open Access Journals out of 3065 publications. Out of top ten authors from the table 2 shows that 3 authors from Bharathidasan University and affiliated colleges.

Recognition of the excellent contributions made to the field of nonlinear dynamics at the international level and in recognition of the S. S. Bhatnagar prize (nation's highest science prize) in Physical Sciences awarded to Prof. M. Lakshmanan from Bharathidasan university (at present Professor of Eminence in the Centre for Nonlinear Dynamics, School of Physics) in 1990 to promote research in that area.

This study has highlighted quantitatively the contributions made by the researchers during 1989-2016 as reflected in Web of Science database. For a thorough analysis of the impact of an author or a publication, one needs to look in multiple databases to find all possible cited references. A number of resources are available that identify cited works including: Web of Science, Scopus, Google Scholar, and other databases with limited citation data. During 28 years period contributions in terms of number of publications is not significant. Though the records available in the Web of Science database reveal a small number, it is important to that the Web of Science covers only the peer-reviewed journals. Overall, at the global level collaboration of publications should be encouraged.

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Information Seeking Behaviour of Women Library Users in The University Libraries of Southern Districts of Tamil Nadu

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Abstract

This paper intents to study the Information Seeking Behaviour of Women Library users in the university libraries Southern District of Tamil Nadu with reference to Alagappa, Madurai Kamaraj and MS universities. The respondents are women post-graduate students, women research scholars and women staff members. Data has been collected from a sample of 1200 respondents. The major objectives of the present study are to identify the women library users, their need of information, their frequency of visit, the amount of time they spent in the library, their usage of formal information sources and their usage of e-resources. The significance of the study is to analyse and evaluate facts and facets pertaining to the Information Seeking Behaviour of women students, scholars and faculty members in the university libraries in the southern districts of Tamil Nadu. The data collected have been analysed separately for each object and for each university. The main findings of the study are that only 45 percent to 67 percent of the women respondents visit library daily. Since library hours have not been allotted in the time table, many PG students visit library only during their leisure hours. Majority of the women respondents visit library in all the three Universities to collect information for their career development. The study reveals that majority of the PG students and research scholars refer to e-resources to update their general knowledge as well current information about their subjects.

Keywords: *E-resources, Information, Seeking behaviour, Research article.*

1. INTRODUCTION

This paper is a study on, "Information Seeking Behaviour of Women Library Users in University Libraries of Tamilnadu". The essential components of librarians are to provide pin-pointed, exhaustive and expeditious information to users. Information is available in different channels, formats, languages and sources. It is essential for a librarian to know to what extent the information is useful to the user community in meeting their requirements. In any type of library, the user studies play a vital role in planning, designing and introducing new information services and in assessing their utilities. Information seeking bahaviour, assessment of user needs and utility of information resources are various aspects covered in the user studies.

2. CONCEPT OF INFORMATION

Dervin and Nilan (1986) described information need as a gap in individual's knowledge in sense-making situation. According to Dervin (!989) "an information need is an impediment preventing an individual from moving forward in cognitive time and space. The concept of information need has been, classified into psychological, physiological needs such as food, water and shelter and cognitive needs such as the need to plan and learn a skill. Information is a critical need of users. It is also an essential ingredient to participate in the new ways of doing personal and academic activities. The types of information required by the women library users are social pragmatic information needs for coping with day-to-day life, Recreational information needs, professional information needs and educational inform needs.

2.1 Information Seeking Behaviour

Information seeking behavior refers to the activities of a person who engages in identifying his or her own need for information, seeking for such information in any way with using or transferring of information. Information behaviour is the totality of human behaviour inrelation to the sources and channels of online communication with others as well as the passive reception of information. Taylor (1991) defines information seeking behaviour as the product of certain elements of the information user environment. The constraints and opportunities of typical environments within which any group or subgroup of this set of people operates and works. Based on the definition,

Taylor believes that the information seeking behaviour of different groups of people is also different. Wilson (1999) defines the information seeking behavior as "those activities a person may engage in which identifying his or her own needs for information searching for such information in any way, and using or transferring that information. From the above definitions, the following inferences are drawn. Information seeking Behaviour is mainly concerned with who needs and what kind of information; It is an activity of an individual in pursuit of information. It is closely related to the personal characteristics and traits of users.

3. SCOPE OF THE STUDY

The study is undertaken in the three universities situated in the southern districts of Tamil Nadu. There are Eleven Universities affiliated by Arts and Science Colleges in Tamil Nadu. For convenience the researcher has selected only three universities situated in the southern districts of Tamil Nadu. They are Manonmaniam Sundaranar University, Tirunelveli, Madurai Kamaraj University, Madurai, and Alagappa University, Karaikudi.

3.1 Period of study

The study is undertaken from January 2016 to April 2016 for a Period of four months.

3.2 Review of Past - Studies

In many of the previous studies on Information seeking behavior, even though the respondents include both women and men, the title given is general. Thee are only a few studies with reference to women respondents only. Hence, only four studies have been cited.

Panwar, B.S.& Vyas S.D.(1976) users survey of the women college libraries in their study explained a questionnaire which was distributed among UG, PG students and teachers of social sciences, library catalogue, shelf arrangement and leaders suggestions. Majority of the teachers suggested that current issues of journals should not be issued for home reading. Students suggested that number of text books and seating capacity should be increased.

Kemparaju and Tharamani Devi Studied extra curricular reading habits of PG lady students in 1988. This study was confined to 300 PG students of Bangalore University. The data was collected regarding the extent of leisure time available, kinds of literature such as news papers, magazines, novels, fictions, etc., subject interest, preferred language, favoured preferences from the point of view of local, regional, national and international coverage, write-ups, articles, editorials etc., which appealed most and the extent of satisfaction by the students belonged to different disciplines like science, social science and humanities. The findings indicated that at PG level, the students are more serious and would like to use their time worthwhile during vacations in reading. Among the various kinds of reading materials sought after news papers and magazines, books are increasingly read by the students. The interest of students in news papers and magazines are on sports, political news, film reviews, honor and social concepts. English language was preferred by majority of the students and kannada comes next. Majority of the students seem to be interested in national level publications. Majority of the students get their extra – curricular reading materials through self – purchase. Good number of lady students depend on University library to satisfy their extra – curricular reading needs.

Vijayakumar, (2010) also studied the usage pattern of electronic based curriculum influencing the reading habit of the student and found that the 60 (10%) male students and 78(13%) females said that their curriculum recommends using e-resources and 144 (24%) males and 144 (24%) females said often and 42 (7%) males and 12 (2%) females said that their curriculum never recommends e-resources. Most of the students opine their curriculum recommends using e-resources."

Ramesh, R Praveen.K. and Nagarajan.M has also E-mail user Behaviour among the users in Engineering College of Puducherry: The study cleared that out of 660 Male respondents, 285 (26.31%) used g-mail, 224 (20.68%) use yahoo mail, 74 (6.8%) used rediff mail, and 77 (7.10%) used Hot mail whereas in the case of female from a total of 423 respondetns 182 (16.81%) used g-mail, 120(11.08%) used yahoo, 70 (6.46 %) used redif and 51 (4.70%) used Hot mail."

4. METHODOLOGY

Since the Population of the study consisted of thousands of women Post graduate students, hundreds of Women research Scholars and teaching staff in each university, the population study was not possible. Because of time constraints random sampling technique was used in this study. Accordingly the questionnaires

were administered to the women library users of the three universities selected for study and responses of the users were solicited. Taking into consideration the total population and the number of teaching departments, a total of 1500 questionnaires were distributed to the women students, women research scholars and women staff of the three universities. Out of the 1500 questionnaires distributed, only 1200 questionnaires were received back fully completed. To find out the validity of the questionnaire, a pilot study was conducted. The questionnaire was revised based on the result of the pilot study. The well structured questionnaire was administered by the researcher directly to the selected samples. The collected data from the respondents were checked and analyzed according to the objectives.

5. OBJECTIVES OF THE STUDY

The following are the major objectives of the present study.

i. To identify the women library users with their frequency of library visit and their need for information
ii. To identify the users with the time spent in the library.
iii. To identify the users with the purpose of seeking information.
iv. To identify the users by their usage of formal information sources.
v. To identify the users by their usage of e-resources.

6. SIGNIFICANCE OF THE STUDY

This study proposes to analyse and evaluate the several facts and facets pertaining to information seeking behaviour of women students, women research scholars and women staff members using university libraries in the Southern Districts of Tamil Nadu.

7. SAMPLING TECHNIQUE

For the present study, stratified random sampling technique was used for the selection of women library users from Alagappa university Karaikudi, Madurai Kamaraj University, Madurai and Manonmaniam Sundaranar University. Tirunelveli. Out of 1500 questionnaires distributed, only 1200 questionnaires were returned duly filled. Hence, 1200 ladies consisting of 750 PG students, 340 research scholars and 110 staff members formed the sample for the study. The details are given in the following table.

