

A COMPREHENSIVE STUDY ON APPLICATION OF SOCIAL MEDIA PLATFORM AMONG LIS PROFESSIONALS OF NORTH-EAST INDIA DURING COVID-19 PANDEMIC

Borna Nath Dibanjyoti Buragohain

Amit Kumar

Borna Nath Dibanjyoti

Buragohain

Department of Library and
Information Science,
Maharaja BirBikram
University, Agartala

Amit Kumar

Department of Library and
Information Science,
Mizoram University, Aizawl
(India)

ABSTRACT -

Purpose: In this era of new science and technologies, transfer and sharing of knowledge are quite easier than the traditional one. Social media like Facebook, WhatsApp, and Instagram is some of the most popular platforms for immediate sharing and transfer of information among people. It is a popular place where people can discuss their issues and challenges. Social media is an internet and computer-based technology, which provides virtual facilities for sharing ideas, thoughts, and information. It provides the user with quick information transfer including photos, videos, voice messages, etc. This paper examined the use of Social media among North-Eastern LIS professionals to retrieve and access information during the lockdown. The survey method was adopted to analyze and data collection. An online questionnaire was designed and distributed among 220 LIS professionals in North-East India. Out of these 78.5% of the questionnaire was received. This paper discusses the major findings regarding awareness about new tools, popularity, and maximum use of social media sites and tools and also measures maximum spending hours on social media for various purposes. The study is based on original research data based on primary data received from North-Eastern LIS professionals. It depicts the activities of LIS professionals on social media during the lockdown.

Keywords - Coronavirus; social media; LIS professionals

INTRODUCTION

A coronavirus is an *Orthornavirae* group of viruses that consists of ribonucleic acid (RNA) which directly attacks the respiratory tract of humans and birds. Mild illness in human beings because of common cold and fever while more illness may cause of SARS, MERS, and COVID-19 (Stokes et al, 2020).

SARS (Severe acute respiratory syndrome) and MERS (Middle East respiratory syndrome) is a viral respiratory infection that has similar symptoms as coronavirus (Canty, 2012). During this pandemic period of COVID-19, social media provides a good platform for information transfer and social connectivity among people beyond the traditional means. The first lockdown was imposed by the government on 25th of March 2020 and it would continue to 30th June as lockdown 5.0, but some of the organizations and institutions have been working throughout the time of lockdown such as food delivery service, medical, defense, airlines, telecoms, media, libraries, etc (Drahosova, 2017).

Social media is a popular communication platform for friends, family, and business to quick interaction among people throughout the world (Koooperundevi, 2017). It is the main factor for fast changes in society and fast connectivity among people. According to Maya E. Dollarhide, around 3 billion social media users are using social media sites. Some of the social media sites are WhatsApp, Facebook, WeChat, Instagram, Youtube, QQ, Tik-Tok, etc. These forms of social media include activities like sharing photos and videos, voice chat, creating social and business networks, blogging, social gaming, election campaign, advertisement, etc (Steeg & Galstyan, 2011). It is not only used for sharing and transfer of information but also a source of virtual income. It is the best option to start online marketing. Facebook, WhatsApp, Instagram, Twitter, Pinterest, LinkedIn, Snapchat are the best place to invest money for virtual income (Edosomwan et al, 2011). Social media is not only the platform for sharing and discussion but it has the potential areas that help people to reach to

next level such as Communication: WhatsApp, Facebook, Instagram are some common sites for common discussion. Besides these Kickstarter or Zopa are the crowdfunding commercial communication sites where people can discuss funding, investment, and business (Ahlqvist et al, 2008); Collaboration: there have some tools for collaboration of information and data such as Wikipedia and GoogleDocs- share and edit data, dropbox- upload and download of files and can be accessed from various devices; Review and Opinion: It is an open platform like communication where people can freely ask a question and can reply such as Quora, Yahoo Answer, CNET, and Amazon. CNET and Amazon focused on blog format with articles and expert reviews and customer's products respectively (Boynd & Ellison, 2016); Brand Monitoring: it is a process of monitoring brands and mentioning what is being said. This can be measured by looking at the level of awareness, consideration, and advocacy (Nezakati et al, 2015). Social media can also be monitored by measuring the level of keywords, hashtags, URLs, and user names. Some of the monitoring tools are Brand 24, Google Alerts, Brand watch, Hootsuite, Aherfs, etc.; Entertainment: Duster, Onverse, Gamers, Raptr, Zynga are some popular social media sites for gaming and entertainment; Education: one of the most positive aspects of social media is to provide a platform for class and assignments in real-time aspect, on the other hand, it has some negative aspects also during the online class teachers are not able to recognize who is paying attention; Society: it helps people to share their ideas and thoughts beyond geographical boundaries. Whereas it has some negative impact on people, lots of time they are wasting in social networking sites and pay less

attention in their social life; and Business: No doubt social media is a good platform for online marketing and advertisement of new products but side by side it has some bad effects on business, the negative comments of people can lead bad impression on marketing organization (Siddiqui, 2016).

REVIEW OF LITERATURE

The following are some particular piece of literature which was opted to review for the study, such as Gao, S., Ver Steeg, G., & Galstyan, A. (2015) in their paper explore the role of social media in changing status, human behaviour, and characteristics of information diffusion. They also discuss the large and small groups of influencers; Martina Drahosova and Peter Balco (2017) in their examined the use of social media and for what purpose. They also discussed the positive and negative aspects of social media; Kopperundevi (2017) in the paper describe the types of social networks used in library services. It also describes how libraries use these networks in a meaningful and purposeful way; Canty (2020) in his paper describes the use of social media platforms in libraries across the world. This paper also measures the data collected from Youtube, Facebook, and Twitter-based for library between the months of July and August 2012; Siddiqui and Singh in their paper discussed the positive and negative aspects of social media in the area of Education, Society, business, and youth; Nezakati et al (2015) in their paper discuss the role of social media in disseminating information specifically in the field of tourism. The study has found that the previous studies concerning the use of revolutionized telecommunication in the tourism aspects are less

concerned and not much intersect was taken so far. The paper stresses the areas such as understanding the usability of social media in the tourism sector, integration of tacit knowledge, and its contribution for tourism researchers and experts in the decision-making process; Choudhury et al (2014) in their paper discuss the vital role of social media and search engines for the retrieval of health-related online search information. The study has examined the platforms used on large-scale log analysis and for the study it has taken around 210 as the size of the sample. The study has shown that the majority of the search was related to serious or highly sensitive information that was retrieved from search engines while the health information was shared on social media platforms; Chakraborty et al (2013) in their paper explore the privacy and security concerning the sharing of information in the social media platform and understand the practices related to privacy that was observed among the elderly generation. The study has also observed the extent to which the information is shared between the old user of Facebook and their respective friends in the respect of their sharing habits and the difference across the gender aspects.

OBJECTIVES OF THE STUDY

The present study has been carried out to measure the usage of social media among Library professionals for sharing and retrieving information among LIS professionals in North – East India. The study includes the following objectives:

- To study the activities of LIS professionals during lockdown;
- To know the purpose of using social media;

- To measure the criteria of using social sites; and
- To measure the effective mood of social media on libraries.

METHODOLOGY

The main objectives of the study have led the researchers to adopt the survey method for the conduct of the further experiment. The survey method can be understood as the process where the collection of data is used to test concepts, established some level of measurement for understanding the concept, and set out another purpose. The survey methods include personal observations, websites, interviews, and interaction with the LIS professionals, and at the same time, the researchers have also collected the data through online questionnaires which have been distributed among the library professional in North-East India.

DATA ANALYSIS & INTERPRETATION

The basis of data received from respondents is the analysis and interpreted in the following ways:

Response Received Gender Wise (157)

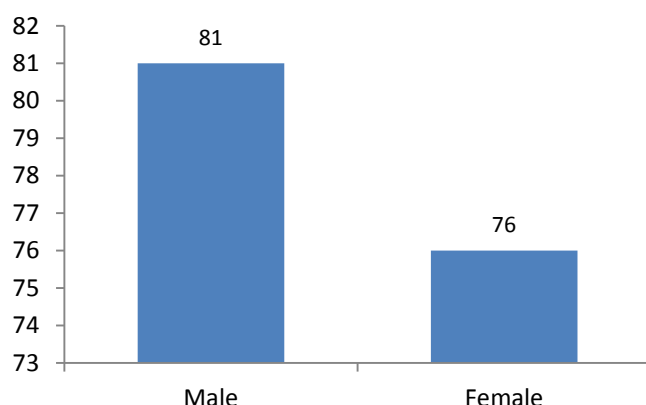


Figure 1 represents the gender-wise distribution of respondents who were received by the researchers from different parts of North-East India. The table depicts that 81 respondent belongs to the male category and the number of female respondents is 76. The aggregate number of respondents is 157 in total.

Respondents received by Age Group (157)

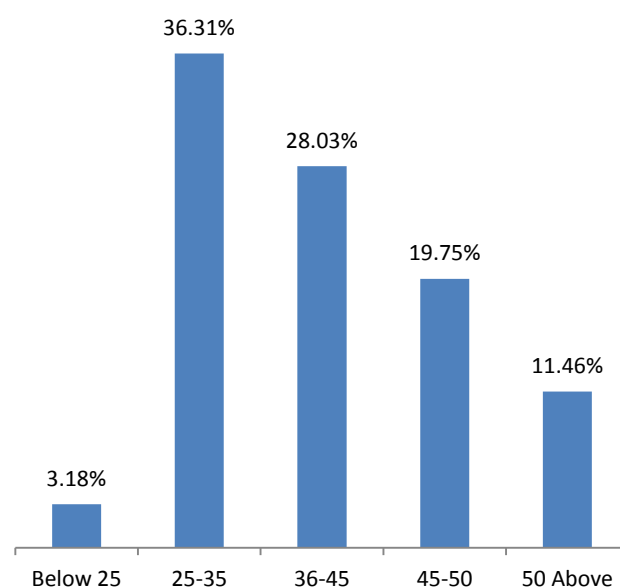
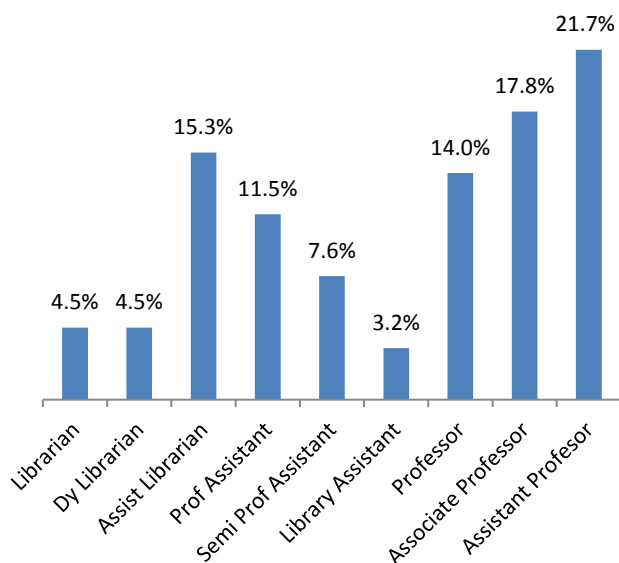


Figure 2: Age wise respondents

It is seen from the above figure 2 that the number of respondents in the category below 25 is 3.18% which is least in the age group category. The highest number of the respondent can be observed in the category of 25-35 age groups with 36.31%. The number of respondents in the category of 36-45, 45-50, and 50 <age groups can be accounted as 28.03%, 19.75%, and 11.46% respectively. As the actively participating group is observed in the age group of 25-35, the LIS professionals are eager and proactive to learn and acquire new concepts and avenues.

Designation of the respondents (157)**Figure 3: Designation wise respondents**

The above figure 3 represents the category-wise distribution of respondents based on their work occupation. The work occupation is distributed based on LIS professionals and teaching professionals. On the category of LIS professional, it is seen that Assistant Librarian has respondent the highest number with 15.3% in total. The least number of professionals can be seen in the category of Library assistants with 3.2%. The distribution of professionals in the categories of Librarian, Deputy Librarian, Professional Assistant, and Semi-professional Assistant is 4.5%, 4.5%, 11.5%, and 7.6% respectively. In the case of teaching professionals, the Assistant professor has the highest number of the respondent with 21.7% in aggregate. The least number of categories can be observed in the category of professor with 14%. In the category of Associate professor, it is seen

that 17.8% have responded to the questionnaire. There are around 157 respondents in total.

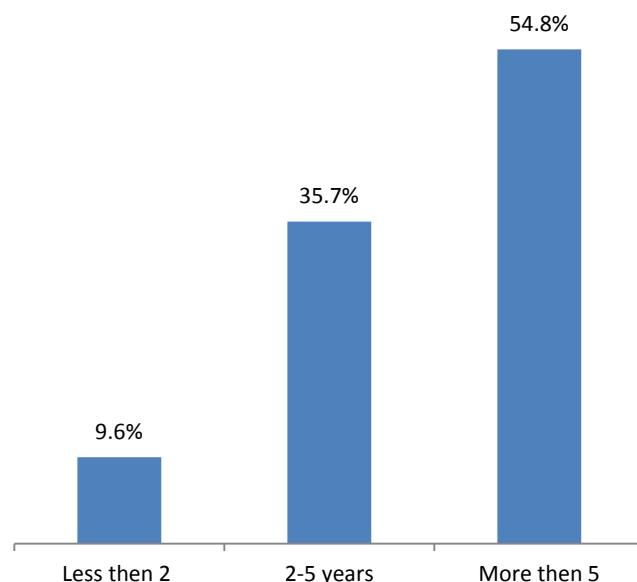
Working experience in year on social media (157)**Figure 4: respondents received based on working experience**

Figure 4 represents the working experience of the respondent on the social media platform. Based on 157 respondents, it is noticed that the majority of the respondent in the category of more than 5 years' experience is 54.8%. The number of professionals who has had worked on the social media platform in the category of 2-5 years is 35.7%. It is also observed that the respondent which has less than 2 years of experience on social media is 9.6% which is the least among the category. The figure depicts that the majority of LIS professionals are inclined with the use of social media and know its application in contemporary times.

Usage of social media for professional activities (157)

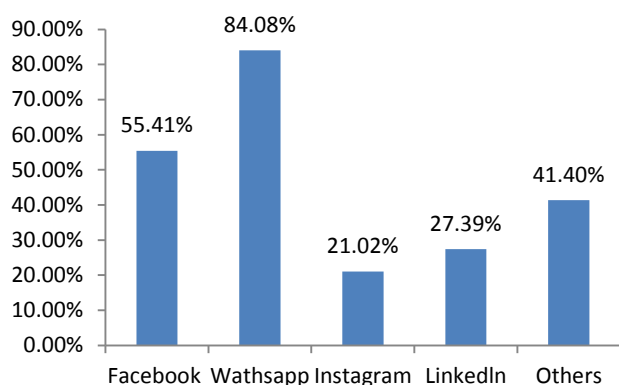


Figure 5: Respondents received usage of social media

Figure 5 represents the usage of social media by the LIS in different social media platforms. Around 84.08% of the LIS professionals use Whatsapp for different academic and professional activities. The least social media platform used by the professionals is Instagram with 21.02% of the respondents. Social media such as Facebook, LinkedIn, and other media have been explored by 55.41%, 27.39%, and 41.40% respectively of the LIS professionals in North-East India. The other media includes Twitter, Snapchat, WeChat, and likewise for various academic activities.

Purpose of using social media (157)

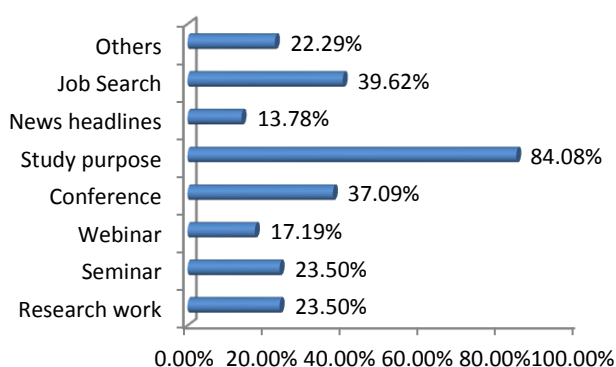


Figure 6: Respondents received purpose of using social media wise

There are various purposes behind the application and usage of social media. The social media platform has enabled students and academicians to remain connected and communicate. In figure 6, it is observed that 84.08% of the social media are used basically for study purposes. Around 39.62% of the social media applications are basically for job-related searches. 23.50% of the social media application is applied for research-related activities and for attending or organizing seminars. 13.78% of the LIS professionals are using social media for hunting the news headline. A total of 37.09% of the social media application is for organizing seminars and workshops. The purpose of using social media in the others category is 22.29% which includes some holistic activities such as sharing tweets, stories on Instagram and Facebook, and likewise.

Groups of LIS professional in social media (157)

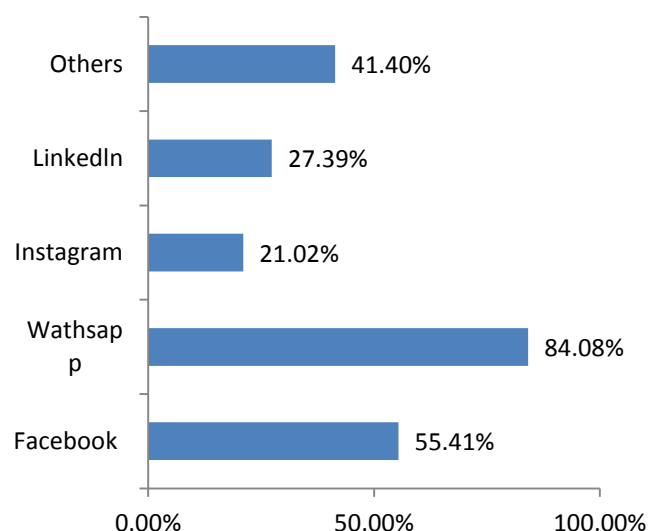


Figure 7: Respondents received according to LIS professional group

Figure 7 depicts the picture of a group of LIS professionals in social media among 157 respondents among the professionals in North-East India. As per the analysis of the data, a total of 84.08% of the professionals have their different groups on social media. An aggregate of 55.41% of respondents are using Facebook and have their respective groups for different purposes. In the category of social media platforms such as LinkedIn and Instagram, 27.39% and 21.02% of the respondents are being involved in different groups for the different academic activities. There are around 41.40% of the LIS professionals who fall in the category of “others” are having different groups for academic activity.

Average daily times spend on social media (157)

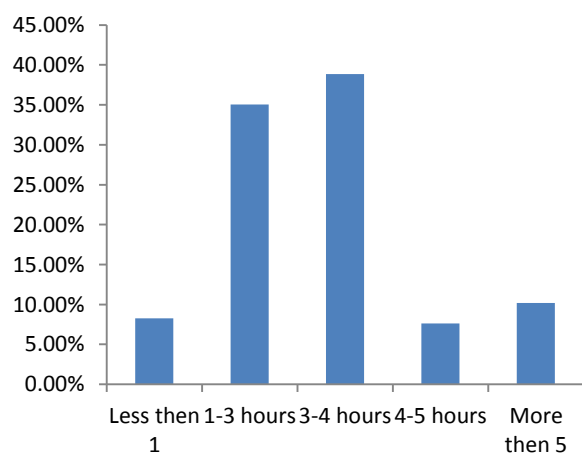


Figure 8: Average time spend on social media

Figure 8 represents the average daily time spent by the LIS professionals on different social media platforms for various academic activities. An average of 40% of the total respondents is using

social media for the time frame of 3-4 hours. 30% of the respondent are using their average time spend between 1-3 hours for social media. It is observed from the data analysis that around 10% of LIS professionals spent their average time with more than 5 hours.

Services received from social media (157)

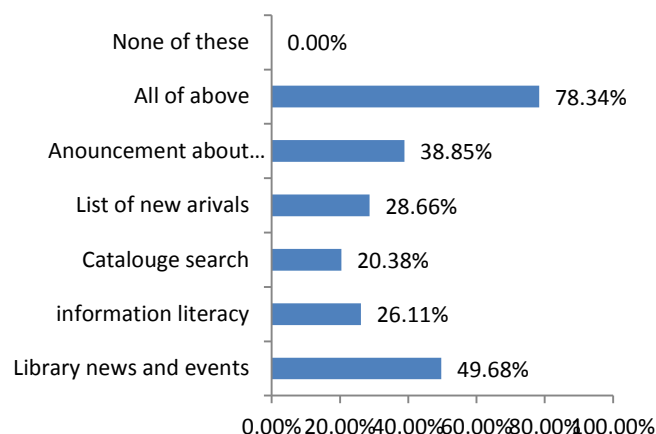


Figure 9: service offered by social media

There are numerous services received from online social media platforms. Services include literature search, management of references, Library news, and many more. It is observed from figure 9 that 78.34% of the respondent has availed all the major services received from the social media platform. It is seen that 49.68% of the LIS professional had received library news and events-related information on social media. Social media has offered 38.85% of the library professionals about the announcement news regarding the library. Around 28.66% of the respondent has received the services such as the list of a new arrival. Social media has also offered services such as catalog search and information literacy program where 20.38% and 26.11% respectively of the respondent has availed the

received this offering. The entire library professional has received these services in one way or the other.

Whether social media provides updated information (157)

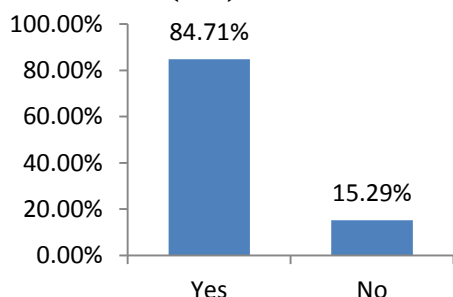


Figure 10: Respondents received updated information for LIS profession

Figure 10 shows the upgraded information received by the LIS professionals concerning different academic activities. The analysis shows that there are around 84.71% of the respondent who has received updated information on social media for various purposes and on the other hand 15.29% of the LIS professionals responded that they don't receive or rather don't avail any upgraded information on the different social media platform.

Social media as effective mode of library services (157)

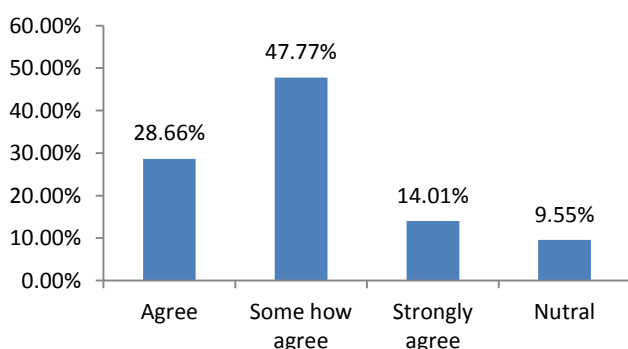


Figure 11: Social media as effective mood of library services

Figure 11 shows whether social media works as an effective mode of library services or not? The figure shows that 47.77% of the respondents are in a position of somehow agreeing. On the other hand, 28.66% of LIS professionals agree that social media is effective to perform different library functions. 14.01% of the LIS professionals strongly agree that social media is an effective tool and 9.55% of the total respondents are neutral in this regard.

RESULTS

The following are some of the major findings of the study:

- It was found that 81 respondents belong to the male category and the number of female respondents is 76. The aggregate number of respondents is 157 in total;
- It is found that the number of respondents in the category of below 25 is 3.18% which is least in the age group category. The highest number of the respondent can be observed in the category of 25-35 age groups with 36.31%. The number of respondents in the category of 36-45, 45-50, and 50 < age groups can be accounted as 28.03%, 19.75%, and 11.46% respectively;
- Based on the category of LIS professional, it is seen that Assistant Librarian has respondent the highest number with 15.3% in total. The least number of professionals can be seen in the category of Library assistants with 3.2%. In the case of teaching professionals, the Assistant professor has the highest number of the respondent with 21.7% in aggregate. The least number of

categories can be observed in the category of professor with 14%;

- The analysis reveals that the majority of the respondent in the category of more than 5 years' experience is 54.8%. The number of professionals who has had worked on the social media platform in the category of 2-5 years is 35.7%;
 - 84.08% of the LIS professionals use Whatsapp for different academic and professional activities. The least social media platform used by the professionals is Instagram with 21.02% of the respondents. Social media such as Facebook, LinkedIn, and other media has been explored by 55.41%, 27.39%, and 41.40% respectively of the LIS professionals in North-East India;
 - It is observed that 84.08% of social media are used basically for study purposes. Around 39.62% of the social media applications are basically for job-related searches. 23.50% of the social media application is applied for research-related activities and for attending or organizing seminars;
 - As per the analysis of the data, a total of 84.08% of the professionals have their different groups on social media. An aggregate of 55.41% of respondents are using Facebook and have their respective groups for different purposes. In the category of social media platforms such as LinkedIn and Instagram, 27.39% and 21.02% of the respondents are being
- involved in different groups for the different academic activities;
 - An average of 40% of the total respondents is using social media for the time frame of 3-4 hours. 30% of the respondent are using their average time spend between 1-3 hours for social media;
 - 78.34% of the respondent has availed all the major services received from the social media platform. It is seen that 49.68% of the LIS professional had received library news and events-related information on social media. Social media has offered 38.85% of the library professionals about the announcement news regarding the library;
 - The analysis shows that there is around 84.71% of the respondent who has received updated information on social media for various purposes and on the other hand 15.29% of the LIS professionals responded that they don't receive or rather don't avail any upgraded information on a different social media platform; and
 - The analysis shows that 47.77% of the respondents are in a position of somehow agreeing. On the other hand, 28.66% of LIS professionals agree that social media is effective to perform different library functions.

DISCUSSION, CONCLUSION & RECOMMENDATIONS

Social media has always played a vital role in the performing of different academic activities

among academicians and LIS professionals. The diverse group of the profession has used social media platforms to avail different types of services for their own personal and self-development. While the study was carried out, the researchers have observed and put forward some suggestions. The respondents said that Social media is an open platform for everyone wherein it becomes necessary to keep all the personal data of LIS professionals secret. It was also suggested that all the conversations should be limited to professional ethics and there should be regular online training to trainee the LIS professionals from time to time. There should be a continuous interaction program where the professionals will avenue new learning skills and develop confidence among themselves. This pandemic brings many changes in human life. Some tools of social media such as WhatsApp, Facebook, and LinkedIn brings LIS professional together virtually (chakraborty et al, 2013). They use these social tools for information exchange and sharing ideas. But only 47.77% of LIS professionals are somehow agreed to connect people for professional talks (De Choudhury, 2014). Moreover, LIS professionals have created professional groups for an online discussion and online training. During this covid pandemic, social media are the sole tools that keep the academicians and research pushing forward. As Saud, Mashud, and Ida in their study found that social media has gained popularity due to society's seeking health and medically related information during the time of the pandemic. Social media has fascinated the public to gain utter information related to all the symptoms of the covid virus. The different social media platform has enabled people to remain connected and stay motivated with their relative and friends.

This media was considered as the most effective medium to share, react and post any health-related information. Again a case study carry forward by (Nadeak,2020). tends to study the effectiveness of social media platforms that are used in distance learning where 250 online questionnaires were distributed among the students by using the Multi-Attribute Utility Theory. The study concludes that online teaching with the use of social media is helpful only for theoretical courses but its results are ineffective for practical-based courses (Kwayu, Abubakre, & Lal, 2021). Despite its several drawbacks, it's having managed to conquer an important phase in everyone's life and especially to all the working professionals where the concept such work from home was possible due to social media.

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INCLINATION TOWARDS ELECTRONIC RESOURCES BY ACADEMIC COMMUNITY IN HISTORY: A STUDY

Dr Neetika Sharma
Prof. Paramjeet Kaur Walia

Dr Neetika Sharma

Librarian

Swami Shraddhanand College,

University of Delhi, Delhi

Email:

sharon_niti@yahoo.com;

library@ss.du.ac.in

Prof. Paramjeet Kaur Walia

Professor

Department of Library and

Information Science,

University of Delhi, Delhi

Email:

pkwalia2002@gmail.com

ABSTRACT -

This paper highlights the usage pattern of e-resources among faculty members, research scholars and postgraduate students only. The geographical area of the present study was restricted to the discipline of history with faculty members, research scholars and postgraduate students of Kurukshetra University and Maharshi Dayanand University only. The study has been conducted at the Kurukshetra University and Maharshi Dayanand University with the help of structured questionnaires offline and online.

The results of this study show that subscribed e-resources are sufficiently used by the top three categories of users but a significant difference was found in the usage pattern of e-resources among the status of the academic community. The usage rate of e-resources for faculty members was higher in comparison to research scholars.

This study is unique in that very few studies have been conducted in the discipline of history regarding the usage pattern of different categories of e-resources by the academic community. This study deals as a separate and important unit to find out the different dimensions of the usage pattern and ranking of e-resources among the academic community in the field of history.

Keywords - e-books, e-journals, Electronic resources, History, online databases

INTRODUCTION

“History is the study of the past, past happenings and, past development of human societies, especially during the period for which written records have been available. History is the account of past happenings, memories, events and incidents. It plays a great role in developing our knowledge towards the past and gave a broader shape to our thoughts and area of knowledge” (Hoselitz, 1959, p.15). The study of “History compels the students to realize that events, ideas, the actions of individuals and shows the relationship between past, current and future issues” (Hunt, 1967, p, 15). Ancient, medieval and modern are the basic specializations in History.

The main motive of the academic community studying and doing research in History is to examine and "analyze, and interpret the past," or collecting, collating, piercing data to extract meaning from it to establish pattern out of thousands of little scraps of information" (Barlow,1998,p.82). In the process of their research faculty members, research scholars and postgraduate students use information sources that include government and institutional records, books, journals, newspapers, newsletters, periodicals, photographs, interviews, films, archives and unpublished manuscripts such as personal diaries and letters". "Evidence plus interpretation are the substance of historical study" (Margaret,1981, p.556). The present study, is a continuation of the studies on the information needs of the academic community and it addresses the information sources consider important by faculty members, researchers and postgraduate students in the field of History, how they locate them, and what their preferences and priorities are and particular attention is paid to the use of e-resource (Stieg,1981).

REVIEW OF LITERATURE

With the emergence of information communication and technology, the academic community in the discipline of history are increasingly using electronic information resources. Evidence shows that faculty members, research scholars and students in history are altering their information-seeking behaviour to take advantage of the opportunities offered by digitization, and the literature. The literature supported the notion that faculty members and students are presently combining traditional means printed and e-resources for the academic activities. "The academic community in history are

responding to the new tools and resources produced by digitization. The recent increase in archival data in digital form is great (Duff, Craig, & Cherry, 2004, p.22). It is found that "bibliographies, book reviews, library catalogues, references in journals, specialized bibliographies and abstracts, or indexes are most important for the academic community in history tool" (Tibbo, 2003, p.13). Archives, web OPACS, and the availability of keyword searching are greatly appreciated by them. Dalton and Charnigo (2004) examined that advent of e-resources has increased the use use of catalogues and indexes by the academic community in their efforts to identify appropriate primary and secondary sources of information.

Studies by Kesner (1982) and Dalton and Charnigo (2004) reported that despite all the advances in digitization, the academic community in history are comfortable using print resources and highly value them as a resource. "Academic community in history will always want and need to have access to original documents" and will prefer a paper because its "utility is well understood, its stability has been experienced and it can be used and read without the help of a machine" (Duff, Craig & Cherry, 2004, p.72).

"Academic community in history feel secure and at ease using print resources as the possible complications of electronic resources are not present in printed sources and this will ensure their continued use by the academic community in history " (Duff, Craig, & Cherry, 2004, p.73). Informative websites of archives and museums, and digital databases have increased the use of e-resources among users in studying history but the ease and simplicity of print resources and their

significance in tracing history make these sources is an essential component for research purposes.

OBJECTIVES OF THE STUDY

The present study is designed to seek the opinion of the faculty members, research scholars and postgraduate students of the Department of History at Kurukshetra University and Maharshi Dayanand University regarding the availability and use of different categories of e-resources in universities and their libraries with the following objectives:

- i. To identify the usage pattern of e-resources by different categories of users in the field of History.
- ii. To identify the core e-databases in the field of History widely used by faculty members, research scholars and postgraduate students.
- iii. To find out the core e-journals in the field of History.
- iv. To find out the core e-magazines in the field of History based on their usage by the academic community.
- v. To find out the core online repositories in the field of History.

- vi. To find out the prominent websites in the field of History frequently used by the respondents.

METHODOLOGY

A structured questionnaire was sent to a random sample of 76 users including faculty members, research scholars and postgraduate students chosen from the Departments of history of two prominent state universities in Haryana. Responses were also collected online by Google questionnaire.

Availability of subscribed e-resources in university libraries

The use of e-resources is based on the availability and proper awareness of authentic and reliable sources of information. The main aim of the present study is to find out the core e-resources like e-journals, e-databases and e-magazines. In this connection, it is required to know the status of the availability of e-resources. Data was collected directly from both the libraries and verified the records and websites of the universities. The collected data is presented in Table 1.

Table 1: Availability of E-resources at Kurukshetra University and Maharshi Dayanand University

E-Databases	Library	
	JLN	Vivekananda
ABI/Inform	√	√
Academic Search Complete	√	√
Academic Search Elite	√	√
EBSCO	√	√
International Bibliography of Social Sciences	×	√
J-Gate	×	×
Lexis Nexis Academic	√	√

Oxford University Press	√	√
Scopus	√	√
Social Science Citation Index	√	√
Social Science Full Text	√	√
Total	9	10

Both university libraries provide 16,000+ Social Science Research Networks (SSRN) and subscribe to more than 5000 e-journals. Online databases, for example, EBSCO, JSTOR, Oxford University Press, and Social Sciences Full Text serve the majority of subject-specific e-databases and journals such as American History and Life, Historical Abstracts with Full Text, History Reference Centre, American Historical Review, Past and Present, Indian Historical Review, The Historian and so on.

Use of Various Types of E-resources in the Discipline of History

Use of Online Databases in History

In the present study, users were asked about how often they used the following online databases which they were aware of and the data was tabulated in Table 2.