7.1 Tools Used for Collection of Data

For the purpose of the collection of primary data, a structured, close endend questionnaire was used. In addition, informal talk with knowledgeable persons, interviews with library professionalists and observation technique were used for the collection of first hand information. Secondary data were collected from various books, journals, Magazines, news papers and unpublished M.Phil dissertations and Ph.D. theses available in the libraries.

7.2 Tools used for Analysis

Information collected through survey was analysed by using simple statistical tools like tables, percentage and averages for the purpose of interpretation of the data analysed. Diagrams were also used for interpretation of the data analysed.

8. LIMITATIONS OF THE STUDY

The study is limited to only three universities covering the southern districts of Tamil Nadu. Out of the 11 universities affiliated by Arts and Science colleges in Tamil Nadu, a small sample of three universities covering 30% have been chosen for study. Secondly the study specializes on women library users only. Hence, the outcomes of the study cannot be generalized and is applicable only to the three universities chosen for study.

9. DATA ANALYSIS AND INTERPRETATION

The population has been stratified into three categories of women library users as post graduate students, Research scholars and faculty members. With reference to the objectives framed, the data collected has been tabulated and analysed for each object for all the three Universities together. Hence, for the five objectives five tables have been used for analysis. Simple statistical tools such as averages and percentages are used for interpretation of the data.

Table 1 shows the details of the number of times the respondents visit the library. About 55.17 percent visit library daily. About 13.33 percent visit thrice in a week. The table shows that 181 (53.24%) research scholars visit library daily. It is inferred that post graduate students and research scholars mostly visit library daily.

9.1 Frequency of Library Visit

To findout how often the women library users visit libraries to collect information five alternative options have been selected viz; visit daily, once in a week, twice a week, three times a week and occasionally.

Table 1 Frequency of Visit of Library by Respondents

Frequency of Visit	PG Students	Research Scholars	Staff	Total	Percentage to Total
Daily	460	181	21	662	55.17
Once in a week	85	28	35	148	12.33
Twice in a week	113	46	24	183	15.25
Thrice in a week	72	77	11	160	13.33
Occasionally	20	08	19	47	3.92
Total	**750**	**340**	**110**	**1200**	**100.00**

Source: Primary Data

9.2 Time Spent in Library

The second object was to collet information regarding the amount of time spent by the respondents in the library per visit.

Table 2 shows that 402 post graduate students spent less than one hour in the library. On enquiry it was found that the PG students go to library according to the time table. Secondly whenever a class is cancelled, the students may be asked to go to library. Out of 340 research scholars, about 72(21.18%) remain in the library continuously for 1 to 2 hours. At the time of finalizing the draft of their thesis they spent more time in the library. So it is inferred that only the research scholars spent more than two hours in the library. Many respondents stated that the facilities provided in the library for research scholars should be improved so that they can sit for long hours in the library and attend to their research work.

9.3 Purpose of Seeking Information

The third object of the study was to collect data regarding the different purposes for which the women respondents collect information. On enquiry it was found that the respondents collect information with regard to the following purposes viz; career development, to solve some immediate practical problem, to keep themselves with uptodata knowledge and to write either an article or a research paper. Table 3 depicts the details of purposes.

The table 3 shows that a majority of 375 (50%) Post grauate students collect information above career development, whereas 184(54.12%) research scholars seek information to write an article in a referced journal or to write a research paper with regard to their research topic. Hence, it is inferred that majority of the respondents collect information with regard to their career development. Only about25 per cent of the respondents showed interest in up-dating their knowledge.

9.4 Use of Formal, Information Sources

The fourth object was to study about the use of different information sources by the respondents. The sources selected for study were: Books, Periodicals, reference sources, thesis, project work, conference proceedings and e-resources. The table 4 shows that 396 (52.80%) post-graduate students mainly refer to books and another 106 (14.33%) PG students refer to previous theses and project reports for information sources. With regard to researchscholars207 (60-88) out of 340 depend on previous thesis and project works for source of information. As far as staff members are concerned, about 36 (32.73%) out of 110 mainly study previous thesis and project works for source of Information. It is inferred that majority of the respondents use books, thesis and project works as sources of information.

Table 2 Time Spent in the Library

Sl.No.	Hours Spent	PG Students	Research Scholars	Staff	Total	%
1	Less than 1hr	402	100	62	564	47
2	1 – 2 hrs	228	72	24	324	27
3	2 – 3 hrs	109	96	15	220	18.33
4	More than 3 hrs	11	72	09	92	7.66
	Total	**750**	**340**	**110**	**1200**	**100.00**

Source: Primary Data

Table 3 Purpose of Seeking Information

Sl. No.	Purpose of Seeking Information	PG Students	Research Scholars	Staff	Total	%
1	For career development	375	38	18	431	35.92
2	To solve immediate/ Practical problem	120	32	16	168	14.00
3	To keep up to data	185	86	34	305	25.42
4	To write article or Research paper	70	184	42	296	24.66
	Total	**750**	**340**	**110**	**1200**	**100.00**

Source : purpose of seeking information

Table 4 Use of Formal Information Sources

Sl. No.	Purpose of Seeking Information	PG Students	Research Scholars	Staff	Total	%
1	Books	396	17	07	420	35.00
2	Periodicals	94	42	21	157	13.08
3	Reference sources	63	47	30	140	11.67
4	Thesis and project works	106	207	36	349	29.08
5	Conference proceedings	68	27	16	111	9.25
6	E-resoruces	23	0	0	23	1.92
	Total	**750**	**340**	**110**	**1200**	**100.00**

Source : use of formal information

9.5 Usage of E - Resources

The final objective of the study was to identify the users by their usage of e-resources in the three universities functioning in the southern districts of Tamil Nadu. For the purpose of study the following four e - resources have been taken. Viz; E-journals, E-Books, CD/DVDS & CD ROM database and Audio-visual resources.

Table 5 shows that a majority of respondents 423 (35.23%) use E-Journals followed by 360 (30%) respondents use E-Books, About 267 (22.25%) use CD/ DVD and another 150 (12.50%) use Audio-visual resources. It is inferred hat majority of the respondents use E-journals and E-Books.

Table 5 Usage of E-resources

Sl. No.	Use of E-resources	PG Students	Research Scholars	Staff	Total	%
1	E - journals	265	113	45	423	35.25
2	E – Books	232	99	29	360	30.30
3	CD/DVDS/CD ROM database	171	74	22	267	22.25
4	Audio – visual resources	82	54	14	150	12.50
	Total	**750**	**340**	**110**	**1200**	**100.00**

Sources :use of E-resource

10. FINDINGS OF THE STUDY

The following are the major findings of the study.

i. The study revealed that majority of the Post graduate students and research scholars visit library daily in all the three Universities.
ii. The Research Scholars only spent more that 2 hours in the library. The PG students spent less that an hour in the library.
iii. The study shows that majority of the respondents collect information with regard to their career development and only 25% fo the respondents showed interest in updating their knowledge.
iv. The study reveal that majority of the respondents use books, thesis and project works as sources of information.
v. It is found that majority of the respondents use E-journals and E-Books.

11. SUGGESTIONS

The following are some of the suggestions offered by the women respondents for improving facilities in the libraries of the Universities

i. Libraries should make available or increase e - books, e-journals, indexing and abstracting journals and provide database services in online and offline.
ii. The libraries should provide orientation programme. It is suggested that advanced training for users at different levels should be started. The content of training programs should be; (a) basic introduction to library services and facilities; (b) using OPAC; (c) methods and tools for searching information resources; (d) using internet; (e) using online and CD-ROM database; (f) using electronic journals; (g) introducing reference books and (h) introducing appropriate indexes and abstracts.
iii. Libraries should take initiatives to prepare a list of subject websites that are useful to the users.
iv. Computer printout and CD writing services should be provided with normal charges at the university libraries.
v. Links to open access repositories, databases and online journals should be provided on the library web page.
vi. Many respondents stated that the facilities provided in the library for women Research Scholars should be improved so that they can sit for long hours in the library and attend to their research work.

12. CONCLUSION

Libraries must understand information seeking behaviour of users to re-engineering their services and provide information efficiently. The results of this study reveal that the women library users are satisfied with library collections and services but they want training in the use of online information. Although document delivery service is being provided on demand, the researchers pointed out that it would be worthwhile if the library could provide the users with indexing abstracting and inter library loan service as well user education about library using must be carried out as a seminar or workshop trainings.

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Scientometric Portrait of Professor M. Lakshmanan: A Study based on Scopus Online Database

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Abstract

Professor M. Lakshmanan has been one of the most versatile research workers in the field of Nonlinear Dynamics today at the international level (15 countries) and has contributed to the field extensively. Particularly very few people have contributed to both the fields of Solitons and Chaos, which are major constituents of Nonlinear Dynamics, on equal footing as Prof. Lakshmanan has done. Further, Dr. Lakshmanan has single handedly built an active research group of international standard in Nonlinear Dynamics and established a Centre for Nonlinear Dynamics at Bharathidasan University, Tiruchirapalli, India. However, there are hardly any sources through which other outputs of these collaborations with 70 Institutions and it could be easily documented and studied.Scientometrics is an application of quantitative techniques for documenting, collecting works of eminent scientists and researchers. In this study present a concise sketch of Professor M. Lakshmanan on his scientific achievements and his research has made great impact in Nonlinear Dynamics. The channals of communications used and distribution of publications among the channels were found with indicators. He has 291 Publications to his credit and received 5014 citations with 38 h-index during the period of 1972-2016. The results indicate his secular publication productivity and nature of research activities were such that he eminently qualified to be taken as a role model for the young generation to emulate in the field of Nonlinear Dynamics.

Keywords: *Scientometric Portrait; Citations; h-index; Highly Cited Papers;*

1. INTRODUCTION

The terms bibliometrics by Pritchard and 'Naukometriya' (the Russian for 'Scientometrics') by Nalimov&Mulchenko were coined simultaneously in 1969 while Narin (1976) used the term 'Evaluative bibliometrics' to denote the use of bibliometric techniques, especially publication and citation analysis in the assessment of a scientific creativity.Bibliometrics is not only the term that is used to refer to the quantitative study of document-related processes. Scientometrics,is fields that overlap with bibliometrics to greater or lesser extent (in the sense either that similar methods are used, or that related processes are studied);

Kalyane and Kalyane (1993) for the first time used the phrase 'Scientometric Portrait' to carry out bio-bibliometric studies on scientists while Sinha&Bhatnagar (1980) and Sinha&Ullah (1994) used the term 'Information profile' for such studies while Sen (1995) proposed the term 'Microbibliometrics' for the studies on individual scientists in IASLIC conference (1994). Recently the term 'Bio-bibliometrics' is being used for a method of retrieving and visualizing biological information (Stapley& Benoit, 2000) while Koganurmath, et al. (2003) have suggested that 'Scientometric portrait' is the appropriate phrase for the studies on scientists.

2. BIOGRAPHICAL SKETCH

M Lakshmanan earned his BSc from NGM College, Pollachi and MSc from Madras Christian College. He carried out his doctoral research in nonlinear dynamics at the Department of Theoretical Physics, University of Madras (1970-74) under the supervision of PM Mathews. He then spent a year at the University of Tuebingen, as an Alexander von Humboldt Foundation post-doctoral Fellow and another year at Eindhoven University. He was a Royal Society Nuffield Foundation Fellow at University of Manchester, Institute of Science and Technology (1979-80); Visiting Guest Scientist, University of Uppasala (1981); and JSPS Fellow at Kyoto University (1984-85). He has also held several short-term Visiting positions in many countries from time to time. Lakshmanan joined the Department of Physics, Bharathidasan University (then Autonomous

Postgraduate Centre of University of Madras), Tiruchirapalli (1978) as a Reader He became Professor (1984) and served as Head of the Department of Physics (1992-2006), when he was made Professor of Eminence.

2.1 Academic and Research Achievements

Lakshmanan has intensive research activities in nonlinear dynamics and theoretical physics including the fields of solitons, integrable systems, bifurcations and chaos and their applications. His identification of magnetic solitons in ferromagnetic systems, invention of the simplest dissipative chaotic circuit along with Murali and Chua (MLC circuit) and his demonstration on the energy sharing collision of optical solitons in multimode fibres, and many other novel results, have enriched the subject and made a mark in the field. A thriving school of young research workers under his leadership started working on different areas of non-linear dynamics. He has published more than 315 research articles with 5060 Citationsindexed in Web of Science databases and 291 publication with 5014citations index in Scopus database and wrote/edited several books on non-linear dynamics. He has mentored 25 Ph.Ds and many MPhil and MSc students.

He served as an INSA Council Member (2005-07). He has also served/is serving as a Member of the Editorial Boards of several prestigious journals, such as Proceedings of Royal Society of London A, International Journal of Bifurcation and Chaos, Chaos Solitons and Fractals, Journal of Nonlinear Mathematical Physics, and Advances in Mathematical Physics.

2.2 Awards and Honours

Lakshmanan received SS Bhatnagar Prize (1989), Hari Om Trust MeghnadSaha Award of UGC (1990), Tamil Nadu Scientists Award (1994), N Biren Roy Memorial Lecture Award of INSA (1998), Goyal Prize (2005), VV Narlikar Memorial Lecture Award of INSA (2006), Raja Ramanna Fellowship of DAE (2006), DST Ramanna Fellowship (2007) and AC Banerjee Lecture Award by NASI (2007). He is a Fellow of the Indian Academy of Sciences, Bangalore and National Academy of Sciences (India), Allahabad, and is an elected Foreign Member of Royal Academy of Sciences, Uppasala, Sweden.

3. OBJECTIVES OF THE STUDY

The prime purpose of the study is to document quantitatively the publication productivity pattern of Dr. M. Lakshmanan from Bharathidasan University:

i. Year-wise and domain-wise productivity
ii. To analyze the authorships and collaborative pattern
iii. To identify the highly cited papers and h-index
iv. Core Channels of Communication and distribution of publications among these channels
v. Geographical distribution of publications and collaborations

4. METHODOLOGY

The study of the Publications and citations of the information down loaded from the Scopus online database, it was observed that there are certain duplicate names in the list. After dropping duplicate name the list counts 291 publications during 1972-2016, which are considered for study purpose using limiting search techniques. The study identifies year, domain-wise productivity and Collaborations, collaborative pattern, mentor's authorship credibility, individual collaborator dynamics, channels of communication used and distribution of publications among channels and geographical distribution of publications with collaboration. Further, the study find out prominent collaborators, the most productive period, top ranking journals, publication density and concentration.

5. DATA ANALYSIS & DISCUSSION

The contribution of 291 publications during 1972-2016 by the mentor were analyzed year, and domain-wise, author-wise authorships credits, mentor's authorship credibility, channels of communication used, Citations, countries of productivity and subject terms used in the titles.

5.1 Year-wise Distribution of Publications

Table 1 describes year-wise contribution of 291 publications by thementor from 1972-March 2016. He has published maximum 20 publications in the year 2009. In his 45 years of research career 1972 is the only year when he made contribution with single publication.

Table 1 Year-wise Distribution of Publications

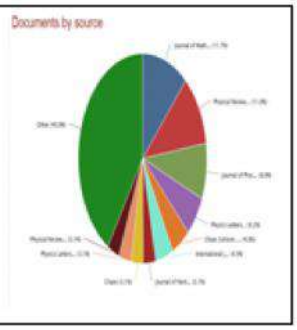
Year	Publications	Year	Publications
2016	2	1993	7
2015	14	1992	8
2014	12	1991	3
2013	10	1990	7
2012	9	1989	3
2011	8	1988	3
2010	12	1987	3
2009	20	1986	7
2008	7	1985	5
2007	10	1984	3
2006	9	1983	5
2005	15	1982	5
2004	5	1981	6
2003	4	1980	6
2002	2	1979	6
2001	8	1978	4
2000	3	1977	2
1999	6	1976	1
1998	6	1975	5
1997	16	1974	1
1996	5	1973	3
1995	5	1972	1
1994	9		

5.2 Document-wise Distribution of Publications

The table 2 depicts the top 7 document wise distribution ofarticles publishedin the sources during 1972 to 2016 by Professor M. Lakshmanan from Bharathidasan University. The productivity ofscientistsspreads over variety of publication media, such that journal articles; Erratum, letter; editorial materials;Notes, Reviews and so on.

Table 2 Document-wise Distribution of Publications

Document Type	Publications
Article	258
Erratum	8
Letter	8
Review	7
Conference Paper	5
Note	4
Editorial	1



It is clear from bellow table analysis that the share of journal articlesisthe most prominent bibliographic form of publication and it occupies 258 of total publications and followed by other sources of information.

5.3 Highly Cited Papers from Professor M. Lakshmanan

Table 3 list papers which were cited more than 80 times during 1977-2016. Data presented in snap shot and 10 papers received more than 100 citations as these have a bigger citation. Totally 5414 citations received out of 292 papers and h-index is 72. 259 paper received the citation range from 1- 100 and only 23 papers does not have citation.