Table 2: Use of E-databases in History by Various Categories of Users

Use of Subscribed E-databases		FM (n=3)			RS (n=24)			Students (n=49)			Total (n=76)		
		f	%	WM	f	%	WM	f	%	WM	f	%	WM
America Periodicals Series	AL	0	0.0	2.6	13	54.2	3.66	28	57.1	4.14	41	53.9	4.03
	OF	0	0.0		0	0.0		3	57.1		41	53.9	
	ST	2	66.7		9	37.5		15	6.1		3	3.9	
	RR	1	33.3		2	8.3		3	30.6		26	34.2	
	NV	0	0.0		11	45.8		20	6.1		6	7.9	
America: History and Life	AL	0	0.0	4	11	45.8	2.91	20	40.8	3.22	31	40.8	3.15
	OF	0	0.0		1	4.2		5	10.2		6	7.9	
	ST	3	100.0		9	37.5		21	42.9		33	43.4	
	RR	0	0.0		3	12.5		3	6.1		6	7.9	
	NV	0	0.0		0	0.0		0	0.0		24	31.6	
Daily Life Through History	AL	1	33.3	1.66	7	29.2	2.08	13	26.5	2	21	27.6	2.01
	OF	0	0.0		0	0.0		1	2.0		1	1.3	
	ST	0	0.0		5	20.8		9	18.4		14	18.4	
	RR	0	0.0		0	0.0		1	2.0		1	1.3	
	NV	2	66.7		7	29.2		23	46.9		32	42.1	
History Reference Center	AL	2	66.7	1.66	9	37.5	2.08	7	14.2 8	2	18	23.68	2.07
	OF	0	0.0		3	12.5		6	12.24		9	11.84	
	ST	0	0.00		10	41.66		28	57.14		38	50	

Use of Subscribed E-databases		FM (n=3)			RS (n=24)			Students (n=49)			Total (n=76)		
		f	%	WM	f	%	WM	f	%	WM	f	%	WM
	RR	1	33.3		2	8.33		8	16.32		11	14.47	
Historical Abstracts	AL	1	33.3	3	6	25.0	2.33	14	28.6	2.89	34	44.7	4.15
	OF	1	33.3		0	0.0		1	2.0		21	27.6	
	ST	0	0.0		8	33.3		20	40.8		2	2.6	
	RR	0	0.0		1	4.2		4	8.2		28	36.8	
	NV	1	33.3		9	37.5		10	20.4		5	6.6	
International Medieval Bibliography	AL	2	66.7	4.33	2	0.0	3.33	3	4.1	3.38	7	25.0	3.40
	OF	0	0.0		13	54.2		28	57.1		45	5.3	
	ST	1	0.0		0	0.0		3	6.1		4	53.9	
	RR	0	66.7		9	37.5		15	30.6		24	3.9	
	NV	0	0.0		0	0.0		0.0	0		0	0.0	

(* AL - Always, OF - Often, ST - Sometimes, RR - Rarely and NV – Never)

It can be seen that in Table 2, the weighted mean of Historical Abstracts (4.15) followed by America Periodical Series (4.03), and International Mediaeval Bibliography (3.40) was high than any other subscribed e-databases of History which reflects that most of the respondents of both universities preferred to use these two databases more than any other e-

database. The Historical Abstracts is found on the higher side in both awareness and usage terms.

Use of subscribed e-journals in history

For depicting the use of e-journals, a users' category-wise table was formulated, in Table 3, the results of usage of e-journals were tabulated for analysis.

Table 3: Use of Subscribed E-journals of History by Various Categories of Users

Use of Subscribed E-journals		FM (n=3)			RS (n=24)			Students (n=49)			Total (n=76)		
		f	%	WM	f	%	WM	f	%	WM	f	%	WM
American Historical Review	AL	0	0.0	3.5	1	4.2	2.3	17	34.7	1.6	18	23.7	2.3
	OF	0	0.0		4	16.7		8	16.3		12	15.8	
	ST	1	33.3		12	50.0		18	36.7		31	40.8	
	RR	1	33.3		7	29.2		6	12.2		14	18.4	
	NV	1	33.3		0	0.0		0	0.0		1	1.3	
Essays in History	AL	0	0.0	2.5	5	20.8	2.83	14	28.6	3.40	19	25.0	3.19
	OF	0	0.0		0	0.0		3	6.1		3	3.9	
	ST	2	66.7		7	29.2		21	42.9		30	39.5	
	RR	1	33.3		11	45.8		11	22.4		23	30.3	
	NV	0	0.0		1	4.2		0	0.0		1	1.3	
History Compass	AL	0	0.0	2.66	2	8.3	3.75	6	12.2	3.61	8	10.5	3.61
	OF	1	33.3		14	58.3		23	46.9		38	50.0	

Use of Subscribed E-journals		FM (n=3)			RS (n=24)			Students (n=49)			Total (n=76)		
		f	%	WM	f	%	WM	f	%	WM	f	%	WM
	ST	0	0.0		8	33.3		17	34.7		25	32.9	
	RR	2	66.7		0	0.0		2	4.1		4	5.3	
	NV	0	0.0		6	25.0		13	26.5		19	25.0	
Indian Historical Review	AL	1	33.3	4.33	12	50.0	4.25	22	44.9	4.26	35	46.1	4.26
	OF	2	66.7		5	20.8		15	30.6		22	28.9	
	ST	0	0.0		0	0.0		1	2.0		1	1.3	
	RR	0	0.0		11	45.8		18	36.7		29	38.15	
	NV	0	0.0		13	54.2		28	57.1		41	53.94	
Journal of American History	AL	1	66.7	3.66	3	12.5	2.51	5	10.20	2.51	9	11.4	2.82
	OF	0	0.0		8	33.3		11	22.44		19	25	
	ST	2	66.7		10	41.64		4	4.08		16	21.05	
	RR	0	0.0		2	8.3		21	42.85		23	30.26	
	NV	0	0.0		1	4.16		08	16.32		9	11.84	
Journal of Interdisciplinary History	AL	2	0.0	4.66	1	4.2	3	2	4.1	2.91	5	6.57	3.01
	OF	1	66.7		7	29.2		19	38.8		7	35.52	
	ST	0	33.3		9	37.5		15	30.6		24	31.57	
	RR	0	0.0		6	25		6	12.24		12	15.78	
	NV	0	00		1	4.16		7	14.8		8	10.52	
Journal of Contemporary History	AL	1	33.3	4	2	8.3	3.41	3	6.12	3.77	6	7.89	3.46
	OF	1	33.3		8	33.3		19	38.77		28	36.84	
	ST	1	33.3		12	50.0		7	14.28		20	26.31	
	RR	0	00		2	8.3		6	12.24		8	10.52	
	NV	0	0.0		0	0.0		14	28.57		14	18.42	
Journal of Modern History	AL	1	33.3	4.33	6	25	2.625	22	44.89	3.69	29	38.15	3.1
	OF	2	66.7		3	12.5		8	16.3		13	21.1	
	ST	0	0.0		5	20.		11	22.4		9	21.1	
	RR	0	0.0		3	12.5		3	6.1		9	3.9	
	NV	0	0.0		7	29.2		18	36.7		16	34.2	
Journal of Social History	AL	1	33.3	4.33	5	20.8	3.3	13	34.7	2.36	19	25	2.7
	OF	1	33.3		7	29.2		4	8.16		12	15.7	
	ST	0	0.0		3	12.5		9	18.36		12	15.7	
	RR	2	66.7		5	20.8		4	8.16		10	1.31	
	NV	1	33.3		4	16.7		19	38.7		23	30.26	
Journal of Multimedia History	AL	1	33.3	3.33	5	20.8	2.79	13	26.5	3.02	19	25.0	2.96
	OF	0	0.0		1	4.2		0	0.0		1	1.3	
	ST	1	33.3		8	33.3		17	34.7		26	34.2	
	RR	1	33.3		7	29.2		16	32.7		24	31.6	
	NV	0	0.0		3	12.5		3	6.1		6	7.9	
Literature and History	AL	0	0.0	2.4	1	4.2	3.16	0	0.0	3.24	1	1.3	3.18
	OF	1	33.3		9	37.5		16	32.7		26	34.2	

Use of Subscribed E-journals		FM (n=3)			RS (n=24)			Students (n=49)			Total (n=76)		
		f	%	WM	f	%	WM	f	%	WM	f	%	WM
	ST	1	33.3		9	37.5		29	59.2		39	51.3	
	RR	0	0.0		4	16.7		4	8.2		8	10.5	
	NV	1	33.3		1	4.2		0	0.0		2	2.6	
Past and Present	AL	0	0.0	1	2	8.3	2.87	14	28.6	3.34	16	21.1	3.10
	OF	0	0.0		1	4.2		4	8.2		5	6.6	
	ST	1	33.3		13	54.2		16	32.7		30	39.5	
	RR	0	0.0		8	33.3		15	30.6		23	30.3	
	NV	2	66.7		0	0.0		0	0.0		2	2.6	
Radical History Review	AL	0	0.0	1.66	1	4.2	2.95	17	34.7	3.73	18	23.7	3.40
	OF	0	0.0		4	16.7		8	16.3		12	15.8	
	ST	1	33.3		12	50.0		18	36.7		31	40.8	
	RR	1	33.3		7	29.2		6	12.2		14	18.4	
	NV	1	33.3		0	0.0		0	0.0		1	1.3	
The Historian	AL	0	0.0	2.66	5	20.8	2.83	14	28.6	3.40	19	25.0	3.19
	OF	0	0.0		0	0.0		3	6.1		3	3.9	
	ST	2	66.7		7	29.2		21	42.9		30	39.5	
	RR	1	33.3		11	45.8		11	22.4		23	30.3	
	NV	0	0.0		1	4.2		0	0.0		1	1.3	
The Economic History Review	AL	1	33.3	3.33	5	20.8	3.5	20	40.8	3.87	26	34.2	3.76
	OF	0	0.0		6	25.0		12	24.5		18	23.7	
	ST	1	33.3		11	45.8		8	16.3		20	26.3	
	RR	1	33.3		2	8.3		9	18.4		12	15.8	
	NV	0	0.0		4	16.7		10	20.4		14	18.4	
The English Historical Review	AL	0	0.0	2.66	2	8.3	3.75	6	12.2	3.61	8	10.5	3.61
	OF	1	33.3		14	58.3		23	46.9		38	50.0	
	ST	0	0.0		8	33.3		17	34.7		25	32.9	
	RR	2	66.7		0	0.0		2	4.1		4	5.3	
	NV	0	0.0		6	25.0		13	26.5		19	25.0	
The Indian Economic and Social History Review	AL	0	0.0	1	2	8.3	2.87	14	28.6	3.34	16	21.1	3.10
	OF	0	0.0		1	4.2		4	8.2		5	6.6	
	ST	1	33.3		13	54.2		16	32.7		30	39.5	
	RR	0	0.0		8	33.3		15	30.6		23	30.3	
	NV	2	66.7		0	0.0		0	0.0		2	2.6	
Western Historical Review	AL	1	33.3	3.33	5	20.8	3.5	20	40.8	3.87	26	34.2	3.76
	OF	0	0.0		6	25.0		12	24.5		18	23.7	
	ST	1	33.3		11	45.8		8	16.3		20	26.3	
	RR	1	33.3		2	8.3		9	18.4		12	15.8	
	NV	0	0.0		4	16.7		10	20.4		14	18.4	

(* AL - Always, OF - Often, ST - Sometimes, RR - Rarely and NV – Never)

Table 3 shows that the cumulated weighted mean of Indian Historical Review (4.26), The Economic History Review and Western Historical Review (3.76), History Compass and The English Historical Review (3.61), Journal of Contemporary History (3.46), Radical History Review (3.40), Essays in History and The Historian (3.19), Literature and History (3.18), Past and Present

(3.10), Journal of Interdisciplinary History and Journal of Modern History (3.01), Journal of Multimedia History (2.96), Journal of American History (2.82), Journal of Social History (2.7) and American Historical Review (2.3) was high than other e-journals in the field of history. Indian Historical Review attained the first rank among other e-journals based on usage.

Table 4: Use of E-magazines of History by different Categories of Users

Use of E-magazines		FM (n=3)			RS (n=24)			Students (n=49)			Total (n=76)		
		f	%	WM	f	%	WM	f	%	WM	f	%	WM
American Heritage	AL	0	0.0	1.66	1	4.2	2.95	17	34.7	3.73	18	23.7	3.40
	OF	0	0.0		4	16.7		8	16.3		12	15.8	
	ST	1	33.3		12	50.0		18	36.7		31	40.8	
	RR	1	33.3		7	29.2		6	12.2		14	18.4	
	NV	1	33.3		0	0.0		0	0.0		1	1.3	
Current World Archaeology	AL	0	0.0	1.66	5	20.8	2.83	14	28.6	3.40	19	25.0	3.9
	OF	0	0.0		0	0.0		3	6.1		3	3.9	
	ST	2	66.7		7	29.2		21	42.9		30	39.5	
	RR	1	33.3		11	45.8		11	22.4		23	30.3	
	NV	0	0.0		1	4.2		0	0.0		1	1.3	
Entrepreneur	AL	1	33.3	3.33	5	20.8	3.58	5	27.8	1.08	26	34.2	3.76
	OF	0	0.0		6	25.0		4	22.2		18	23.7	
	ST	1	33.3		11	45.8		4	22.2		20	26.3	
	RR	1	33.3		2	8.3		0	0.0		12	15.8	
	NV	0	0.0		6	25.0		5	27.8		20	26.3	
History Today	AL	1	33.3	3.66	9	37.5	3.95	0	0.0	1.06	26	34.2	4.13
	OF	1	33.3		9	37.5		3	16.7		39	51.3	
	ST	0	0.0		4	16.7		10	55.6		8	10.5	
	RR	1	33.3		1	4.2		5	27.8		2	2.6	
	NV	0	0.0		0	0.0		0	0.0		1	1.3	
Military History	AL	0	0.0	3.66	0	0.0	2.62	1	5.6	0.89	1	1.3	2.60
	OF	2	66.7		9	37.5		4	22.2		29	38.2	
	ST	1	33.3		9	37.5		7	38.9		25	32.9	
	RR	0	0.0		0	0.0		1	5.6		1	1.3	
	NV	0	0.0		1	4.2		5	27.8		1	1.3	

(* AL - Always, OF - Often, ST - Sometimes, RR - Rarely and NV – Never)

Table 4 shows that the weighted mean of Entrepreneur (2.3) and Military History (2.2) was high than any other e-magazine, which shows that most of the respondents preferred to use these two magazines more than any other e-magazine.

FINDINGS OF THE STUDY

The most important findings regarding the core e-resources used by an academic community in the field of history are as follows:

Table 5: Ranking of Top Subscription-based E-databases of History

E-database	Rank
Historical Abstracts	I st
America Periodicals Series	II nd
International Medieval Bibliography	III rd
History Reference Centre	IV th
Daily Life Through History	V th
America History and Life	VI th

The above table highlights, that Historical Abstracts attained the first rank in terms of use among all categories of users. America Periodical Series is in the second rank followed by International Medieval Bibliography (IIIrd), History Reference Centre (IVth), Daily Life through History attained the fifth rank (Vth) and

America History and Life attained the VIth rank. Overall, in terms of use, the top e-databases in the field of History found were Historical Abstracts, America Periodical Series America Periodicals Series, International Medieval Bibliography, History Reference Centre and Daily Life Through History.

Table 6: Ranking of Top E-journals in the field of History

E-journal	Rank
Indian Historical Review	I st
The Economic History Review	II nd
Western Historical review	II nd
English Historical Review	III rd
History Compass	III rd
Journal of Contemporary History	IV th
Radical History Review	V th
Essays in History	VI th
The Historian	VI th
Literature and History	VII th
Past and Present	VIII th
Journal of Interdisciplinary History	IX th
Journal of Multimedia History	X th
Journal of American History	XI th
Journal of Social History	XII th
American Historical Review	XIII th

Table 6 above shows the ranking of e-journals based on usage by the three categories of academic users. Indian Historical Review attained the first rank followed by The Economic History Review (IInd), History Compass (IIIrd), Journal of Contemporary History (IVth), Essays in History and The Historian (Vth), Literature and History (VIIth),

Past and Present (VIIIth), Journal of Interdisciplinary History and Journal of Modern History (IXth), Journal of Multimedia History (Xth), Journal of American History (XIth), Journal of Social History (XIIth) and American Historical Review (XIIIth).

Table 7: Top Five E-magazines of History Frequently Used by Users

E-magazines	Rank
History Today	I st
Current World Archaeology	II nd
Entrepreneur	III rd
American Heritage	IV th
Military History	V th

The top high-ranked e-magazines found were History Today (Ist), Current World Archaeology

(IInd), Entrepreneur (IIIrd), American Heritage (IVth) and Military Heritage (Vth).

SUGGESTION

Based on the findings of the present study it is suggested that the reading list should be revised at the university level and the electronic format of the information sources should include in the further readings list of history. University libraries can expand their e-library project by procuring all necessary facilities to access the e-library and make effective use of its resources. The library of selected state universities should subscribe to more subject-specific e-journals and e-databases. Hence, the present study strongly suggests that university librarians must keep social sciences' especially history faculty members, research scholars and students up to date about the various categories of e-resources available in their respective libraries. The librarians and library staff should focus on information literacy programmes / workshops / seminars to increase the awareness of users of resources in the field of history. Libraries should

provide single sign-on and off-campus access to e-resources to all users instead of only faculty members.