5.4 Source-wise Distribution of Publications

The table 4 depicts the source wise distribution of publications, published in the journal during 1972 to 2016by Professor M. Lakshmanan. Journal of Mathematical Physics is top ranked with 34 publications, followed by Physical Review E Statistical Nonlinear and Soft Matter Physicswith 32 publications, while Journal of Physics A Mathematical and General third with 25 publications and followed by other Journal titles. SJR, SNIP, IF and IPP are the indicators for measuring the journals.

5.5 Collaborative Author-wise Distribution of Publications

It provides the detail of 121 collaborative authorships out oftotal 291 Publications. Among these 291Publications,49 publications are with V. K. Chandrasekar, 40 Publications are with M. Senthilvelan and followed by other scientists from all over the world.

5.6 Institution and Country-wise Collaboration of Professor M. Lakshmanan

Professor M. Lakshmanan has been one of the most versatile research workers in the field of Nonlinear Dynamics today at the international level (15 countries) and has contributed to the field extensively. Particularly very few people have contributed to both the fields of Solitons and Chaos, which are major constituents of Nonlinear Dynamics, on equal footing as Prof. Lakshmanan has done. His many faceted research works have enriched the subject considerably and contributed to the advancement of the general theory of solitons, integrable systems, magnetic and optical solitons,

classical chaos including bifurcations, controlling, synchronization and secure communications as well as quantum chaos and spatiotemporal patterns. Further, Dr. Lakshmanan has single handedly built an active research group of international standard in Nonlinear Dynamics and established a Centre for Nonlinear Dynamics at Bharathidasan University, Tiruchirapalli, India. However, there are hardly any sources through which other outputs of these collaborations with 70 Institutions and it could be easily documented and studied.

5.7 Subject-wise Distribution of Publications

The table 7 depicts the top 14 subject-wise distribution ofarticles published in different sources during 1972 to 2016. Physics and Astronomysubject istop rankedwith 236 publications, followed by Mathematics subjects with 170 publications, while Engineering subject ranked third with 21 publications and followed by remaining subjects.

Table 3 Highly Cited Papers from Professor M. Lakshmanan

1	Continuum spin system as an exactly solvable dynamical system View at Publisher	Lakshmanan, M.	1977	Physics Letters A	237
2	Inelastic collision and switching of coupled bright solitons in optical fibers	Radhakrishnan, R., Lakshmanan, M., Hietarinta, J.	1997	Physical Review E - Statistical Physics, Plasmas, Fluids, and Related Interdisciplinary Topics	166
3	Singularity analysis and localized coherent structures in (2+1)-dimensional generalized Korteweg-de Vries equations	Radha, R., Lakshmanan, M.	1994	Journal of Mathematical Physics	150
4	Exact soliton solutions, shape changing collisions, and partially coherent solitons in coupled nonlinear Schrödinger equations View at Publisher	Kanna, T., Lakshmanan, M.	2001	Physical Review Letters	144
5	Bright and dark soliton solutions to coupled nonlinear Schrodinger equations View at Publisher	Radhakrishnan, R., Lakshmanan, M.	1995	Journal of Physics A: Mathematical and General	129
6	Transmission of signals by synchronization in a chaotic Van der Pol-Duffing oscillator	Murali, K., Lakshmanan, M.	1993	Physical Review E	121
7	On the dynamics of a continuum spin system View at Publisher	Lakshmanan, M., Ruijgrok, Th.W., Thompson, C.J.	1976	Physica A: Statistical Mechanics and its Applications	118
8	Hyperchaos in a modified canonical Chua's circuit View at Publisher	Thamilmaran, K., Lakshmanan, M., Venkatesan, A.	2004	International Journal of Bifurcation and Chaos in Applied Sciences and Engineering	117
9	Secure communication using a compound signal from generalized synchronizable chaotic systems	Murali, K., Lakshmanan, M.	1998	Physics Letters, Section A: General, Atomic and Solid State Physics	116
10	Dromion like structures in the (2+1)-dimensional breaking soliton equation View at Publisher	Radha, R., Lakshmanan, M.	1995	Physics Letters A	104
11	Painlevé analysis and integrability of coupled non-linear Schrödinger equations View at Publisher	Sahadevan, R., Tamizhmani, K.M., Lakshmanan, M.	1986	Journal of Physics A: Mathematical and General	92
12	Exact soliton solutions of coupled nonlinear Schrödinger equations: Shape-changing collisions, logic gates, and partially coherent solitons	Kanna, T., Lakshmanan, M.	2003	Physical Review E - Statistical, Nonlinear, and Soft Matter Physics	84

Table 4 Source-wise Distribution of Publications, SJR, IPP, SNIP and IF

Source Title	Publications	SJR	IPP	SNIP	IF
Journal of Mathematical Physics	34	0.722	1.032	0.905	1.243
Physical Review E Statistical Nonlinear and Soft Matter Physics	32	1.034	1.922	1.004	2.238
Journal of Physics A Mathematical and General	25	0.785	1.256	0.767	1.583
Physics Letters A	18	0.662	1.619	0.978	1.626
Chaos Solitons and Fractals	14	0.697	1.428	1.030	1.503
International Journal of Bifurcation and Chaos in Applied Sciences and Engineering	13	0.540	0.998	0.754	1.078
Journal of Nonlinear Mathematical Physics	9	0.596	0.688	0.627	0.760
Chaos	9	0.775	1.475	0.823	1.954
Physics Letters Section A General Atomic and Solid State Physics	9	0.662	1.619	0.978	-
Physical Review Letters	9	4.402	6.471	2.464	7.512

Table 5 Collaborative Author-wise Distribution of Publications

Author	Publications	Author	Publications
Chandrasekar, V.K.	49	SenthilVelan, M.	6
Senthilvelan, M.	40	Palaniyandi, P.	6
Senthilkumar, D.V.	27	Subash, B.	5
Murali, K.	21	Vijayalakshmi, S.	5
Kurths, J.	17	Ganesan, K.	5
Radha, R.	16	Rajendran, S.	5
Kanna, T.	15	Myrzakulov, R.	5
Daniel, M.	13	Nakamura, K.	5
Venkatesan, A.	13	Sakkaravarthi, K.	4
Muruganandam, P.	13	Gopal, R.	4
Sheeba, J.H.	11	Murugesh, S.	4
Kaliappan, P.	10	Froman, P.O.	4
Tamizhmani, K.M.	10	Kumar, C.S.	4
Sahadevan, R.	9	Froman, N.	3
Srinivasan, K.	9	Tiwari, A.K.	3
Suresh, R.	9	Ganesan, S.	3
Porsezian, K.	8	Mohanasubha, R.	3
Vijayajayanthi, M.	8	Mathews, P.M.	3
Pandey, S.N.	8	Raja Mohamed, I.	3
Rajasekar, S.	8	Karlsson, F.	3
Radhakrishnan, R.	8	Bindu, P.S.	3
Pradeep, R.G.	7	Athavan, N.	3
Thamilmaran, K.	7	Kundu, A.	3
Parthasarathy, S.	6	Ponnuswamy, P.K.	3

Table 6 Country and Institution-wise Distribution of Publications

Country (15)	Publications	Institution (70)	Publications
Germany	21	University of Madras	32
United Kingdom	11	Potsdam Institut fur Klimafolgenforschung	15
Japan	9	Humboldt-Universitatzu Berlin	14
Sweden	6	Anna University	14
United States	6	SASTRA University	11
Australia	5	Bishop Heber College India	9
Kazakhstan	5	Universitat Potsdam	9
Netherlands	3	Nehru Memorial College	7
France	2	Motilal Nehru National Institute of Technology	6
Belgium	1	Uppsala Universitet	6
China	1	University of Aberdeen	6
Finland	1	Government College for Women	4
Greece	1	University of Manchester	4
Italy	1	Fukuoka Institute of Technology	4
Poland	1	Kyoto University	4

Table 7 Subject-wise Distribution of Publications

Subjects	Publications
Agricultural and Biological Sciences	3
Biochemistry, Genetics and Molecular Biology	1
Chemistry	21
Computer Science	2
Decision Sciences	1
Earth and Planetary Sciences	1
Engineering	22
Environmental Science	1
Immunology and Microbiology	1
Materials Science	6
Mathematics	170
Medicine	5
Multidisciplinary	21
Physics and Astronomy	236

6. CONCLUSION

Professor M. Lakshmanan has been one of the most versatile research workers in the field of Nonlinear Dynamics today at the international level and has contributed to the field extensively. Particularly very few people have contributed to both the fields of Solitons and Chaos, which are major constituents of Nonlinear Dynamics, on equal footing as Prof. Lakshmanan has done. His many faceted research works have enriched the subject considerably and contributed to the advancement of the general theory of solitons, integrable systems, magnetic and optical solitons, classical chaos including bifurcations, controlling, synchronization and secure communications as well as quantum chaos and spatiotemporal patterns. Further, Dr. Lakshmanan has single handedly built an active research group of international standard in Nonlinear Dynamics and established a Centre for Nonlinear Dynamics at Bharathidasan University, Tiruchirapalli, India.

In 1977, Professor Lakshmanan had made one of his outstanding contributions to Nonlinear Dynamics by proving that the continuum Heisenberg ferromagnetic spin system (this paper about has more than 300 citations (In Scopus 237 citations)) is a completely integrablesoliton system, thereby leading to the notion of magnetic solitons.Finally, one must also note that Professor Lakshmanan had done yeoman service to the cause of theoretical physics and in particular Nonlinear Dynamics in India and elsewhere by developing the Centre for Nonlinear Dynamics to international level from scratch at a remote place Tiruchirapalli in southern India. The facilities at the Centre have been availed by a large number of scientists all over the country and abroad. Professor Lakshmanan is revered as a father figure in Nonlinear Dynamics by fellow scientists in India. Top 10 paper received more than 100 citations out 292 papers

and it well contribution to the Bharathidasan University. More over this study will continue with other databases like Web of Science and Indian Citation Index and so on.

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Application of Bradford's Law to LIS research: Citation study of the Journal of the University Librarians Association of Sri Lanka

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Abstract

This study analyzes all the 70 articles, which revealed 1050 citations, in the open access Journal of University Librarians Association (JULA) of Sri Lanka, published since the initiation of this journal in 2005 up to date. The purpose of this paper is to testify the Bradford's law of scattering in the Journal of the University Librarians Association (JULA) of Sri Lanka and apply this law to identify the core journals utilized by Sri Lankan LIS researchers. Findings revealed that journals were the most frequently cited format, accounting for 49.24% of all citations. Data sets were fit well with the Leimkuhler model of Bradford's law. Fifteen journals were identified as belonging to the most productive nucleus of journals cited by articles in the Journal of University Librarians Association (JULA). In the ranked list of core journals, The Journal of Academic Librarianship took the top place. This paper provides useful insights into the current nature of academic publishing in the Journal of University Librarians Association (JULA) and can be used as a baseline indicator for the improvement of this journal. In addition, the study will help librarians for LIS collection development in Sri Lankan libraries.

Keywords: *Bradford's law, Citation analysis, Journals*

1. INTRODUCTION

The term "bibliometrics" was pioneered by Alan Pritchard in 1969 to describe "the application of mathematics and statistical methods to books and other media of communications" (Jena et al., 2012). Citation analysis, which is a branch of bibliometrics, "offers an unobtrusive method for studying the scholarly communication process of researchers in a specific field and of libraries' own patrons" (Young, 2014).

Journals are vital for research purposes. Every discipline has journals to which researchers frequently refer because of the close link between the journal literature and the research work (Wardikar, 2013). These highly cited "core journals", a concept derived from Bradford's law of scattering, "always contain a higher concentration of relevant articles in a particular discipline" (Sudhier, 2010). Citation analysis is the most popular technique in bibliometrics for identifying core journals in a discipline. It provides useful information to scholars while supporting librarians in their challenging decision-making regarding collection development given the increasing cost of journal subscriptions and limited library budgets.

There is a need for Sri Lankan libraries to enhance and update their LIS journal collections, in order to better serve their users and provide them with the most current and relevant information. The academic librarians themselves are the main category of users of the library LIS collections and engage in research as part of their academic profession. This study may serve as a baseline indicator of resources used by LIS researchers in Sri Lanka and can be used by library managers to focus on LIS collection development. At the same time, this study aims to create awareness among Sri Lankan LIS researchers about the current trends of their information resource usage. Identifying current trends in research output via the articles of this journal will help when proposing changes and suggesting new areas for development of the journal under study.

For this study, the *Journal of the University Librarians Association (JULA)* of Sri Lanka, a peer-reviewed journal published by the University Librarians Association of Sri Lanka (ISSN: 1391-4081), was selected because it provides a major platform for scholarly communications among academic librarians in Sri Lanka. This is a biannual publication that can be accessed through http://jula.sljol.info/.

The objectives of this study are to:

- Determine the most cited format of literature by LIS academic researchers of Sri Lanka
- Prepare a ranked list of core journals
- Demonstrate Bradford's law of scattering
- Make recommendations for LIS collection development

2. LITERATURE REVIEW

Wardika (2013) has applied Bradford's law to LIS research by conducting an analysis on doctoral thesis citations submitted to the Universities of Maharashtra. This study included 798 periodicals containing 5,467 references extracted from 138 theses from 1982-2010. *Annals of Library Science and Documentation* took top place in the ranked list of journals. The data sets were fit with the Leimkuhelr model of Bradford's law. In his application of Bradford's law on Human-Computer Interaction (HCI) research literature, Kumar (2014) used 137,120 articles published in journals indexed in Science Citation Index from 1987-2011 and observed that practical data did not fit with either the verbal or graphical Bradford formulation.

Banateppanavar *et al* (2015) conducted a citation analysis of articles published in the journal *Collection Building* from 2009-2012. The study revealed that journals (53.84 per cent) were the most preferred source used by LIS researchers and that *Collection Building* was ranked first with 68 citations (9.70 per cent). Data in that study fit well with Bradford's law of distribution.Similar studies were carried out by Edewor (2013) and Gupta and Rattam (2013). Edewor (2013) examined articles in the *Journalof Information and Knowledge Management (IIJIKM)* from 2010-2013, while Gupta and Rattam (2013) analyzed articles in the online journal *Information Research: An International Electronic Journal (IR)* from 2008-2012. Both studies identified journals as the most popular format. In the ranked lists, the journal *Library Philosophy and Practice (E-journal)* topped the list in the former study while the *Journal of the American Society for Information Science and Technology* came in first in the latter. Barik and Jena (2014) conducted a study to analyze the growth of LIS research articles in India, examining a total of 385 articles indexed by the Scopus database from 2004-2013. Bradford's law was applied to identify the scattering of core journals. Fasae (2012), Zafrunnisha (2012), and Trigar *et al* (2013) have analyzed research literature in different disciplines and observed that journals were the most preferred format of citation.

3. METHODOLOGY

This study examined all the articles published so far (that is from 2005-2016) in the *Journal of University Librarians Association (JULA)*, Sri Lanka. The necessary data were retrieved via the journal's website. The reference lists of each work were analyzed individually, and the data were tabulated to align with the objectives of the study using Excel spreadsheets. Only full-length research articles were examined, excluding book reviews, commentaries, and editorials. Citations were categorized into categories of journals, books, proceedings, theses and dissertations, web resources, reports (including annual and technical reports), and miscellaneous (including government documents, circulars, standards, manuals, handbooks, newspapers, magazines, and course materials).

Quantitative analysis was conducted on a total of 1050 citations extracted from 70 articles. Cited journals were then arranged in descending order of frequency. Bradford's law was applied to determine the core journals.

3.1 Application of Bradford's Law

Bradford's law of scattering is a bibliometric tool that is used extensively to study the productivity of journals in a particular discipline. This law expresses the quantitative relationship between journals and the publications cited in them. The journals are arranged in descending order of their productivity and divided into approximately equal zones. Bradford defined the first zone as the "nuclear zone", which is highly productive and accounts for a small number of core journals. The second zone is described as moderately productive, and the third zone as low productive. Bradford perceived a systematic order in computing the number of titles in each of the three zones and concluded that the ratio of the journal titles in successive zones followed a common pattern (Sudhier, 2010).

Bradford defined his law of scattering as follows:

[. . .] if scientific journals are arranged of decreasing productivity of articles on a given subject, they may be divided into a nucleus of periodicals more particularly devoted to the subject and several groups or zones

containing the same number of articles as the nucleus, when the numbers of periodicals in the nucleus and succeeding zones will be as 1: n: n^2 [. . .] (Bradford, 1950, p. 116).

Bradford did not introduce a mathematical model for his law, though later several authors, including Brookes, Vickery, and Leimkuhler, did formulate such models (Sudhier, 2010). Leimkuhler(1980) developed a model based on Bradford's verbal formulation:

$R(r) = a \log (1 + br)$ (1)
r=1,2,3, . . .

Where R(r) is the cumulative number of items produced by sources of rank 1,2,3,. . ., r.
a and b are constants appearing in Leimkuhler's law.
In explaining Leimkuhler's law, Egghe (1985, 1990a, 1990b) has shown:

$a=Y_o/\log K$ (2)
$b = (k - 1) / r_o$ (3)

Where r_o is the number of sources in the first Bradford's group, Y_o is the number of items in every Bradford group (all these groups of items being of equal size), and k is the Bradford multiplier.