CONCLUSION

The academic community in history information patterns involves the use of print and electronic resources. The ease and simplicity of print resources and the general failure of electronic tools to meet the information needs of an academic community in history account for their determination to continue their use of traditional resources. There are many opportunities for an academic community in history to make use of electronic resources, for example, informative websites, the web pages of archives, museums and online databases. Continuing improvements in finding aids, virtual reference, and other digital tools will ensure that digital reference continues to enhance the research of the academic community in history. An academic community in history

suggested that print and traditional resources remain essential for their academic and research

purposes

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SCIENTOMETRIC BENCHMARKING OF RASHTRASANT TUKADOJI MAHARAJ NAGPUR UNIVERSITY AND SANT GADGE BABA AMRAVATI UNIVERSITY: A COMPARATIVE STUDY

Ravindra Sopan Bankar

Shalini Ramdas Lihitkar

Ravindra Sopan Bankar

Corresponding author's e-mail:

ravib@ancalib.in

Librarian,

Anand Niketan College of
Agriculture, Anandwan,
Warora. (MH)-442907.

Shalini Ramdas Lihitkar

E-mail:

shalinilihitkar2015@gmail.com

Associate Professor,

Department of Library and
Information Science

Rashtrasant Tukadoji Maharaj
Nagpur University, Nagpur.
(MH)-440033.

ABSTRACT -

The study reports the comparative benchmarking of two well-known universities from the Vidarbha region of Maharashtra State- Rashtrasant Tukadoji Maharaj Nagpur University and Sant Gadge Baba University Amravati. Data were retrieved from the Web of Science Core Collection (WoSCC) for the period of five Years (2015-2019). A total of 1185 records were included in the study from both universities. The research output of SGB Amravati University shows declining trends in graphs and the research output of RTMN University shows consistent research productivity growth. Research depicts various core elements of Scientometrics like- Author Productivity (High Yielded Authors), Highly Producing Journals, Document Types, Languages, Institutional Collaboration and Productivity and Country Collaboration.

Keywords - Scientometrics, Bibliometrics, Science Mapping, Scientometric benchmarking, Scientific Communication, Science & Technology forecasting, etc.

INTRODUCTION

The reputation and status of an institution are directly associated with the outcome of research through the publication productivity of the faculty members of that institution. It also reflects the reputation, visibility, and academic interest of the individuals working in that institution. As a higher academic institute, the major mission of the university is imparting knowledge through, teaching, learning, and research in prime areas which is not only concerning that university but also to the Government as a whole for the benefit of society. Productivity is the indicator of efficiency in any production system. The research productivity is to create new knowledge through the process of inputs such as humans, scientific instruments, and materials along with the accumulated knowledge, social networks, and economic values.

The outputs will be publications, patents, conference proceedings, databases, standards, research reports, and so on. The principal efficiency indicator of any production unit is its productivity by an individual, research group, department, institution, field, or country. Scientometrics is to measure and identify the development of science and its research trend. It is a mathematical and statistical method of studying the trend and growth of the research output. The study will reveal the overall quantitative research aspects of both universities.

METHODOLOGY

The Scientometric method was used to assess the research productivity and trends based on sourced data from the Web of Science core collection database. The search strings used for data retrieval as an affiliation were:

1. Rashtrasant Tukadoji Maharaj Nagpur University and,
2. Sant Gadge Baba Amravati University.

Timespan set for the search string was 2015-2019, The following Scientometric and Computer tools have been employed for the study:

1. Biblioshiny (R-Metrics Package)(Aria & Cuccurullo, 2017)
2. HistCite Tool (Eugene Garfield, n.d.)
3. Microsoft Excel (Microsoft, 2018)

Area Study: Geographically, historically, politically, and according to cultural sentiments, Maharashtra has five main regions: 1. Konkan - (Konkan Division) 2. Paschim Maharashtra also known as Desh - (Pune Division) 3. Khandesh - (Nashik Division) 4. Marathwada - (Aurangabad

Division) and 5. Vidarbha - (Nagpur and Amravati divisions) - formerly part of (Central Provinces and Berar). Both the universities under study are the leading non-agricultural universities of the Vidarbha region of Maharashtra state.

A) Sant Gadge Baba Amravati University: Amravati University was established on Maharashtra Day, the 1st of May 1983 to cater to mostly the educational needs of the rural population of western Vidarbha. The university has its jurisdiction within five districts of Vidarbha viz. Amravati, Akola, Yavatmal, Buldana and Washim. By now, this sapling has grown into a gigantic tree having about 4 lacs students.

It is noteworthy to state that the University has a lush green campus of 470.63 acres with 28 Teaching Departments, a conducted Model Degree College at Buldana, and nine Faculties satisfying the knowledge appetite of the students. The University pays special attention to education upliftment of the backward and the downtrodden.

Sant Gadge Baba Amravati University has been determined and committed to creating a human resource capable of converting challenges into opportunities through imparting training to youth in various aspects of skill development. As such it addresses all dimensions of the higher teaching-learning process towards making the learners; the ideal citizens, the academic leaders, and the global entrepreneurs to represent the Leader Indian in the 21st Century. The vision of the University is student-centric. The Students Welfare Section truly incarnates this vision by providing the students, a platform for multi-dimensional and multi-faceted development.

B) Rashtrasant Tukadoji Maharaj Nagpur

University: The Nagpur University was established on 4th August 1923 with six affiliated colleges and 927 students. During 1947, the number of students increased to about 9000 accompanied by the improvement and diversification of curricula and expansion in the range of subjects. The expansion of the library and sports facilities occurred during these years for the intellectual and physical well-being of the students. It was in 1958 that some new Departments in Arts and Social Science faculties were opened; the major expansion, however, came in 1963 when several sciences and other teaching Departments were started. The Departments were shifted to spacious buildings on the main campus in 1972-73. In later years, several career-oriented courses have been started viz., Business Management, Fine Arts, Mass Communication, Library Science, Physical Education, etc.

Presently University comprises Forty-Four Postgraduate Teaching Departments (PGTD), and three Constituent Colleges/Institutions (Law College, Laxminarayan Institute of Technology, and College of Education). Five hundred and three colleges are affiliated with The Department and conducted college/Institution buildings are spread over several campuses in and around the city. More than four Lakh students are enrolled in different courses at the university.

REVIEW OF LITERATURE

It is a fact that Scientometric or bibliometric studies are applied for analyzing the usability and impact of particular scientific communications/publications of any Researcher, Journal or Institution. Researchers have gone

through various similar studies to know about different aspects that can be explored.

Okubo (1996) evaluated many technological forecasting and innovation studies that rely on bibliometric methods as part of their analysis, if we understand the premise of scientific research to be the production or enhancement of knowledge then the literature of science can be seen to be the “manifestation of that knowledge”. The need to interrogate this knowledge via databases of citations is understandably critical to the process of technology forecasting.

Karisdappa, et al. (2002) studied the distribution of productivity of authors and their collaboration in theoretical population genetics. The study reveals that the productivity of the distributions of authors is closer to Lotka's type of distribution for the latter group of authors and collaboration.

Ramesh and Nagaraju (2003) discussed the various features distribution of papers, the authorship pattern, and the year-wise distribution of the degree of collaboration in their study. They revealed that the author affiliations emphasize the dominance of Indian authors and the multiple authorship belonging to academic institutions.

Garg (2003) has given an overview of the studies published in the International Journal of Scientometric during 1978-2000 on cross-national, national, and institutional Scientometric assessment.

Abbas Horri (2004) made a bibliometric overview of library and Information Science research productivity in Iran over the years 1966-1988. His findings indicate that most contributions to

the scientific production of the field are research papers, theses, and research reports respectively.

Kraus (2004) researched the citation patterns of advanced undergraduate biology students and later Kraus compared the differences between citation usage of undergraduates and faculty in the biology department. Graduate students are heavy users of library resources, and theses and dissertations are often readily available. This makes them a well-known user group for citation analysis.

Kademani, et al. (2006) Scientometric study on nuclear science and technology research in India for the period 1970-2002 has been done. The data source for the study was International Nuclear Information System (INIS). The study reported Year-wise and country-wise contribution of research papers in the nuclear science and technology field by Indian researchers and other countries, types of publications, language-wise, research collaboration, and frequency of keywords in nuclear science and technology research papers.

Bandyopadhyay and Nandi (2008) carried on a bibliometric study covering articles in the issues of 'The Indian Economic Review'. They examined authorship patterns and the degree of collaboration between authors and geographical distribution. The study analyzed 1653 citations appended to 68 research articles and found that the double-author and multiple-author publications are increasing in number.

Mahapatra (2009) describes in her book *Bibliometric studies in the internet era* (Indiana Pub.) the potential and value of science mapping and evaluation tools for science and technology

forecasting in the internet era, the researchers described various aspects of Scientometrics & Bibliometrics in the Internet era that help evaluate the progress of scientific production and communications.

Simon (2011) in his project generated a theory of the process of expansion/contraction or staying stagnant of scientific knowledge, He applied a methodological approach that includes studies of four domains- Anaerobic Bacteriology, Aeronautics, Forensic Psychology, and Clinical Biochemistry- each with a different set of values on productivity and also institutionalization, Data came from Bibliometric Indicators derived from over 8500 Scientific Publications and interviews with 52 scientists actively working in four research domains.

Queupil (2016) in their work- 'Educational collaboration networks and leadership in Chile and Latin America: A social network analysis' examined relationships and patterns that emerge from a dataset of co-authored scholarly publications among the HEI (Higher Education Institutions) in Chile and Latin America. The Datasets were retrieved from the WoS (Web of Science). The researcher derived various sociograms and networks using centrality indicators like –Degree, Density, Betweenness (Collaboration), and Closeness (Co-authorships) along with all other bibliometrics aspects.

Bapte and Gedam (2018) presented a scientometric profile of Sant Gadge Baba Amravati University of India for 1996–2017. And Dubey and Dadhe (2020) gave the Scientometric Profile of Science Faculty of Rashtrasant

Tukadoji Maharaj Nagpur University from 1990 to 2019.

Li et al. (2020a) made a scientometric study on the topic of terahertz research. The authors observed extensive research on the topic in subjects like chemistry, physics, food safety, communication, biology, biochemical, biological imaging, and medical sciences. Li et al. (2020b) evaluated 1,386 papers published over the last 20 years and obtained from Scopus to assess the important environmental issues of metal-organic structure. The study found China as the most published country with 626 papers. Based on 4,027 records retrieved from the Web of Science.

The above-reviewed researches show various aspects analyzed through the lenses of Scientometrics for evaluating different particulars like authors, specific subject domains, or different departments of the institution. The current study is an exclusive comparative benchmarking of two HEIs with the degree of collaboration of affiliated institutes, sources, and countrywide research collaboration using impact indicators like CPP and RCI.

OBJECTIVES OF THE STUDY

Given the formulated research problem, the following objectives are framed to have a detailed analytical study.

- To identify and analyze the rate of growth of research output in both universities.

- To analyze the most prolific authors and their research collaboration in both universities.
- To examine the institution-wide and global collaboration share of research output of both universities.
- To know the impact of the research outcome among the surveyed universities.

SIGNIFICANCE OF THE STUDY

Scientometrics is a sub-field of Informetrics. It includes the measurement of the impact of research yield and its usability within other academia. The present study reveals how the science research output of both universities has grown in the last few years. The study will help policy-making and management contexts to HIEs (Higher Education Institutes) in their exclusive development towards scientific research activities and their dissemination through evaluating their performance using scientometric techniques.

Scientometric analysis, discussion, and results:

Research Productivity :

Yearly Research Productivity (Sant Gadge Baba Amaravati University): In this section, the researcher excerpted the data on the yearly research productivity of SGBAU University. The Statistics in the enlisted table show 2016 was the highest-yielding year. In the years 2018 and 2019, it is shown negative growth. Citation ratings are also high in year 2016 only.

Table 1 : Yearly Research Productivity (SGBAU)

Sr. No.	Publication Year	Record	Percent	TLCS	TGCS
1	2015	88	24.3	223	1875
2	2016	101	27.9	294	1151

3	2017	70	19.3	136	666
4	2018	64	17.7	76	447
5	2019	39	10.8	7	201
	Total	362	100	736	4340

Yearly Research Productivity (Rashtrasant Tukadoji Maharaj Nagpur University): In this section, the following table shows the yearly research output of RTM Nagpur University. The

statistics show that the year 2018 bagged the highest yield in productivity, Research output has shown growth consistently but 2019 is lower because the recent data couldn't be updated still is a possibility.

Table 2 : Yearly Productivity (RTMNU)

Sr. No.	Publication Year	Records	Percent	TLCS	TGCS
1	2015	177	21.5	240	1909
2	2016	154	18.7	158	1322
3	2017	172	20.9	143	1178
4	2018	180	21.9	56	893
5	2019	140	16.3	14	297
	Total	823	100	611	5599

Research productivity of SGBA University shows the Statistics that- the year 2016 was the highest yielding. In the years 2018 and 2019, it's shown negative growth. Citation ratings are also high in year 2016 only. And RTM Nagpur University statistics show that the year 2018 bagged the highest yield in productivity, Research output has shown growth consistently but 2019 is lower because the recent data couldn't be updated still is possibility Total productivity has much difference in both RTMNU produced a higher yield of academic research in science field during these five years (2015-2019)

Authors' Productivity:

Authors Productivity (Sant Gadge Baba Amaravati University): In this section, the researcher enlisted highly yielded authors of SGBA University. At top of the list is Rai M with 92 publications and his CPP is 21.17 and his RCI is 1.48. 2nd is Omanwar SK have 81 records in his account with 6.83 CPP and 0.48 RCI, 3rd is Anis M and whose yield is 42 and CPP is 19.64 and RCI is 1.38. The average CPP of a group of prolific authors is 13.95 and the Average RCI is 0.98.

Table 3 : Authors Productivity (SGBAU)

Sr. No	Author	Records	Percent	TLCS	TGCS	CPP	RCI
1	Rai M	92	25.4	120	1948	21.17	1.48
2	Omanwar SK	81	22.4	219	553	6.83	0.48
3	Anis M	42	11.6	318	825	19.64	1.38

4	Muley GG	42	11.6	248	732	17.43	1.22
5	Ingle AP	34	9.4	49	599	17.62	1.23
6	Waghuley SA	28	7.7	17	109	3.89	0.27
7	Bajaj NS	27	7.5	142	264	9.78	0.68
8	Palan CB	24	6.6	100	182	7.58	0.53
9	Koparkar KA	22	6.1	80	178	8.09	0.57
10	Shirsat MD	22	6.1	202	471	21.41	1.50
11	Katore SD	21	5.8	20	74	3.52	0.25
12	Baig MI	20	5.5	129	353	17.65	1.24
13	Hussaini SS	19	5.2	180	400	21.05	1.47
14	Gade A	17	4.7	38	257	15.12	1.06
15	Dahm H	16	4.4	26	295	18.44	1.29
					Avg.	13.95	0.98

Authors Productivity (Rashtrasant Tukadoji Maharaj Nagpur University): This section shows the research productivity of the prolific authors of RTMN University. We can see Dhobale SJ is at the top of the list with 220

records in his account and his CPP is 7.16 and RCI is 0.87 second is Moharil SV with 60 publications and 4.63 CPP and 0.56 RCI, third in the list is Bhanvase BA with 35 publications 15.91 CPP and 0.84 RCI.

Table 4 : Author Productivity (RTMNU)

Sr.No.	Author	Records	Percent	TLCS	TGCS	CPP	RCI
1	Dhoble SJ	220	26.7	272	1575	7.16	0.87
2	Moharil SV	60	7.3	52	278	4.63	0.56
3	Bhanvase BA	35	4.3	40	557	15.91	1.93
4	Dhoble NS	35	4.3	56	242	6.91	0.84
5	Sonawane SH	30	3.6	37	528	17.60	2.13
6	Nair GB	28	3.4	100	312	11.14	1.35
7	Singh V	23	2.8	13	174	7.57	0.92
8	Kokare DM	22	2.7	36	178	8.09	0.98
9	Gedam SC	19	2.3	8	36	1.89	0.23
10	Swart HC	19	2.3	21	199	10.47	1.27
11	Subhedar NK	17	2.1	32	132	7.76	0.94
12	Joshi CP	16	1.9	28	102	6.38	0.77
13	Kondawar SB	16	1.9	7	86	5.38	0.65
14	Patil RR	16	1.9	10	52	3.25	0.39
15	Belgamwar VS	15	1.8	25	266	17.73	2.15
					Avg.	8.79	1.06

SGBA University's statistic of prolific authors shows that- at the top of the list author is Rai M

with 92 publications and their CPP is 21.17 and RCI is 1.48. 2nd is Omanwar SK have 81 records in his account with 6.83 CPP and 0.48 RCI, 3rd is

Anis M and whose yield is 42 and CPP is 19.64 and RCI is 1.38. The Average CPP of a group of prolific authors is 13.95 and the Average RCI is 0.98.

RTMN University's statistics show - Dhobale SJ is at the top of the list with 220 records in his account and his CPP is 7.16 and RCI is RCI is 0.87 second is Moharil SV with 60 publications and 4.63 CPP and 0.56 RCI, third in the list is Bhanvase BA with 35 publications 15.91 CPP and 0.84 RCI.

Comparatively CPP (Citation per Paper) of Authors from SGBAU is seen as higher than Authors of RTMNU and RCI (Relative Citation

Index) Impact seems comparatively equal for both Universities.

Research Source Collaborations:

Highly Producing Journals/Sources (Sant Gadge Baba Amaravati University): The following table depicts the most producing journals that collaborated publications of SGBA University during 5 years- at the top list comes OPTIK journal with 33 publications share and total global citation share is 374 nos. 2nd journal is the Journal Of Materials Science-Materials In Electronics and its publication share is 20 with 74 global citations. 3rd on the list is LET Nano-biotechnology with a total of 19 publications and 144 citation yields.

Table 5 : Prolific Journals (SGBAU)

Sr.	Journal	Records	Percent	TLCS	TGCS
1	OPTIK	33	9.1	152	374
2	Journal Of Materials Science-Materials In Electronics	20	5.5	16	74
3	LET Nano-biotechnology	19	5.2	36	144
4	Optical Materials	12	3.3	74	198
5	Bulletin Of Materials Science	8	2.2	25	57
6	Journal Of The Indian Chemical Society	8	2.2	0	4
7	Indian Journal Of Physics	6	1.7	15	26
8	Journal Of Alloys And Compounds	6	1.7	9	51
9	Materials Letters	6	1.7	21	51
10	Research On Chemical Intermediates	6	1.7	9	32
11	Indian Journal Of Pure & Applied Physics	5	1.4	0	10
12	Optics And Laser Technology	5	1.4	39	109
13	Astrophysics And Space Science	4	1.1	0	30
14	Environmental Chemistry Letters	4	1.1	6	74
15	International Journal Of Pharmaceutics	4	1.1	2	142

Highly Producing Journals/Sources (Rashtrasant Tukadoji Maharaj Nagpur University): The following table shows the High yielding journal that collaborated with RTMN

University. At the top Luminescence with 73 records and its share is 362 citations of the total, 2nd is the Journal of Luminescence with 34 publications and 236 citations, and 3rd is OPTIK with 33 publications and 144 citations.

Table 6 : Prolific Journals (RTMNU)

Sr.No	Institution	Records	Percent	TLCS	TGCS
1	Sant Gadge Baba Amravati University	335	85.4	621	3615
2	University of Sao Paulo	22	6.1	21	285
3	Dr. Babasaheb Ambedkar Marathwada University	20	5.5	176	425
4	Milliya Arts Science & Management Science College	19	5.2	174	397
5	Prof Ram Meghe College of Engineering & Managemen	19	5.2	121	338
6	Shri Shivaji Science College	16	4.4	6	62
7	Nicolaus Copernicus University	14	3.9	21	277
8	King Khalid University	13	3.6	36	180
9	University of Sorocaba	10	2.8	1	98
10	Bhabha Atom Research Centre	9	2.5	63	113
11	Prof Ram Meghe Institute Technology & Research	9	2.5	10	29
12	Toshniwal ACS College	8	2.2	48	93
13	VIT University	8	2.2	53	124
14	University of Campinas	7	1.9	24	109
15	Kalyani University	7	1.9	6	57

Institutional Collaboration and Productivity (Rashtrasant Tukadoji Maharaj Nagpur University): In this section Institutional collaboration under RTMN University has been tabulated. The researcher selected the top 15 contributors in the publication Share- at top of the list is Rashtrasant Tukadoji Maharaj Nagpur

University and its departments their contribution is 702 with a 4989 total citation count. 2nd is Visvesvaraya Natl. Inst. Technology with 68 publications and a 373 citation count. The third is Shri Ramdeobaba College of Engineering & Management with 62 Publications and 258 citations.

Table : 7 Institutional Collaboration and Productivity (RTMNU)

Sr. No.	Institution	Records	Percent	TLCS	TGCS
1	Rashtrasant Tukadoji Maharaj Nagpur University	702	85.3	586	4989
2	Visvesvaraya National Institute of Technology	68	8.2	23	373
3	Shri Ramdeobaba College of Engineering & Managemen	62	7.5	34	258
4	Laxminarayan Institute Technology	39	4.7	42	368
5	Bhabha Atom Research Centre	37	4.5	33	216
6	National Institute Technology Warangal	34	4.1	38	541
7	Konkuk University	23	2.8	13	174
8	Sevadal Mahila Mahavidyalaya	23	2.8	40	146
9	K.Z.S. Science College	19	2.3	8	36
10	University of Free State	19	2.3	14	143
11	North Maharashtra University	17	2.1	6	66
12	Sri Venkateswara University	16	1.9	7	174
13	Indian Institute Technology	15	1.8	7	183
14	Institute of Chemical Technology	15	1.8	23	209

These statistics of both universities clearly show that mainstream output through university departments is consistently more as compared to colleges affiliated with them.

Country Collaboration:

Country Collaboration (Sant Gadge Baba Amaravati University): In this section, the

researcher studied Collaborated countries in the research output of SGBA University. This list is of the top 15 countries in collaboration. 1st on the list is India with 361 records and 4244 total global citations. 2nd is Brazil with 43 record shares and 556 global citations in their account.

Table 8 :Country Collaboration (SGBAU)

Sr. No.	Country	Records	Percent	TLCS	TGCS
1	India	361	99.7	732	4244
2	Brazil	43	11.9	46	556
3	Poland	17	4.7	26	297
4	Saudi Arabia	15	4.1	37	255
5	USA	10	2.8	26	383
6	UK	6	1.7	2	55
7	South Korea	5	1.4	43	119
8	Egypt	3	0.8	4	90
9	Italy	3	0.8	8	594
10	Peoples Republic China	3	0.8	0	32
11	Argentina	2	0.6	4	61
12	Australia	2	0.6	1	46
13	Belgium	2	0.6	1	21
14	Czech Republic	2	0.6	4	50
15	Germany	2	0.6	4	18

Country Collaboration (Rashtrasant Tukadoji Maharaj Nagpur University): In this section, the researcher studied Collaborated countries in the research output of RTM

University. This list is of the top 15 countries in collaboration. 1st on the list is India with 823 records and 5599 total global citations. 2nd is S. Korea with 31 record shares and 220 global citations in their account.

Table 9 : Country Collaboration (RTMNU)

Sr. No.	Country	Records	Percent	TLCS	TGCS
1	India	823	100	611	5599
2	South Korea	31	3.8	17	220
3	South Africa	29	3.5	26	276
4	USA	28	3.4	22	336
5	UK	17	2.1	13	131
6	Japan	11	1.3	4	93

7	Australia	10	1.2	8	96
8	Taiwan	9	1.1	8	135
9	Italy	8	1	6	74
10	Brazil	7	0.9	4	76
11	Russia	7	0.9	0	19
12	Canada	5	0.6	1	214
13	Peoples Republic China	4	0.5	0	35
14	Saudi Arabia	4	0.5	0	14
15	Qatar	3	0.4	0	22

India is at the top in Collaboration because of the home country of both universities so the degree of collaboration is high as compared to other countries, and while considering SGBAU, Brazil is 2nd most collaborated country, and if we consider RTMNU- it is South Korea at 2nd top in collaboration.

CONCLUSION

After analysing a total of 362 records produced by 488 Authors in 345 contributed journals with SGBAU and Analysing a total of 823 records produced by 1419 Authors in 346 contributed journals with RTMNU, researchers conclude following insight about both universities have been presented collectively.

(i) Yearly Research Productivity: Total productivity have much difference in both, RTMNU produced a higher yield of academic research in the science field during these five years (2015-2019). SGBAU research productivity is comparatively low to RTMNU but in qualitative terms, local citations (TLCS) and global citations (TGCS) SGBAU leads to RTMNU in more fraction. SGBAU holds more cited research than RTMNU in terms of research usability.

(ii) Author Productivity: Comparatively, the CPP (Citation per Paper) Impact of Authors from SGBAU is seen as higher than Authors of RTMNU and RCI (Relative Citation Index) Impact of Authors from SGBAU and RTMNU seems equal during these five years (2015-2019).

(iii) Highly Producing Journals: It is seen that both the university authors are collaborating and their choices of highly impacting journals are resembling in subjects like- Physics, Electronics, Metallurgy, and Chemistry; Collaboration of these faculties seems more in the research yield of both universities.

(iv) Institutional Collaboration and Productivity: Institutional collaboration under both universities has been seen with the renowned national research institutes like Bhabha Atomic Research Centre (BARC), National Institute of Technology, Warangal (NITW), Institute of Chemical Technology, Mumbai (ICT) along with many other international universities. These statistics clearly show that mainstream output through university departments is consistently more as compared to the collaborated institution with them in research yield.

(v) Country Collaboration: India will remain at the top in Collaboration because of the home

country of both universities, but countries like Brazil, South Korea, USA, UK, Saudi Arabia, and the People Republic of China seem to be common collaborations in both universities.

After analyzing a total count of 1185 records, 1419 authors, and 513 journals conclusions have emerged: - In research output or productivity terms RTMN University bags more points than SGBA University, but when qualitative terms are assigned (RCI and CPP indexes of authors) it is seen that SGBA University holds higher weight in their side.

However, the Application of Scientometrics to world-class universities no doubt can play a vital role in the competition among them for benchmarking the research progress. Various rankings of top universities are done using academic research yield. And now the Govt. of India and UGC also made it mandatory for Institutions to show their impact by evaluating their performances.

Suggestions: Nowadays research contribution and impact have become a new scale for evaluating any higher education institute. As a counterpart of different assessments like NIRF and NAAC for performance-based evaluation, universities are under increasing pressure to demonstrate their commitment to producing high-quality scientific outputs and promoting research excellence. This self-assessment should include a focus on the quality of the research conducted and the impact it has on society, as well as an evaluation of the resources and support provided to faculty members and researchers. In addition to self-assessment, universities must also showcase their eminent research contributors through various mediums, such as publications,

conferences, and online platforms. By highlighting the work of their top researchers, universities can attract and retain top talent, establish themselves as leaders in their respective fields, and increase their visibility and reputation among the broader scientific community.

Conflicts of Interest Statement:

The research can help to benchmark the academic progress of both universities effectively. The study has not been intuited to undermine any organization by any means.

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IN PURSUIT OF ELECTRONICS LITERATURE AND BRADFORD'S LAW OF SCATTERING & LEIMKUHLER MODEL: A STUDY BASED ON WEB OF SCIENCE DATABASE

Dr Sangeeta Mahajan

ABSTRACT -

Dr Sangeeta Mahajan
Librarian, Dayanand College of
Law, Latur (M. S.)
sangeetamahajanlatur@gmail.com

The application of Bradford's law of scattering to electronic publications is the subject of this research article. The data for the study came from the Web of Science core collection, which is free to the public. 741 journals' five-year data sets produced 10387 English-language publications relating to electronics themes in general and physics studies in particular over the study period (2016-2020). The theoretical components of Bradford's law, as well as the rank list of journals created from the database, were tested. The Publication of Instrumentation emerged as the most desired journal, with 641 articles. The Bradford Multiplier (k) was found to be 10.451 in the database, and it was determined to be genuine because the percentage error of the distribution is - 0.02658, which is extremely small. The Bradford law is also graphically tested by creating a graph, which shows that it supports all three criteria.

Keywords - Bradford's Law of Scattering, Citation Dispersion, Leimkuhler model, Rank list of Journals, Web of Science

INTRODUCTION

A wealth of information is available on the internet and in libraries. When it comes to reading the articles, the majority of pupils and readers find them to be tedious. Researchers and librarians have the responsibility of making information retrieval as simple as possible. Primary data can be retrieved from a variety of sources, including books, periodicals, journals, conference proceedings, theses, and other similar publications. Journal literature will be considered not only important but also an emerging source of information among all of these sources.

Journal literature will be considered not only important but also an emerging source of information among all of these sources. Journals in any discipline typically present fresh ideas, concepts, formulas, and novel research discoveries. Micro-thoughts, subject comparisons, in-depth studies, and new developments in subjects, among other things, may be covered in the journal. Some of these publications are regularly referred to by students or researchers because they discovered a very strong relationship between their subjects, associations of ideas, and areas of study activity. This knowledge is focused in a few core journals. These highly referenced journals are designated as the subject's core journals.

S.C. Bradford, who popularised the Bradford Law of Scattering, was the first to propose the concept of core journals in 1934. The numerous approaches to identify the core journals in a field from a huge number of journals include citation indexing techniques, impact factor values of journals, and so on. Bradford's technique is the most widely used and well-known in bibliometric investigations including the appropriate and effective application of science through mathematical evidence.

Bradford Law of Scattering states that, "If scientific journals are arranged in order 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 articles as the nucleus, when the number of periodicals in the nucleus and succeeding zones will be as 1: n: n^2 , where 'n' is a multiplier."

The current research investigates the application of Bradford's law to the field of electronics in order to identify the field's core journals. The paper also discusses the Leimkuhler model, as well as year-by-year and document-by-document analysis.

Electronics

Electronics have had a significant impact on the evolution of modern society. Electronics is the study of the emission, flow, and control of electrons in a vacuum and matter. It includes physics, engineering, technology, and applications. It differs from classical electrical engineering in that it employs active devices to control electron flow via amplification and rectification, as opposed to passive effects such as resistance, capacitance, and inductance.

Information processing, telecommunication, and signal processing are all areas where electronics is used. Digital information processing is made possible by electronic devices' ability to act as switches. Circuit boards, electronics packaging technology, and other various forms of communication infrastructure complete circuit functionality and transform the mixed electronic components into a regular working system known as an electronic system. An electronic system can be a subsystem of another engineered system or a stand-alone device.

REVIEW OF LITERATURE

Bibliometrics studies have been published in a variety of journals across a variety of fields. Initially, literature on bibliometrics and related aspects by Bellis, Diodatoand, and Borgman was used to clarify concepts. The studies on

bibliometrics by Garg and Tripathi and Tanuscodi were reviewed, but none of them addressed Bradford Law and the Leimkuhler Model.

Many articles in the LIS literature have focused on Bradford's Law of scattering. Several different versions of the law have been proposed. Vickery's (1948) paper was the first notable paper on law, followed by Kendall's (1949) paper (1960). Later, Wilkinson (1972) discussed the law's bipolar nature, proposing that the law's verbal formulation expresses Bradford's theory while its graphical formulation expresses his observation. Vickery and Leimkuhler (1967) initiated the search for an exact formulation of Bradford's law, which was later followed by many other authors. Despite the fact that several research have meticulously evaluated the law's reasonableness, they frequently discover that the Bradford multiplier's value differs among subject groups. The investigations of Sengupta (1990) and Goffman and Morris (1970) are remarkable in terms of application.

Gunasekaran, S. and et.al.(2006) used bibliometric analytic methodologies to conduct a study on Chemical Science. The information was gathered from the Chemistry Citation Index CD-ROM, which was released in 2002.

Sudhier, K.G (2010) used Bradford's law of scattering to the literature of physics. The Indian Institute of Science doctorate theses were cited in the report. The Bradford multipliers were computed, and the law was shown to be applicable with K equal to 1.2. This modification satisfies the Bradford law for the data set when the multiplier for the first two zones was calculated using $n=5$. However, when the multiplier's mean (13.4) is taken into account, the

law does not suit the journal distribution, and the percentage of error is found to be 68.66. Bradford's law was validated using the Leimkuhler model, according to the study. Only 0.072% of the total was discovered, which is insignificant.

Amsaveni, N. (2016) Assessing Bradford's Law of Scattering in Neural Network Literature. It is discovered that, while this law does not fit theoretically, the alternative, such as the Leimkuhler model, is applicable to neural network literature.

Neelamma, G. (2016) used Bradford's law in Botany literature from 2005 to 2014. There are a total of 12051 references in 1183 publications, with 572 journals cited. The investigation indicated that Bradford's law matches the data well, with a 1.5% margin of error.

Pattanashetti, D.M., and Harinarayana N.S. (2017) conducted research on 'Assessment of Medical Engineering Research Output Using Scientometrics Indicators from Japan and South Korea.' The results suggest that Japanese publications in Mechanical Engineering are declining while those in the other two countries are increasing. During the study period, South Korea doubled its publications.

OBJECTIVES OF THE STUDY

The following are the primary objectives of the current study:

- 1) To comprehend the year-wise types of documents.
- 2) To prepare a rank list of the most cited journals on the electronics topic.

- 3) To study the phenomenon of article scattering.
- 4) To examine the appropriateness of verbal and graphical formulations of Bradford's Law of Scattering.
- 5) To validate the Leimkuhler model in the field of electronics.

METHODOLOGY

The current study focuses on the application of the Leimkuhler model to the research outcomes of electronic subjects in general, and the physics research area in particular, published in journals between 2016 and 2020, in order to verify Bradford's law of scattering. The Web of Science core journal open access database was used to acquire information about the journals publication years, document type, subject, research field, database, language of publishing, and other specified bibliographic parameters. Following that, a data sheet with various properties was developed. The application of Bradford's Law of

Bradford's Law of Scattering establishes a quantifiable relationship between journals and the papers that appear in them. The Current Bibliography of Applied Geophysics (1928-1931) and the Quarterly Bibliography of Lubrication were statistically analysed by Samuel Clement Bradford, Chief Librarian of the London Science Museum (1931-1933). He examined journals that contained references to these topics in descending order of productivity, then separated the articles into three zones that were roughly similar in size. He referred to the first as the nuclear zone, which is highly productive; the second as a moderately productive zone; and the third as a low-productive zone. Bradford observed consistency while estimating the number of titles in each of

Scattering and the Leimkuhler Model were carried out and evaluated using these parameters, and the procedure and results were discussed as conclusions. Articles were classified as items, and journals as sources, in the study. In descending order of productivity, 741 journals containing 10387 articles were arranged from electronics. The identified journals and their accompanying frequency of articles were analysed for the verification of Bradford's law of scattering proposed by Bradford and Leimkuhler's model. For assessing the adequacy of the graphical formulation, the natural log value of the cumulative number of journals was generated for producing the graph, whereas the verbal formulation was examined using three separate parameters for carrying the diverse number of periodicals.