Egghe (1986) has derived a mathematical formula for calculating k. His formula is based on the fact that if journals are ranked in decreasing order of productivity, Y_m is the number of items in the most productive source (i.e. the source of rank one). p is the number of groups and a parameter that can be chosen freely in the formation of Bradford's groups. Once p and Y_m are determined, k can be calculated by:

$k = (e^{\gamma} Y_m)^{1/p}$ (4)

Where γ is Euler's number

γ =0.5772 and e^{γ}=1.781

Then, $k = (1.781\ Y_m)^{1/p}$ (5)

Also Y_0 and r_o follows:

$Y_o = Y_m^2 \log k$ (6)
and
$r_o = (k - 1)Y_m$(7)

According to Egghe (1990b), formulas (6) and (7) have limited application because Y_o and
r_o can be deduced easily using practical data.

Furthermore, Egghe (1990a, 1990b) has shown that:

Y_o = A/p, where A denotes the total number of articles in the bibliography.

Let T be the total number of sources (journals). In the i^{th} Bradford group, there are $r_o k^{i-1}$ sources (i =1, 2, 3, . . .p). Therefore,

$T = r_o + r_o k + r_o k^2 + ... + r_o k^{p-1}$ (8)

So, $r_o = T/ (1 + k + k^2 + . . . + k^{r-1}) = T (k -1) / (k^p \_ 1)$ (9)
Since A and T are known from the raw data, r_o and Y_o are calculated once k is calculated using formula (5).

4. RESULTS AND DISCUSSION

A total of 1050 citations were collected in this study from 70 articles published so far since 2005 to date, in the *Journal of University Librarians Association (JULA)*. Major findings are summarized in Figure 1, which shows that journals were the most preferred citation format (49.24 per cent).

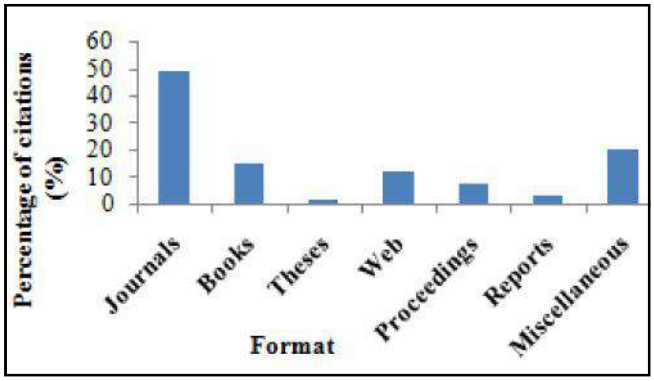

Fig.1 Distribution of the format of cited literature

4.1 Bradford's Law

The total number of journal citations (517) was divided into three equal zones. Twelve journals covered 151 citations while the next 38 journals covered 170 citations, and the next 165 journals covered 196 citations. According to Bradford zones, the relationship between each zone is 12:38:165. This data set does not fit into Bradford's distribution (Tables 1 and 2).

Table 1 Distribution of Journals

Rank	No. of Journals	Cumulative No. of Journals (n)	No. of Citations	Total No. of Citations	Cumulative No. of Citations	log n	(%) Cumulative Citations
1	1	1	19	19	19	0	3.675048356
2	1	2	17	17	36	0.693	6.963249516
3	1	3	16	16	52	1.099	10.05802708
4	2	5	14	28	80	1.609	15.47388781
5	1	6	12	12	92	1.792	17.79497099
6	2	8	11	22	114	2.079	22.05029014
7	1	9	10	10	124	2.197	23.98452611
8	3	12	9	27	151	2.485	29.20696325
9	6	18	7	42	193	2.890	37.33075435
10	2	20	6	12	205	2.996	39.65183752
11	6	26	5	30	235	3.258	45.45454545
12	14	40	4	56	291	3.689	56.28626692
13	10	50	3	30	321	3.912	62.08897485
14	31	81	2	62	383	4.394	74.08123791
15	134	215	1	134	517	5.371	100

Table 2 Scattering of Journals and Citations over Bradford Zones

Zone	No. of Journals	No. of Citations	% Journals	% Citations
1	12	151	5.582	29.207
2	38	170	17.674	32.882
3	165	196	76.744	37.911
Total	215	517	100	100

Therefore, the model developed by Leimkuhler was employed for the verification of Bradford's law of scattering.

Number of groups p=3, and the number of items in the most productive source Y_m=19.

Bradford multiplier k, $k = (e^r Y_m)^{1/p}$

$k = (1.781 \text{ Ч } 19)^{1/3} = 3.23$

The number of items in every Bradford group (Y_o), Y_o = A/p=517/3= 172
Number of sources in the first Bradford group r_o:
$r_o = T(k - 1)/(k^p - 1) = 215 (3.23 - 1)/(3.23^3 - 1) = 14.66$

Therefore, Bradford's distribution: $14.66:14.66(3.23):14.66(3.23^2) = 14.66:47.35:152.95$
Percentage error = {(215-(4.66+47.35+152.95))/215}*100% = 0.02%.

The data set fits well with the Leimkuhler model of Bradford's law since the percentage error is negligible. Therefore, in the first zone 15 journals, the core journals (6.977 per cent) covered 172 citations (33.269 per cent), the next 47 journals (33.462 per cent) covered 173 citations (33.269 per cent), and the next 172 journals (71.163 per cent) covered 153citations (35.437 per cent) (Table 3).

Table 3 Scattering of Journals and Citations Based on the Leimkuhler Model

Zone	No. of Journals	No. of Citations	% Journals	% Citations
1	15	172	6.977	33.269
2	47	173	21.86	33.462
3	153	172	71.163	33.269
Total	215	517	100	100

Graphical distribution, which is the "experimental verification of the verbal formulation which observes certain regularity in the distribution of scientific publications" (Wardikar, 2013), is presented in figure 2.

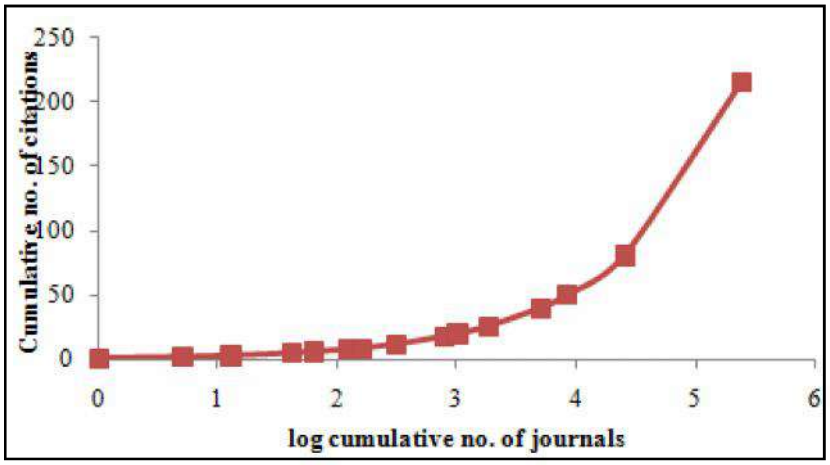

Fig.2 Bradford plot for journal distribution

The ranked list of core journals is presented in Table 4.

Table 4 Ranked List of Core Journals (Journals in Bradford's Zone 1)

Sl.No.	Journal Name	Rank
1	The Journal of Academic librarianship	1
2	Journal of the University Librarians Association of Sri Lanka	2
3	Library Trends	3
4	College and Research libraries	4
5	Library Review	4
6	Scientometrics	5
7	Information Research	6
8	Library Philosophy and Practice (e journal)	6
9	Journal of Academic Librarianship	7
10	Bulletin of the Medical Library Association	8
11	Journal of Documentation	8
12	Journal of Marketing	8
13	Collection Building	9
14	Library Management	9
15	New Library World	9

5. CONCLUSION

Citation analysis is a technique that can be employed to satisfy a variety of purposes including, evaluation of scholarly outputs and serving as a tool for collection development. The current study revealed that journals were the most widely used resource type for research purposes by LIS academics in Sri Lanka and *The Journal of Academic Librarianship* was the highly preferred journal for their scholarly communications. This demonstrates the nature of research output in the *Journal of the University Librarians Association* (*JULA)*.

In the application of Bradford's law, data sets were fit with the Leimkuhler model of Bradford's law and core journals were determined, as summarized in Table IV. Based on the results, indicators can be built up to support the library's LIS collection development by selecting journals of greater importance and productivity and thereby overcoming the constraint of limited financial resources. Priority for subscriptions should be given to core journals which are found to be most significant in the scholarly communications.