DISCUSSION

Bradford's Law of Scattering

the three zones. Bradford determined that the ratio of journal titles in consecutive zones followed a consistent pattern based on his findings. Bradford's initial formulation was that if scientific journals were sorted in order of decreasing production of articles on a given subject, they might be classified into a nucleus of periodicals more specifically devoted to the subject and many groups or zones containing the same articles as the nucleus, with the number of periodicals in the nucleus and subsequent zones being $1: n: n^2$, where 'n' is a multiplier.

Bradford's law was depicted graphically. Vickery (1948), Leimkuhler (1967), Brookes (1969a, 1969b), Wilkinson (1972), Egghe (1985, 1986, 1990a, 1990b), Basu (1992), and Ravichandra

Rao (1992) proposed the mathematical models afterwards (1998). These researchers provided mathematical models for the dispersion of journal articles.

A. Brooke's Model (1969)

$$F(x) = a + b \log x \text{-----}(1)$$

where $F(x)$ is the cumulative number of references contained in the first x most productive journals, and a and b are constants. Bradford's Law is most commonly expressed in this manner.

The verbal formulation was developed by Vickery (1948) to show that it may be applied to any number of zones with equal yield.

B. Leimkulher's (1967) Model

$$R(r) = a \log(1 + br) \text{-----}(2)$$

where $R(r)$ is the cumulative number of articles contributed by journals ranked 1 through r , and a and b are parameters. Where $r = 1, 2, 3 \dots$

C. Egghe's model

Bradford's Multiplier has been modified using Leimkuhler's Model as

$$k = (e^\gamma \times y_m)^{1/p} \text{-----}(3)$$

Where γ is Euler's number ($e^\gamma = 1.781$),

p = Number of zones i.e. 3.

y_m = Number of items in the most productivity sources.

$$Y_0 = A/p$$

Where A denotes the total number of articles.

Let T denote the total number of journals in Bradford group

r_0 = Number of journals in the nucleus zone of Bradford is calculated as:

$$r_0 = \frac{T(k-1)}{(k^p-1)} \text{-----}(4)$$

$$r_1 = r_0 \times k$$

$$r_2 = r_0 \times k^2$$

Brooke asserts that in order to evaluate the applicability of Bradford's Law, the following three implicit requirements must be satisfied:

- i. The number of articles in each zone must remain constant when the journals are divided into zones.
- ii. The Bradford multiplier, k , must be greater than 1.
- iii. The Bradford multiplier must remain approximately constant.

Type of Documents Cited

Table - 1: Year wise Types of Documents cited

Publication Year	Books	Conference proceedings	Journals	Scientific reports	Article Total
2016	1	229	1470	2	1702
2017		367	1854	3	2224
2018		261	2064	2	2327
2019		318	2422	1	2741

2020		207	2577		2784
	1	1382	10387	8	11778

The frequency of Conference proceedings and J citations is higher than other B and S categories of documents in the year-by-year trend of types of documents referenced from 2016 to 2020. The table contains information about the frequency and type of documents cited. It demonstrates that journals take up the majority of this five-year distribution, followed by Conference

proceedings. Scientific reports & Books are insignificant.

Rank list of journals

Ranking journals are those that have achieved recognition in their respective fields. In descending order, the table 2 shows the frequency rankings of core journals.

Table 2: Rank list of journals

Rank	Article Title	Frequency	Percentage
1	Journal of instrumentation	641	6.1712%
2	Electronics	506	4.8715%
3	Nuclear instruments & methods in physics research section a- accelerators spectrometers detectors and associated equipment	446	4.2938%
4	Advanced materials	285	2.7438%
5	Nature communications	272	2.6187%
6	Applied sciences-basel	263	2.5320%
7	Scientific reports	248	2.3876%
8	Ieee transactions on nuclear science	221	2.1277%
9	Advanced functional materials	218	2.0988%
10	Micromachines	216	2.0795%
11	Nanomaterials	187	1.8003%
12	AIP advances	182	1.7522%
13	Applied physics letters	179	1.7233%
	Acs applied materials & interfaces	179	1.7233%
14	Materials	176	1.6944%
15	Physical review B	151	1.4537%
16	Nano letters	146	1.4056%
17	Advanced science	145	1.3960%
18	Advanced electronic materials	135	1.2997%
19	IEEE transactions on electron devices	133	1.2804%
20	ACS Nano	121	1.1649%
21	Advanced materials technologies	118	1.1360%
22	Nanoscale	114	1.0975%
23	Review of scientific instruments	101	0.9724%
24	Sensors	98	0.9435%
25	Optics express	88	0.8472%
26	Journal of materials chemistry c	85	0.8183%

	Journal of applied physics	85	0.8183%
27	Ieee sensors journal	83	0.7991%
28	Nanotechnology	80	0.7702%
29	Physical review applied	77	0.7413%
30	Small	76	0.7317%
	Total	6055	58.2940%

The table 2 shows that thirty (30) journals accounted for 6055 (58.2940 percent) of all journal citations. The table 2 also shows that the Journal of instrumentation is the most mentioned journal by authors of publications in the topic of electronics, having been cited 641 times, accounting for around 6.1712% of the journals cited. Nuclear instruments & methods in physics research section a-accelerators spectrometers, detectors, and associated equipment were rated third with a frequency of 446 times (4.8715%). The frequency and percentage for the remaining

first thirty journals are indicated in the table above.

Number of Journals in Each Rank

All 10387 journal articles are organised in decreasing order and assigned a rank to determine the number of journals that occupy specific ranks.

The frequency of citations below 30 is provided in the following table 3, along with the rank from the previous table 2 for convenience. The rankings, on the other hand, are given as the number of journals in a certain group with a total number of articles.

Table 3: Number (Frequency) of Journals in Each Rank with no of articles

Sr No	Rank	No. of Journals	No. of Articles
01.	32 - 35, 37, 39 - 41, 42, 46, 48 -49, 56	1 each	599
02.	31, 36, 38, 43-45, 47, 53	2 each	694
03.	52,54,57,59,64	3 each	315
04.	5-51, 60,65,68	4 each	392
05.	55, 61-62	5 each	280
06.	67	6	66
07.	58, 63	9 each	315
08.	69	11	99
09.	66	12	144
10.	70-71	15 each	225
11.	72-73	33 each	363
12.	74	44	176
13.	75	58	174
14.	76	105	210
15.	77	280	280
	Total		4332

The total of 10387 articles is derived from 741 journals. The journals are classified into 77 distinct ranks based on the frequency with which they appear in the media. In the top three positions, 15.34% of journals are found. Within the first 30 ranks, the table 3 lists 6055, or 58.2940 percent, and 4332, or 41.71 percent. There are only a couple of journals. However, when compared to a specific rank, the number of journals ranges from 1 to 293 journals. There were 280 journals in the last rank, which was 77. It showed that the lower-ranking journals have a higher number of publications than the middle-ranking journals. The table 4 shows the number of journals that are available for each rank. Thus, the top 30 journals accounted for more than 58 percent (58.2940 percent) of all journal citations, while 741 journals accounted for the remaining 42 percent. As a result, a huge number of citations are concentrated in a few journals.

Bradford's Law: Its Implementation

The following explanation and data are offered to demonstrate the appropriateness of journal distribution using the verbal formulation of

Bradford's law. The first section is concerned with the theory's linguistic form. The first section studies the geometric representation based on the same data, and the second half analyses the periodicals sorted by decreasing frequency of citations.

Verbal Formation

In the table 4, a total of 10387 cited journals are listed in order of decreasing number of citations. A table 4 is generated with the information of journals with their rank, total number of journals in each rank, cumulative number of journals, number of articles received by each journal, cumulative articles, log of cumulative journals of each rank to test the verbal construction of Bradford's law. This data is required to put Bradford's law to the test verbally. The 10387 journals were separated into three zones in order to test the algebraic interpretation of the law. The Bradford multiplier factor was calculated by dividing a zone's journals by the previous zone's journals. The three zones were chosen with the goal of minimizing the percentage error in citation distribution throughout the three zones.

Table 4: Journal and Citation Dispersion in Bradford Zones

Rank	N0. of Journals	Cumulative no. of Journals	No. of Articles/Frequency	Cumulative No. of Articles/Frequency	Log(n)	Zone
1	1	1	641	641	0	First
2	1	2	506	1147	0.69	
3	1	3	446	1593	1.10	
4	1	4	285	1878	1.39	
5	1	5	272	2150	1.61	
6	1	6	263	2413	1.79	
7	1	7	248	2661	1.95**	
8	1	8	221	2882	2.08	
9	1	9	218	3100	2.20	

Rank	N0. of Journals	Cumulative no. of Journals	No. of Articles/Frequency	Cumulative No. of Articles/Frequency	Log(n)	Zone
10	1	10	216	3316	2.30	
11	1	11	187	3503	2.40*	
12	1	12	182	3685	2.48	Second
13	2	14	358	4043	2.64	
14	1	15	176	4219	2.71	
15	1	16	151	4370	2.77	
16	1	17	146	4516	2.83	
17	1	18	145	4661	2.89	
18	1	19	135	4796	2.94	
19	1	20	133	4929	3.00	
20	1	21	121	5050	3.04	
21	1	22	118	5168	3.09	
22	1	23	114	5282	3.14	
23	1	24	101	5383	3.18	
24	1	25	98	5481	3.22	
25	1	26	88	5569	3.26	
26	2	28	170	5739	3.33	
27	1	29	83	5822	3.37	
28	1	30	80	5902	3.40	
29	1	31	77	5979	3.43	
30	1	32	76	6055	3.47	
31	2	34	146	6201	3.53	
32	1	35	72	6273	3.56	
33	1	36	67	6340	3.58	
34	1	37	61	6401	3.61	
35	1	38	58	6459	3.64	
36	2	40	112	6571	3.69	
37	1	41	51	6622	3.71	
38	2	43	100	6722	3.76	
39	1	44	48	6770	3.78	
40	1	45	46	6816	3.81	
41	1	46	40	6856	3.83	
42	1	47	39	6895	3.85	
43	2	49	76	6971	3.89*	Third
44	2	51	74	7045	3.93	
45	2	53	72	7117	3.97	
46	1	54	34	7151	3.99	
47	2	56	64	7215	4.03	
48	1	57	31	7246	4.04	
49	1	58	30	7276	4.06	

Rank	N0. of Journals	Cumulative no. of Journals	No. of Articles/Frequency	Cumulative No. of Articles/Frequency	Log(n)	Zone
50	4	62	116	7392	4.13	
51	4	66	112	7504	4.19	
52	3	69	81	7585	4.23	
53	2	71	50	7635	4.26**	
54	3	74	72	7707	4.30	
55	5	79	115	7822	4.37	
56	1	80	22	7844	4.38	
57	3	83	63	7907	4.42	
58	9	92	180	8087	4.52	
59	3	95	57	8144	4.55	
60	4	99	72	8216	4.60	
61	5	104	85	8301	4.64	
62	5	109	80	8381	4.69	
63	9	118	135	8516	4.77	
64	3	121	42	8558	4.80	
65	4	125	52	8610	4.83	
66	12	137	144	8754	4.92	
67	6	143	66	8820	4.96	
68	4	147	40	8860	4.99	
69	11	158	99	8959	5.06	
70	15	173	120	9079	5.15	
71	15	188	105	9184	5.24	
72	33	221	198	9382	5.40	
73	33	254	165	9547	5.54	
74	44	298	176	9723	5.70	
75	58	356	174	9897	5.87	
76	105	461	210	10107	6.13	
77	280	741	280	10387	6.61*	
	741		10387			

* Bradford zone dispersion

** Bradford zone dispersion with application of Leimkuhler model

Table 5: Scatter of Journals and articles over Bradford's zone

Zone	No. of journals	No. of articles	Bradford Multiplier
1	11	3503	--
2	38	3468	3.45
3	692	3416	18.21
Total	741	10387	10.83

Application of Leimkuhler model

The 741 journals have been separated into three zones in order to test Bradford's law. Bradford assumes a minimum of three zones, i.e., $p=3$, hence the value of k i.e. Bradford's Multiplier can be computed using the formula.

$$k = (1.781 \times Y_m)^{1/p}$$

Where Y_m is the number of citations received to rank one journal = 641 (Please refer Table 4)

$$k = (1.781 \times 641)^{1/3} = (1141.62)^{1/3} = 10.451$$

$$Y_0 = A/P$$

Where P is number of zones = 3 (Please refer Table 5)

$$Y_0 = 10387 \div 3 = 3462.33$$

$$r_0 = T(k-1) \div (k^p - 1)$$

$$= 741(10.451 - 1) \div (10.451^3 - 1)$$

$$= (741 \times 9.451) \div (1141.49 - 1)$$

$$= 7003.19 \div 1140.49$$

$$r_0 = 6.14$$

$$r_1 = r_0 \times k = 6.14 \times 10.451 = 64.174$$

$$r_2 = r_0 \times k^2 = 6.14 \times 10.451^2 = 670.69$$

$$a = Y_0 \div \log k = 3462.33 \div 1.019 = 3397.77$$

$$b = (k - 1) \div r_0 = (10.451 - 1) \div 6.14 = 9.451 \div 6.14 = 1.539$$

Table 6 summarises the results of the calculation.

From table 6, the number of journals in nucleus is found to be 6.14 and $k = 10.45$ is a multiplier.

Therefore, the Bradford distribution is

$$6.14: 6.14 \times 10.45: 6.14 \times 10.45^2 \approx 1: n: n^2$$

$$6.14 : 64.163 : 670.50 = 740.803$$

$$\text{Percentage of error} = [(740.803 - 741) \div 741] \times 100 = [(-0.197) \div 741] \times 100 = -0.0002658 \times 100$$

$$\text{Percentage of error} = -0.02658 \%$$

The percentage error of the distribution is 0.02658%, and the number of journals sending articles to each zone multiplies by 10.451. The first zone, with 6.14 journals, contributes 2413 articles; the second zone, with 64.174 journals, contributes 4979 articles; and the third zone, with 670.69 journals, contributes 2995 articles.

Table 6: Application of Leimkuhler model

Zone	No. of journals	No. of articles	Bradford Multiplier
1	6.14	2413	--
2	64.174	4979	10.451
3	670.69	2995	10.451
Total	741.004	10387	10.451

Graphical Formulation

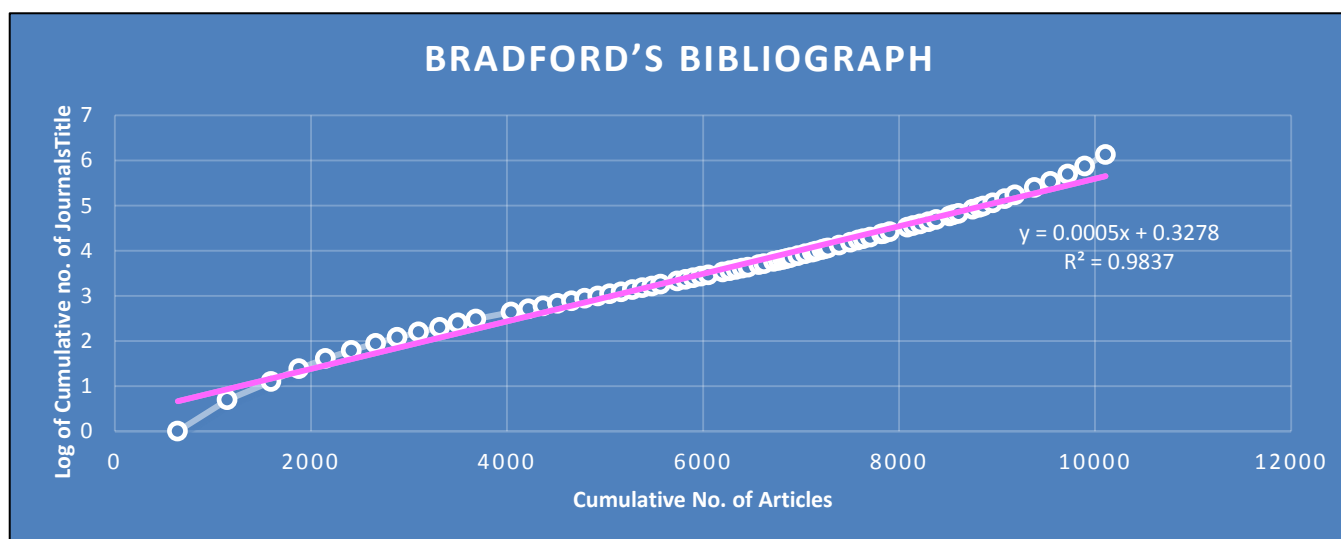
Brookes pioneered the graphical (formulation) method. It is only the experimental confirmation of Bradford's Law's verbal formulation that notices a certain regularity in the distribution of scientific publications.

The graph shows the cumulative number of journal titles on the vertical (Y) axis and the cumulative number of articles on the horizontal (X) axis as a logarithmic plot.

If Bradford's law is confirmed, the distribution will display the following three characters.

- i. A rapid rise for the first few points

- ii. A major portion of linear relation between two variables and
- iii. A 'droop' at the tail end of the distribution indicating the incompleteness of the bibliography.