Taking into account the perspectives that this study offers on the current behaviour of LIS researchers, changes can be proposed and new developments can be made for *Journal of the University Librarians Association* (*JULA)*. The University Librarians Association of Sri Lanka should take measures to encourage foreign contributions to *Journal of the University Librarians Association (JULA)* and increase the global visibility of this journal. The use of high-impact journals must be promoted. Further analysis can be carried out to identify other bibliometric characteristics in this journal, such as authorship pattern and age of cited material.

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Health Science Research in India: A Bibliometric Study based on Scopus Database

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Abstract

This research aims to study the output of health sciences research indexed in the Scopus database during 1866-2016. About 355481 bibliographical records were reviewed from Scopus database to investigate the research output under the search term "Health Science", irrespective of the field. Health sciences are somewhat related to social aspect than pertaining to pure medical aspect. It is also termed as health care science. It is not to be confused with medical research. Therefore an attempt has been made to find the growth of literature in basic health sciences. For this purpose, medical online data base were not considered. Instead Scopus database has been taken for the study.

Keywords: *Health Science Research; Scopus Database; Bibliographic Study: India*

1. INTRODUCTION

Dimensional growth in health science has been witnessed during the last two decades. Majority of the development on health science literature were covered in medical database. Casual analysis has been made in the Scopus database to find out literature on health sciences. It is surprising to see there is an existence of more than one lakh publications in the Scopus database during the period of 1866 to 2016(137 years). This paved way for the bibliometric study on health science and hence this paper.

1.1 Health Science

Healthcare science, also known as medical science, is a part of applied sciences applying portions of natural science or formal science, or both, to develop knowledge, interventions, or technology of use in healthcare or public health. Such disciplines as medical microbiology, clinical virology, clinical epidemiology, genetic epidemiology, and biomedical engineering are medical sciences. Explaining physiological mechanisms operating in pathological processes, however, pathophysiology can be regarded as basic science. It is not to be confused with Medical research. This indicates that health sciences are somewhat related to social aspect than pertaining to pure medical aspect. There are at least 45 different specialism within healthcare science, which are traditionally grouped into three main divisions

i Specialism involving life sciences
ii Specialism involving physiological science
iii Specialism involving medical and Physics or bioengineering

Bibliometrics is a branch of Library and Information Science. Bibliometric analysis that counts up on bibliographic information on literature output. Bibliometric analysis is employed by researchers to study the growth of literature in given field. Pritchard (1865) defined the term Bibliometric as the application of statistical and mathematical methods to books and other communication. The bibliometrics has emerged as a thrust area of research, incorporating different branches of human knowledge. There are famous Laws of Bibliometric i.e. Lotka's law (1926) of scientific productivity, Bradford's law (1934) of scattering and Zips law (1949) on frequency of words. But the Bibliometric studies started in late sixties.

2. OBJECTIVES

The researcher has framed the following objectives for this study:

i. To examine the growth of Health Science literature in Scopus database during the hundred and thirty seven years between 1866 and 2016.
ii. To examine the worldwide research production in health sciences.
iii. To identify the document type of the publications in health sciences.
iv. To identify the institution/organizations conducting the research in health sciences.
v. To highlight the top thirty journals coverage in health sciences.

3. METHODOLOGY

The literature on health sciences data has been downloaded from 'Scopus', multidisciplinary online database, which is an international indexing and abstracting database, using the search term "Health Science". For this study, publications from 1866-2016 (137 years) has been downloaded from the database. A total of 3, 61,576 data has been identified. The collected data has been classified by using Excel.

4. DATA ANALYSIS AND INTERPRETATION

4.1 Year-wise Distribution of Publications

Table 1 shows the individual year-wise breakup overall quantum of health science research published. It is inferred that maximum article output is found during the year 2014 and minimum in the year 1866 - 1890.Out of 3, 61,576 articles, the highest per cent of them were contributed in 2014. It can be seen from the table 1 that the publication of health science research seems to be in parabolic nature. During the last ten years there is a substantial increase in the publications. This indicates that the awareness and importance of health science has been in increasing trend.

4.2 Country-wise Collaboration of Research

The distribution of publications with the rank is given in table 2. During analysis it is observed that most of the articles was contributed by Indian authors with United State of America with 18114 Publications and followed by UK with 7321 Publications, Australia with 3189 and remaining countries publications listed in the below table.

Table 1 Year-wise Distribution of Health Science Publication

Year	Publications	%	Year	Publications	%
2014	36669	**10.14**	1948	47	**0.01**
2015	32630	**9.02**	1931	40	**0.01**
2013	30134	**8.33**	1935	38	**0.01**
2012	27373	**7.57**	1929	34	**0.01**
2011	24142	**6.68**	1939	31	**0.01**
2010	20700	**5.72**	1938	30	**0.01**
2009	16884	**4.67**	1937	30	**0.01**
2008	14124	**3.91**	1930	30	**0.01**
2007	12173	**3.37**	1949	29	**0.01**
2006	11052	**3.06**	1936	29	**0.01**
2005	9730	**2.69**	1934	29	**0.01**
2004	8680	**2.40**	1933	27	**0.01**
2003	8246	**2.28**	1932	26	**0.01**
2002	6617	**1.83**	1945	25	**0.01**
2016	6095	**1.69**	1940	23	**0.01**
2001	5834	**1.61**	1926	23	**0.01**
2000	5451	**1.51**	1925	21	**0.01**
1999	5356	**1.48**	1928	20	**0.01**
1998	5052	**1.40**	1942	19	**0.01**
1997	4675	**1.29**	1927	19	**0.01**
1996	4019	**1.11**	1944	18	**0.00**
1993	3059	**0.85**	1943	13	**0.00**

1990	3004	**0.83**	1923	13	**0.00**
1974	2977	**0.82**	1941	10	**0.00**
1992	2974	**0.82**	1921	9	**0.00**
1981	2890	**0.80**	1909	8	**0.00**
1994	2824	**0.78**	1924	7	**0.00**
1991	2822	**0.78**	1920	7	**0.00**
1977	2811	**0.78**	1913	6	**0.00**
1995	2790	**0.77**	1910	6	**0.00**
1978	2787	**0.77**	1908	6	**0.00**
1989	2786	**0.77**	1922	5	**0.00**
1979	2736	**0.76**	1918	5	**0.00**
1973	2681	**0.74**	1911	5	**0.00**
1982	2665	**0.74**	1905	5	**0.00**
1980	2621	**0.72**	1902	5	**0.00**
1976	2596	**0.72**	1919	4	**0.00**
1988	2513	**0.70**	1915	4	**0.00**
1975	2499	**0.69**	1912	4	**0.00**
1985	2310	**0.64**	1906	4	**0.00**
1984	2190	**0.61**	1903	4	**0.00**
1987	2079	**0.57**	1917	3	**0.00**
1983	1942	**0.54**	1900	3	**0.00**
1986	1872	**0.52**	1899	3	**0.00**
1972	534	**0.15**	1898	3	**0.00**
1970	368	**0.10**	1889	3	**0.00**
1971	358	**0.10**	1880	3	**0.00**
1969	315	**0.09**	1914	2	**0.00**
1968	305	**0.08**	1901	2	**0.00**
1965	290	**0.08**	1887	2	**0.00**
1967	275	**0.08**	1885	2	**0.00**
1964	259	**0.07**	1884	2	**0.00**
1966	254	**0.07**	1883	2	**0.00**
1963	244	**0.07**	1873	2	**0.00**
1962	200	**0.06**	1916	1	**0.00**
1961	181	**0.05**	1907	1	**0.00**
1958	148	**0.04**	1893	1	**0.00**
1959	144	**0.04**	1892	1	**0.00**
1960	133	**0.04**	1890	1	**0.00**

Table 2 Country-wise Collaboration of Research

Country	Publications	Country	Publications
United States	18114	Singapore	1129
United Kingdom	7321	Sweden	1127
Australia	3189	South Africa	1079
Germany	3030	Spain	1047
Canada	2971	Belgium	1032
Japan	2401	Thailand	833
France	2310	Nepal	805
Italy	1858	Taiwan	747
China	1786	Pakistan	645
Switzerland	1766	Denmark	645
Netherlands	1479	Hong Kong	601
South Korea	1421	Mexico	551
Saudi Arabia	1419	Israel	550
Malaysia	1311	Argentina	546
Brazil	1180	Bangladesh	537

4.3 Document-wise distribution of Publications

It can be seen from the table 3 that majority of the health science literature are published as journal article (75.11%). It is followed by Letter (8.21%), Review (5.75%) and notes column (1.67%). The top 27 Subjects that contribute the health science literature has been identified and shown in table 4.