FINDING

The following facts are revealed as a result of the many Scientometrics indicators and the application of Bradford's law of scattering:

1. According to document analysis, 19% are journals, 11.73% are Conference proceedings, barely 0.07% are Scientific reports, and a minuscule 0.01% are Books.
2. In terms of five-year dispersion, the year with the most publications 2784 (23.64%) was 2020, while the year with the fewest 1702 (14.45%) was 2016.
3. With 641 (6.1712%) articles, the 'Journal of Instrumentation' is the most preferred journal. As per the three zones of cited periodicals, equal articles have not been fit into Bradford's law of Scattering.

4. The study provided by Eggle's Leimkuher model demonstrates that Bradford's law will suit the 14:64.174:670.69 geometric sequence of referenced journals with a constant Bradford Multiplier of 10.451.

5. After applying the Leimkuher model, the proportion of errors is found to be the most negligible (-0.02658%).

CONCLUSION

The current database included 11 journals that covered 3503 articles, 38 journals that covered 3468 articles, and 692 journals that covered 3416 articles. In other words, each journal group covered one-third of the total number of citations.

Bradford predicted that the detected zones would form an almost geometric series in the form of 1: n : n^2 , but the relationship of each zone in the current investigation was determined to be

11:38:692. This is not consistent with the Bradford distribution.

As a result, the method based on the Leimkuhler model is used to verify Bradford's Law of scattering. Bradford's Law was found to be valid for the database using the Leimkuhler model. The percentage of errors discovered to be the least significant (-0.02658%). Bradford's Law of Scattering has received a great deal of attention. However, no one model has yet been developed that adequately matches the majority of the data.

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CONCEPTUAL UNDERSTANDING OF PLAGIARISM IN RELATION WITH THE USE OF ELECTRONIC INFORMATION RESOURCES BY RESEARCH SCHOLARS: A STUDY

Dr. Geetha C S

Dr. Geetha C S

Department of Library and
Information Science
Bangalore University,
Bengaluru – 560056
geethamanu415@gmail.com

ABSTRACT -

The present survey intends to explore the understanding of plagiarism in relation to the use of electronic information resources among the research scholars of state and private universities in Bengaluru and Mysuru cities of Karnataka, India. This survey aims to elucidate the data from the 502 research scholars of 14 different universities of Karnataka by utilizing a well-structured questionnaire. Results revealed that the majority, 74.1%, of the respondents use e-journals, 57.8% e-databases, and 50.2% are e-books regularly. The majority, 75.7% (N=380), are highly knowledgeable on what strictly plagiarism is? and the plagiarism-related aspects.

Keywords - Plagiarism, Information sources, Electronic information resources, Research Scholars, Higher Education Institutions.

INTRODUCTION

Many individual talks about information as a product of the process they are constantly engaged with, a newly discovered, mysterious, and natural phenomenon. People recognize the value of information sometimes instead in unusual ways, and in the last centuries, a shift in people's attitude toward knowledge has taken place. Nowadays, producers of information materials are grappling with technology and producing a mix of traditional and electronic information products. These days, writers have been predicting a paperless society, and despite these predictions, printed materials are still very much with us¹. One of the first forays into the digital world that is still widely in use is the CD-ROM product which then moves to internet/web-based products. These products can be E-journals, E-books, E-databases, ETDs, E-Reference sources, etc. the usefulness of these forms of sources can be listed as they provide better access to information, users can read at their desks, are quick and convenient to access, saves paper, can refer anytime and anywhere, ease of access and user flexibility.

Because of the above usefulness, nowadays, users prefer more of the electronic version of information rather than the print version. With this idea in mind, the present study intends to know the awareness and use frequency of e-sources of information among research scholars concerning plagiarism - an ongoing phenomenon at almost every academic.

OBJECTIVES OF THE STUDY

1. To examine the preferred electronic sources of information by research scholars.
2. To assess the participant's attitude toward acknowledging the materials they have referred to.
3. To analyze the theoretical and conceptual understanding of plagiarism among the respondents of the study.
4. To analyze the research scholars' knowledge of different types of plagiarism.
5. To know the researcher's preference to clarify the doubts on plagiarism and related aspects.

REVIEW OF LITERATURE

Ozegalska-Trybalska (2021)² explored the facts and myths on plagiarism and self-plagiarism. These two concepts are becoming more and more vital in the context of discussions, especially in science, rather than the results obtained by the research. The study briefly describes various circumstances of plagiarism, self-plagiarism and how plagiarism will come under copyright infringement as of the Copyright Act. Kumar, Dipongkor et al. (2021)³ illuminated the framework for plagiarism detection among academic and scientific writing by using newly developed plagiarism detection software, namely

AcPgChecker. The study explains in detail about steps and techniques of plagiarism detection and how the results show the end-users. Josef & Lucie (2021)⁴ investigated the attitude towards and perception of plagiarism among students of the Faculty of Regional Development and International Studies at Mendel University. After analyzing the respondent's opinions, the study suggests that the faculty of the university conduct classes on common mistakes, citations, references, etc. Perkins, M., Gezgin, U. B., & Roe, J. (2020)⁵ examined the introduction of intervention programs at the university level to reduce plagiarism and improve academic integrity. An intervention program called Academic English Master (AEM) was used and identified the differences in academic writing. As a result, the study suggested that to reduce plagiarism, similar kinds of other interventions may be adopted to bring out the potential academic integrity in the institutions. Keefer, L A; Brown, M & Rothschild, Z K (2020)⁶ explored the study "Framing plagiarism as a disease heightens student's valuation of academic integrity," in which 365 undergraduate students were considered as participants. For effective motivation among the students and to improve academic integrity, institutional policy support and serious punishable actions play a vital role. Sureda, Comas & Oliver (2020)⁷ analyzed the phenomenon of academic plagiarism among secondary education and high school students; the questionnaire was used to draw the data from the students (n=2749). Based on the result, the study suggests that the teachers need to take care and must be provided improved IT and library facilities to the students and also create an awareness program among the students about the disadvantages of plagiarism.

METHODOLOGY

Karnataka is one of India's pioneer states in implementing higher education reforms, and the study is confined to collecting data from research scholars of Karnataka's state and private universities located in Bengaluru and Mysuru. It is found that there are 14 higher education institutions coming under the study area. As the present research work is based on the survey method, it employs a questionnaire as a tool to collect the data from the research scholars. A total of 2538 research scholars are presently involved in their research work. Among them, 597 research scholars were considered as respondents by adopting a stratified sampling method and distributing the questionnaires to those scholars. As a return, 502 wholly filled questionnaires were received, which led to an 84% of response rate.

Analysis and Interpretation of Data:

Demographical details of Research Scholars by gender and age groups:

The study population is comprised of 502 participants; among them, 58.6% of them are male, and 41.4% of them are females. Further, there are 83.3% of the participants belong to the age group of 23-35 years. There are, 9% of the respondents are in the age group between 36-45 years, followed by 7.85% of the Research Scholars within the age group of 46-55 years, and there are no Research Scholars in this age group above 56 years; this is obvious to know, as they are pursuing their research studies.

Distribution of Research Scholars by their Status in Registration of research

Table 1: Distribution of Research Scholars by their Status in Registration of research

Research Scholars	Frequency	Percentage (%)
PDF	03	0.6
JRF/SRF	48	9.6
Full Time	302	60.2
Part-Time	149	29.6
Total	502	100

As a prerogative for registration of research, there are many options available such as UGC-JRF, CSIR-Fellow, ICCR (Foreign Students), UGC-NET, etc. Accordingly, respondents of the study are asked to state the mode of their registration for their research. Table 2 shows that 60.2% of the Research Scholars are Full-time, while 29.6% of them are part-time. Researchers. Further, 9.6% of them have qualified with JRF/SRF, while 0.6% of them have been working as Post-doctoral

Fellows (PDF). It shows only 0.6% of the researchers have been pursuing Post-doctoral Fellows. This shows that the majority of the Ph.D. holders have settled in their areas, and only a few of them are showing interest in continuing their research. It is inferred that the majority of the respondents are from the science faculty, which means their research might be lab-oriented and avail of different fellowships. Hence the highest number of them are full-time scholars.

Membership to Professional Bodies and Discussion Forums

The digital era has created many Web-based discussion groups/forums and User groups for mutual interactions and exchanging and sharing knowledge. These online forums and discussion groups are the platforms to communicate scientific information among their communities. In this context, data has been collected, and the

results show that 43% of Research Scholars are members of professional associations and web-based discussion forums.

Use of Print and Electronic Sources of Information:

The study intends to analyze the respondent's preference and use of electronic information sources. Table 2 present the participants' most preferred and most used sources of information.

Table: 2 Use of Electronic Information Sources

Most preferred and used electronic source information	Responses					Total
	N	R	O	F	MF	
E-Books	00 (0.0%)	00 (0.0%)	52 (10.4%)	252 (50.2%)	198 (39.4%)	502 (100%)
E-Journals	01 (0.2%)	00 (0.0%)	14 (2.8%)	115 (22.9%)	372 (74.1%)	502 (100%)
Database	17 (3.4%)	16 (3.2%)	72 (14.3%)	107 (21.3%)	290 (57.8%)	502 (100%)
E-Reference Sources	00 (0.0%)	14 (2.8%)	83 (16.5%)	244 (48.6%)	161 (32.1%)	502 (100%)
Electronic Thesis and Dissertation	12 (2.4%)	32 (6.4%)	185 (36.9%)	168 (33.5%)	105 (20.9%)	502 (100%)
E-Magazine and E newspaper	33 (6.6%)	22 (4.4%)	237 (47.2%)	145 (28.9%)	65 (12.9%)	502 (100%)
E-Patents	90 (17.9%)	92 (18.3%)	154 (30.7%)	135 (26.9%)	31 (6.2%)	502 (100%)

N- Never, R- Rarely, O-Occasionally F- Frequently, MF- Most Frequently

Table 2 shows the distribution of data on the usage of electronic resources by respondents. It is found that e-books are frequently used by 50.2% of the Research Scholars, while 10.4% of them

responded 'occasionally.' E-Journals are most frequently used by the majority of 74.1% of the Research Scholars and 2.8% occasionally. For referring to e-databases, 57.8% of them

responded 'most frequently' while 3.2% of them responded 'rarely.' For the use of electronic reference sources, 48.6% of them responded 'frequently' while 16.5% of them responded 'occasionally.' Electronic thesis and dissertations have been referred to by 36.9% of the respondents 'occasionally' while 6.4% of them responded 'rarely.' There are 30.7% of the participants responded 'occasionally' while 6.2% of them responded 'most frequently' to refer e-Patents as their source of information. In using Online Magazines and newspapers, it is observed that 47.2% of the Research Scholars responded

'occasionally' while 6.6% of them responded 'never' and 12.9% responded 'most frequently.'

Distribution of respondents with regard to the awareness of Referencing:

Giving credit to the authors and acknowledging the resources in the form of references/citations is one of the major research ethics. The study extends to know whether the respondents are aware that the information sources they are using are protected by copyright, and the responses have been presented under Table 3

Table: 3 Distribution of responses with regard to the awareness of Referencing

Statements	Responses	Research Scholars	Total
Are you aware that the above sources are copyrighted materials with legal Provisions to use them?	Yes	480 (95.6%)	502 (100%)
	No	22 (4.4%)	
If No, have you been enlightened about this aspect by your library or by others?	Yes	20 (90.9%)	22 (100%)
	No	02 (9.1%)	

Table 3 reveals that 95.6% of the Research Scholars are aware that sources that they are referencing are protected with legal rights. At the same time, 4.4% of the Research Scholars responded 'No' to the query. It is good to know that 90.9% of the Research Scholars have been enlightened about this with the help of their library or from others. It is clear from the analysis that the majority of the Research Scholars are updating themselves with the current knowledge on the protection of information sources.

Awareness and Knowledge of Plagiarism

Meaning of Plagiarism

A previous study by Mahmood⁸ (2010) examined academic integrity among respondents by evaluating their awareness of various concepts in relation to plagiarism. The findings reveal that the majority of the respondents had a misconception about plagiarism and were unaware of the consequences of plagiarism. In this context, participants were asked to state their opinion about the plagiarism meaning, and the responses are tabulated under Table 4.

Table: 4 Distribution of respondents by responses on the meaning of Plagiarism.

Plagiarism means	Respondents
Using the copyrighted work without permission and citing appropriately	78 (15.5%)
Unknowingly using the other's work	11 (2.2%)
Translating from other languages and presenting as one's own	47 (9.4%)
All the above	380 (75.7%)
Total	502 (100%)

The analysis of Table 4 reveals that 75.7% of the Research Scholars have responded with the right answer of "All the above." According to Merriam-Webster online dictionary⁹ Plagiarism is "...to steal and pass off the ideas or words of

another as one's own", "to use another's production without crediting the source," "to commit literary theft," and "to present as new and original an idea or product derived from an existing source" The above meaning established the answer "all the above" means the same.

Techniques of Plagiarism

Table: 5 Statistical analysis of responses on the techniques of Plagiarism.

Statements on Plagiarism	Responses				
	SD	D	UC	A	SA
Converting someone else's work as your own and giving no credit to the author is an act of plagiarism	18 (3.6%)	07 (1.4%)	17 (3.4%)	211 (42.0%)	249 (49.6%)
Copying from several sources and tweaking the content is plagiarism	17 (3.4%)	08 (1.6%)	42 (8.4%)	280 (55.8%)	155 (30.9%)
Falling to put quotation marks amounts to plagiarism	09 (1.8%)	19 (3.8%)	141 (28.1)	236 (47.0%)	97 (19.3%)
Use of his/her own work without citation is plagiarism	09 (1.8%)	47 (9.4%)	114 (22.7)	186 (37.1%)	146 (29.1%)
Providing incomplete information about the sources so one cannot trace the original source is an act of plagiarism	12 (2.4%)	20 (4.0%)	126 (25.1)	236 (47.0%)	108 (21.5%)

SD- Strongly disagree D- Disagree UC- Uncertain A- Agree SA- Strongly agree

Table 5 presents the statistical analysis of the responses on the different techniques of committing Plagiarism. Among Research Scholars, 49.6% of them Strongly Agree, while 1.4% disagree, and 3.4% of them are uncertain that converting someone else's work as your own and giving no credit to the author is an act of plagiarism. It is observed that 55.8% of the respondents agree while 1.6% of them disagree and 3.4% of them strongly disagree with the statement "Copying from several sources and tweaking the content is plagiarism"

Nearly 47% of Research Scholars agree, while 3.8% of them disagree, and 28.1% are uncertain that "Failing to put quotation marks amounts to Plagiarism." Further, 37.1% of the Research Scholars agree, while 1.8% of them strongly disagree with the statement "Use of his/her own work without citation is plagiarism." The majority, 47% of Research Scholars, agreed, while 2.4% strongly disagreed with the statement. "Providing incomplete information about the sources so one cannot trace the original source is an act of plagiarism."

Types of Plagiarism

Table: 6 Frequency and percent distribution of Research Scholars by responses on 'awareness of types of plagiarism'

Statements on Plagiarism	Types of Plagiarism	
	Intentional Plagiarism	Unintentional Plagiarism
Failing to put quotation marks	202 (40.2%)	300 (59.8%)
Mixing of information from different sources	324 (64.5%)	178 (35.5%)
Provide incomplete information about the original source through it becomes difficult to find the original source.	365 (72.7%)	137 (27.3%)
Taking some material from the Internet or electronic database without proper citation or permission	401 (79.9%)	101 (20.1%)

Table 6 indicates that, among Research Scholars, 40.2% of them have responded to 'intentional plagiarism' while 59.8% of them have responded to 'unintentional plagiarism' for "Failing to put quotation marks." For the second statement, "Mixing of information from different sources," 64.5% of them responded 'intentional

plagiarism,' and 35.5% responded 'unintentional plagiarism.' There are 72.7% of Research Scholars have responded to 'intentional plagiarism' while the remaining 27.3% of Research Scholars have responded to 'unintentional plagiarism' for "Providing incomplete information about the

original source through it becomes difficult to find the original source." About 79.9% of Research Scholars have responded 'intentional plagiarism' while 20.1% of Research Scholars have responded 'unintentional plagiarism' to the statement "Taking some material from the Internet or electronic database without proper citation or permission."

5.5.4 Preferred Reference to contact to get Clarity on Copyright, and Plagiarism. In order to find out respondents' preferred contacts or to get clarity about the Copyright, plagiarism, and related doubts, the participants are asked to respond between 'Yes' or 'No.'

Table 7: Distribution of Participants by responses on Preference of Reference to contact to get Clarity on, Copyright, and Plagiarism

Preferred Reference to contact to get Clarity on IPR, Copyright, and Plagiarism	Responses	
	Yes	No
Your Teachers	332 (66.1%)	170 (33.9%)
Experts	316 (62.9%)	186 (37.1%)
Colleagues	164 (32.7%)	338 (67.3%)
Library staff	141 (28.1%)	361 (71.9%)
Friends	168 (33.5%)	334 (66.5%)
Online Discussion forums	191 (38.0%)	311 (62.0%)
Internet, Websites, wikis	386 (76.9%)	116 (23.1%)

The analysis of responses revealed that 66.1% of Research Scholars are contacting their teachers. 62.9% of Research Scholars are communicating with experts. About 32.75% of the Research Scholars discussed with their Colleagues. Only 28.1% of Research Scholars are in touch with library staff. Further, nearly 38% of the Research Scholars are following Discussion forums. They were followed by 66.5% of Research Scholars who are not communicating about these issues with their friends. It is also seen that 76.9%

of Research Scholars are getting clarifications through the internet, and related websites.