Table 3 Distribution of Document Type

Type	Publications	%
Article	271564	75.11
Letter	29686	8.21
Review	20783	5.75
Note	6029	1.67
Conference Paper	5287	1.46
Editorial	4920	1.36
Article in Press	3466	0.96
Book Chapter	2354	0.65
Short Survey	2027	0.56
Erratum	483	0.13
Book	187	0.05
Undefined	14790	4.09

4.4 Subject Domain-wise Distribution of Publications

Table 4 reveals, Publications in Scopus database by the subject are classified according the following thematic sections: Medicine, Agricultural and Biological Sciences, Biochemistry, Genetics and Molecular Biology, Immunology and Microbiology, Multidisciplinary, Pharmacology, Toxicology and Pharmaceutics, Veterinary, etc., The largest number of the articles of Indian authors between 2000 and 2009 was devoted to Medicine; these include 309092 papers, which comprise 55.72% of all publications followed by Biochemistry, Genetics and Molecular Biology with 50668, Agricultural and Biological Sciences with 30962 and so on.

4.5 Source Title-wise Distribution of Publications

Out of 3, 61,576 records, Current Science top with 10654 articles followed by Indian Veterinary Journal (6349) and Indian Journal of Animal Sciences (6281) journals are the major contributors in health sciences are represented in table 5. The articles were appeared in top 31 journals.

Table 4 Subject-wise Distribution of Publications

Name	Publications	%
Medicine	3,09,092	55.72
Biochemistry, Genetics and Molecular Biology	50,668	9.13
Agricultural and Biological Sciences	30,962	12.61
Multidisciplinary	24,164	4.36
Pharmacology, Toxicology and Pharmaceutics	22,746	9.26
Veterinary	22,174	4.00
Immunology and Microbiology	17,288	7.04
Neuroscience	10,607	1.91
Dentistry	9130	1.65
Environmental Science	7614	1.37
Health Professions	7506	1.35
Chemistry	7406	1.34
Engineering	6043	1.09
Physics and Astronomy	4877	0.88
Social Sciences	4643	0.84
Nursing	4034	0.73
Chemical Engineering	2795	0.50
Materials Science	2707	0.49
Psychology	2689	0.48
Mathematics	2037	0.37
Computer Science	1735	0.31
Energy	1534	0.28
Decision Sciences	1096	0.20
Arts and Humanities	473	0.09
Earth and Planetary Sciences	303	0.05
Economics, Econometrics and Finance	234	0.04
Business, Management and Accounting	160	0.03

Table 5 Source Title-wise Distribution of Publications

Publications	Publications	%
Current Science	10654	**10.49**
Indian Veterinary Journal	6349	**6.25**
Indian Journal of Animal Sciences	6281	**6.19**
Indian Pediatrics	6267	**6.17**
Indian Journal of Pediatrics	5471	**5.39**
Journal of Clinical and Diagnostic Research	5030	**4.95**
Indian Journal of Medical Research	4963	**4.89**
Journal of Association of Physicians of India	4584	**4.51**
Indian Journal of Dermatology Venereology and Leprology	3754	**3.70**
BMJ Case Reports	3674	**3.62**
Plos One	3461	**3.41**
Indian Journal of Pathology and Microbiology	3126	**3.08**
Neurology India	3069	**3.02**

Journal of the Indian Medical Association	3069	**3.02**
Indian Journal of Surgery	2489	**2.45**
Indian Heart Journal	2342	**2.31**
Indian Journal of Ophthalmology	2249	**2.21**
Indian Journal of Otolaryngology and Head and Neck Surgery	2152	**2.12**
Indian Journal of Radiology and Imaging	2068	**2.04**
Journal of Anaesthesiology Clinical Pharmacology	1923	**1.89**
Medical Journal Armed Forces India	1917	**1.89**
Indian Journal of Cancer	1916	**1.89**
Journal of Scientific and Industrial Research	1906	**1.88**
Asian Journal of Pharmaceutical and Clinical Research	1880	**1.85**
Nature	1806	**1.78**
Indian Journal of Science and Technology	1790	**1.76**
National Medical Journal of India	1726	**1.70**
Lancet	1451	**1.43**
Indian Journal of Medical Microbiology	1435	**1.41**
Indian Journal of Dermatology	1400	**1.38**
Indian Journal of Gastroenterology	1333	**1.31**

4.6 Institution-wise distribution of Publications

The above table 6 highlights that 31 institution contributions. Among the 31 top institutions, All India Institute of Medical Sciences, Postgraduate Institute of Medical Education and Research, Christian Medical College, Vellore are in top three positions. It seems majority of the articles in health science are appeared in the journals. Therefore it is better to identify the top 20 journals in health science. The table further shows the percentage of contribution on total number of records and the cumulative percentage.

Table 6 Affiliation-wise Distribution of Publications

Affiliation	Publications	%
All India Institute of Medical Sciences	21000	17.31
Postgraduate Institute of Medical Education and Research	15316	12.62
Christian Medical College, Vellore	6615	5.45
Sanjay Gandhi Postgraduate Institute of Medical Sciences Luck now	5180	4.27
Tata Memorial Hospital	4447	3.66
Chhatrapati Shahuji Maharaj Medical University	4292	3.54
Indian Veterinary Research Institute	3881	3.20
King Edward Memorial Hospital India	3739	3.08
Banaras Hindu University Institute of Medical Sciences	3653	3.01
Kasturba Medical College, Manipal	3490	2.88
National Institute of Mental Health and Neuro Sciences	3488	2.87
Maulana Azad Medical College	3457	2.85
Jawaharlal Institute of Postgraduate Medical Education and Research India	3397	2.80
Indian Institute of Science	3183	2.62
Bhabha Atomic Research Centre	3109	2.56
Pandit Bhagwat Dayal Sharma Postgraduate Institute of Medical Sciences	2538	2.09
University College of Medical Sciences	2514	2.07

Banaras Hindu University	2419	1.99
Medical College and Hospital Kolkata	2267	1.87
Vardhman Mahavir Medical College & Safdarjung Hospital	2231	1.84
University of Delhi	2142	1.77
Sree Chitra Tirunal Institute for Medical Sciences and Technology	2083	1.72
Central Drug Research Institute India	2026	1.67
Lady Hardinge Medical College	1953	1.61
G.B. Pant Hospital India	1937	1.60
L.V. Prasad Eye Institute India	1935	1.59
Kasturba Medical College Mangalore	1889	1.56
Indian Council of Medical Research	1830	1.51
University of Calcutta	1794	1.48
Panjab University	1781	1.47
Jawaharlal Nehru Medical College Aligarh	1762	1.45

4.7 Language-wise Distribution of Publications

Table 7 highlights that Language wise distribution of Publications. English is the most preferred language in terms of publishing research works though the contributions are from other regions.

Table 7 Language-wise Distribution of Publications

Language	Publications	%	Language	Publications	%
English	361016	99.6927	Bengali	10	0.00276
Turkish	224	0.06186	Slovene	3	0.00083
Spanish	208	0.05744	Swedish	3	0.00083
French	167	0.04612	Bulgarian	2	0.00055
German	149	0.04115	Dutch	2	0.00055
Portuguese	99	0.02734	Malay	2	0.00055
Croatian	66	0.01823	Romanian	2	0.00055
Italian	42	0.0116	Serbian	2	0.00055
Polish	42	0.0116	Bosnian	1	0.00028
Japanese	31	0.00856	Danish	1	0.00028
Chinese	27	0.00746	Estonian	1	0.00028
Russian	17	0.00469	Hindi	1	0.00028
Arabic	10	0.00276	Persian	1	0.00028

5. FINDINGS AND CONCLUSION

i. The literature research in Scopus shows an increasing trend and the growth is continuous and gradual. Though the research in the subject Health Science is on the increase, the growth rate is not uniform and there is a sudden decrease.

ii. Indian Scientist are collaboration with developed and developing countries in terms of Publications.

iii. Research communications in the field of Health Science in Scopus database published in various formats, of which, journal article is maximum forming 75.11 per cent of the total output.

iv. The total number of journals that have contributed research productivity in the subject Health Science in Current Science is 10654, of which the journal ranked first. The second ranked journal is Indian Veterinary Journal and the third ranked journal is Indian Journal of Animal Sciences. It has been

observed from the table 8 that majority of the health science literature are published in journal article (98.74%). It is followed by books (0.74%), and Conference proceedings (0.37%).

v. It also observed that, among the 31 top institutions, All India Institute of Medical Sciences, Postgraduate Institute of Medical Education and Research, Christian Medical College, Vellore are in top three positions. It seems majority of the articles in health science are appeared in the journals.

vi. The present investigation is to apply Scientometric tools to the Literature on health Science in Scopus database. The study is an attempt to discover the publishing pattern of scholars in the database. The present study has indicated that degree of collaboration is more and the scholars prefer to publish their research findings in Journals published from Developed counties like USA, England.

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