It is inferred that Research Scholars are clarifying their doubts with the help of the internet, wikis, and other related websites. It is very obvious to know since most academia is now ICT literate.

FINDINGS AND CONCLUSION

It is found from the survey that the majority, 74.1% of the respondents referring e-journals, and 57.8% of them are using e-databases

most frequently. More than 50.2% are using e-books, and 48.6% are consulting e-reference sources often. Among the respondents, 47.2% of them read e-magazines & e-newspapers, followed

by 36.9% referring to ETD, and 30.7% talking about e-patents occasionally to fulfill their day-to-day information needs. It is good to know that the majority, 95.6% (N=480) of the respondents, are aware that the various information sources they are referring to are copyrighted (rights have been protected) materials with a legal provision to use them, along with that, 75.7% of them have better knowledge on what leads to committing plagiarism.

An average of 64.32% of the survey participants are aware of different types of plagiarism, and the highest numbers, 76.9% of research scholars, are clarifying their doubts on copyright, and plagiarism through the internet, wikis, and other related websites. It is identified from the survey that N=480 (95.6%) of the total participants are highly knowledgeable about acknowledging the resources they have referred to fulfill their information needs. Hence, the study recommends that higher education institutions need to organize regular awareness programs on current updates to make that 100% and to follow academic integrity.

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AUTHORSHIP PATTERNS IN ENDOCRINOLOGY LITERATURE: A SCIENTOMETRIC STUDY

Mr. S. C. Hosamani

Dr. C. Krishnamurthy

Mr. S. C. Hosamani

Research Scholar

Dept. of Library and
Information Science

Karnataka University, Dharwad
-580003

Email: sidduch001@gmail.com

Dr. C. Krishnamurthy

Professor

Dept. of Library and
Information Science

Karnataka University, Dharwad
-580003

Email: jrfkrishna@gmail.com

ABSTRACT -

The paper deals with the authorship pattern in the field of endocrinology based on the literature research output as reflected in the Web of Science (WoS) database during the period from 1992 to 2021. The study examined India's performance based on its publication output in endocrinology, using different scientometric indicators, such as authorship pattern, collaborative index, degree of collaboration, and highly productive Institutions in India. A total number of 9812 publications were retrieved. The data was analyzed using MS-Excel Spreadsheet and VOS viewer software. It was examined that the degree of collaboration reveals an increasing trend in the field. Mohan, V has published 359 papers with 30.31 average citations per paper and the collaborative index for universal level value is 5.38. The single-author papers have increased performance in scientific research activities.

Keywords - Authorship Pattern, Scientometric, Collaborative Index, Degree of Collaboration, Endocrinology, Prolific Journals, Research Productivity

INTRODUCTION

Endocrinology is one of the important subjects of biomedical sciences. It focuses on the endocrine system. Infact endocrine system that is made up of several glands create and release hormones into the bloodstream. These are the body's chemical messengers. They carry information, instructions, and messages through the blood to organs, skin, muscles, and other tissues from one group of cells to another. Therefore, endocrinology is an important area in the field of medical science. Research in endocrinology has a great significance. Scientometrics is the study of the measurement of scientific and technological progress. The main focus of scientometrics is the quantitative aspects of science as a discipline including research evaluation and aspects of research policy.

Scientometrics Provides some preliminary assumptions about what science actually is and how a true scientific achievement is to be recognized, scientometrics ultimately addresses the quantitative and comparative evaluation of scientists, groups, institutions, and countries' contribution to the advancement of knowledge and proper guidance in which direction the research has to be conducted (Rousseau et al, 2018). Scientometrics is an indispensable method in the investigation carried out through publications and citations, or, stated alternatively, insofar as scientometric techniques are applied to scientific and technical literature. In this paper, an attempt is made to analyze the literature published on endocrinology during the period of 1992 to 2021.

REVIEW OF LITERATURE

Many studies have carried out in different disciplines and also study the authorship pattern in scientometric studies on different subjects are reviewed here.

Rahul & Nishy (2016) have focused study on the mycobacterial tuberculosis and leprosy in India during the year of 1987 to 2012. Data was retrieved from the Web of Science database. Identifying the most productive Organizations, authors, and journals. authors also used different parameters such as Relative Activity Index, Activity Index, highly Co-authorship pattern, and highly cited papers.

Ram S (2017) reveals that breast cancer research in India, based on Scopus, MESH, and PubMed databases form the year of 1975 to 2014. The result shows that the Indian Journal of Cancer has the highest impact factor with (0.802) in the year

2014, and the USA has the highest collaborative research country with India (9.75%).

Nair & Raja (2018) observed that the Indian genetic Diversity research from the year 2013 to 2017 by using the Web of Science database. The study focuses on the wise growth rate & doubling time, most published journals, institution wise distribution, and country. the highest collaborative index value is 6.24 (2016) & the Collaborative Coefficient is the highest in the year 2016 (0.76), USA has the highest collaborated country with India in 160 publications.

Ram S (2018) divulge that Indian leishmaniasis research from the year of “1968 to 2017” in the Scopus, PubMed & Medical Subject Headings (MESH) databases. The study emphasized on the Banaras Hindu University, Varanasi has the highest number of citations i.e.15582, and the PLOS Neglected Tropical Diseases journal published from the USA has the highest Impact factor (3.834). The result shows the strength of the Indian research and shall be able to enhance the awareness among the stockholders in better policy decisions.

Ramakrishnan J et.al. (2019) detected the growth of Indian Lung cancer literature from the year of 2010 to 2015. Data was collected from the MEDLINE database. The authors used different indicators Relative growth rate, doubling time, year-wise growth of publication, country productivity, & Activity index. The result shows that Indian efforts in Lung Cancer research were better in three years out of six years of study.

The review of literature reveals that the previous studies focused on endocrinology and its allied

subjects research, and most of the data were retrieved from Pubmed, MEDLINE, MESH, and Web of Science databases. Furthermore, few studies have determined the Collaborative coefficient, relative growth rate, doubling time, and activity index. The present study is based on data accessed from the Web of Science citation database and comprehensively relates to the following indicators such as authorship pattern, collaborative index, and degree of collaboration. Hence this study would bridge the gap.

OBJECTIVES OF STUDY

The major objectives of the study are as follows:

1. To study the growth of endocrinology from the year of 1992 to 2021;
2. To examine the most prolific authors in the field of endocrinology literature;
3. To analyze the sub-areas of endocrinology literature;
4. To determine the authorship pattern in the endocrinology literature;
5. To find out the single multi-authored papers and study the degree of collaboration;
6. To examine the collaborative index in the endocrinology literature;
7. To ascertain the most productive institutions/organizations;
8. To determine the most prolific journals;
9. To study the country wise collaborative sharing of publications; and

10. To find out the highly cited papers in endocrinology literature.

METHODOLOGY

The present study is a scientometric analysis of the authorship patterns in the field of endocrinology for 30 years during the period of 1992 to 2021. The data was collected from the Web of Science (www.isiknowledge.com) database maintained by Clarivate Analytics. The data on endocrinology was extracted by using the key word SU= Endocrinology AND CU=India on Endocrinology for the same period. For interpreting the data, MS-Excel and VOS Viewer software were used. The data obtained resulted as of June 2022, a total number of 9812 publications and 159424 citations were retrieved during the period of the study.

DATA ANALYSIS AND INTERPRETATION

Growth of Endocrinology Research Publications

Table 1 indicates the year wise distribution of publications of Endocrinology research during the period of 1992 to 2021. A total number of 9812 publications were published in this field. The highest number of publications 797 (8.12%) were published in the year 2020 and the least number of publications were found in the year 1996 (0.65%). The average number of publications per year is 327.06. The gradual increase in the number of publications indicate the changing trends of research in endocrinology.

Table 1: Year-wise distribution of Publication

Year	TP	Cumulative TP	%	Cumulative %
1992	72	72	0.73	0.73
1993	79	151	0.81	1.54
1994	97	248	0.99	2.53
1995	82	330	0.84	3.36
1996	64	394	0.65	4.02
1997	193	587	1.97	5.98
1998	98	685	1.00	6.98
1999	112	797	1.14	8.12
2000	135	932	1.38	9.50
2001	116	1048	1.18	10.68
2002	148	1196	1.51	12.19
2003	177	1373	1.80	13.99
2004	162	1535	1.65	15.64
2005	157	1692	1.60	17.24
2006	218	1910	2.22	19.47
2007	228	2138	2.32	21.79
2008	248	2386	2.53	24.32
2009	486	2872	4.95	29.27
2010	470	3342	4.79	34.06
2011	415	3757	4.23	38.29
2012	441	4198	4.49	42.78
2013	569	4767	5.80	48.58
2014	533	5300	5.43	54.02
2015	529	5829	5.39	59.41
2016	562	6391	5.73	65.13
2017	619	7010	6.31	71.44
2018	575	7585	5.86	77.30
2019	691	8276	7.04	84.35
2020	797	9073	8.12	92.47
2021	739	9812	7.53	100
	9812		100	

Highly Productive Authors in the field of Endocrinology Research

Table 2 represents the highly productive authors in the field of endocrinology. The author Mohan, V of Dr. Mohan's Diabetes Specialities Centre, Chennai, Tamil Nadu ranks first with 359

publications with 10833 citations, (ACPP 30.31 and h-index 55), followed by Ramachandran, A of M. V. Hospital for Diabetes, Diabetes Research Centre, Chennai, Tamil Nadu has published 223 publications with 9343 citations (ACPP 41.9 and h-index 47), Bhansali, Anil of Post Graduate Institute of Medical Education &

Research, Chandigarh has 184 publications with 3326 citations (ACPP 18.08 and h-index 28).

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Table 2: Highly Productive Authors of Endocrinology Research in India

Sr. No.	Author	Affiliation / Institution	TP	TC	ACP	H-Index
1	Mohan, V	Dr. Mohan's Diabetes Specialities Centre, Chennai, Tamil Nadu	359	10833	30.31	55
2	Ramachandran, A	M. V. Hospital for Diabetes, Diabetes Research Centre, Chennai, Tamil Nadu	223	9343	41.9	47
3	Bhansali, Anil	Post Graduate Institute of Medical Education & Research, Chandigarh	184	3326	18.08	28
4	Kumar, Ashutosh	Council Of Scientific and Industrial Research–Indian Institute of Toxicology Research (CSIR–IITR), Lucknow, Uttar Pradesh	161	4054	25.18	33
5	Kalra, Sanjay	Bharati Hospital & BRIDE, Karnal, Haryana	149	1548	10.39	20
6	Kumar, Sudhir	Council Of Scientific and Industrial Research -Central Drug Research Institute (CSIR-CDRI), Department of Endocrinology, Lucknow, Uttar Pradesh	143	1764	12.34	26
7	Tandon, Nikhil	All India Institute of Medical Sciences, New Delhi	137	2114	15.43	25
8	Snehalatha C	M. V. Hospital for Diabetes, Diabetes Research Centre, Chennai, Tamil Nadu	134	6718	50.13	37
9	Gupta, N	All India Institute of Medical Sciences, New Delhi	124	2596	20.94	29

Research output under various sub-fields of Endocrinology

Table 3 indicates research output sub fields in Indian endocrinology research during the period of 1992 to 2021. Biochemistry Molecular Biology contributed the highest research publications i.e. 1981 (34.36%), followed by

Nutrition Dietetics with 632 (10.96%) publications, and Zoology with 502 (8.71%) publications. Hence, most of the endocrinology applications are seen in Biochemistry Molecular Biology, Nutrition Dietetics, Zoology, Neurosciences Neurology, and Pediatrics. In the near future, endocrinology will exist as a separate discipline.

Table 3: Distribution of publications in different Sub-fields

Sl. No.	Subject Name	TP	%	Cumulative	Cumulative %
1	Biochemistry Molecular Biology	1981	34.36	1981	34.36
2	Nutrition Dietetics	632	10.96	2613	45.32
3	Zoology	502	8.71	3115	54.02
4	Neurosciences Neurology	419	7.27	3534	61.29
5	Pediatrics	400	6.94	3934	68.23
6	Cell Biology	258	4.47	4192	72.70
7	Physiology	196	3.40	4388	76.10
8	Pharmacology Pharmacy	180	3.12	4568	79.22
9	Research Experimental Medicine	175	3.04	4743	82.26
10	Toxicology	154	2.67	4897	84.93
11	Urology Nephrology	153	2.65	5050	87.58
12	Immunology	142	2.46	5192	90.05
13	Genetics Heredity	104	1.80	5296	91.85
14	Biophysics	102	1.77	5398	93.62
15	Reproductive Biology	99	1.72	5497	95.33
16	Obstetrics Gynecology	90	1.56	5587	96.90
17	Hematology	60	1.04	5647	97.94
18	Cardiovascular System Cardiology	53	0.92	5700	98.86
19	Science Technology Other Topics	34	0.59	5734	99.45
20	General Internal Medicine	32	0.55	5766	100
	Total	5766	100		

Distribution of Authorship Pattern

Table 4 shows the authorship pattern of 9812 publications during the period of 1992 to 2021. The data is divided into eleven blocks as single., two, three, four five six, seven, eight, nine, ten, and more than ten authored publications. The result shows that three authored publications were ranked first with 1541

publications. The year-wise analysis shows that the performance of three authored publications is better in almost all the years except in 2020 and 2021. Followed by two authored papers which ranked second with 1443 publications of the total contributions. The year-wise analysis shows that the two authored contributions have shown a considerable trend in 2010 and 2020. The four

authored papers ranked third with 1425 of the total publication. The five authored papers ranked fourth with 1244 of the total publication. The six

authored papers ranked fifth with 980 of the total publication during the period of 1992 to 2021.

Table 4: Distribution of Authorship Patternship

Year	Single A	Two A	Three A	Four A	Five A	Six A	Seven A	Eight A	Nine A	Ten A	More than ten A	Total
1992	2	24	25	8	5	4	1	2	1	0	0	72
1993	3	30	15	16	8	1	2	1	0	1	2	79
1994	9	18	25	21	13	4	2	2	2	0	1	97
1995	5	24	14	17	9	4	5	0	3	1	0	82
1996	2	17	18	9	11	2	1	1	1	0	2	64
1997	10	40	41	34	30	18	3	4	3	2	8	193
1998	1	22	24	17	19	5	4	3	1	1	1	98
1999	2	27	28	20	19	7	2	3	1	0	3	112
2000	4	25	31	23	24	18	5	0	0	2	3	135
2001	2	26	24	19	17	11	9	2	1	1	4	116
2002	3	33	32	25	23	14	8	4	1	2	3	148
2003	4	31	41	33	19	15	10	14	7	1	2	177
2004	6	26	34	27	22	13	14	10	5	0	5	162
2005	3	18	25	29	35	18	10	10	4	2	3	157
2006	5	25	41	29	47	33	14	9	10	1	4	218
2007	10	37	46	40	30	21	18	7	7	2	10	228
2008	13	53	38	33	36	22	20	12	6	7	8	248
2009	48	94	83	64	56	42	34	21	22	10	12	486
2010	16	65	71	78	70	46	36	32	26	10	20	470
2011	24	64	63	65	51	48	31	15	16	7	31	415
2012	18	59	65	72	53	60	34	18	14	11	37	441
2013	35	75	80	88	70	65	40	39	16	22	39	569
2014	36	67	70	77	69	65	43	25	23	10	48	533
2015	32	65	68	70	59	65	41	32	21	15	61	529
2016	42	70	82	79	75	49	38	34	20	21	52	562
2017	48	89	76	78	70	68	45	35	21	18	71	619
2018	21	67	94	75	66	53	36	40	36	23	64	575
2019	32	98	93	93	67	58	48	49	46	27	80	691
2020	37	81	96	99	88	77	60	62	51	48	98	797
2021	35	73	98	87	83	74	55	56	48	44	86	739
Total	508	1443	1541	1425	1244	980	669	542	413	289	758	9812

Degree of Collaboration

Single Vs Multiple authors: The major finding of the study was that the Endocrinology domain is highly collaborative as the analysis of data resulted that multiple authorship of the paper is used to measure the extent of research collaboration. (Subramanyam, 1983) propounded the DC, a measure to calculate the proportion of single and multi-author papers and to interpret it as a degree.

According to Subramanyam, the Formula is

$$DC = Nm / (Ns + Nm)$$

Where:

DC= Degree of Collaboration

Nm = The number of multi authored papers,

Ns = The number of single-author paper

The year-wise distribution of the degree of collaboration is presented in Table 5. It shows that there is an increasing and decreasing trend in the degree of collaboration, i.e. 0.97 in 1992 to 0.95 in 2021. The average degree of collaboration is 0.96. The degree of collaboration is high in the year 1998 and the degree of collaboration is low in the year 2009, when single authorship productivity is 9.45% and multiple authorship productivity is 8.17%.

Table 5: Single Vs Multi-Authored and Degree of collaboration (Annual Distribution of degree of Collaboration of Authorship)

Year	Single Author (Ns)		Multi Author (Nm)		Total	Degree of Collaboration
	No. of Publication	%	No. of Publication	%		
1992	2	0.39	70	0.75	72	0.97
1993	3	0.59	76	0.82	79	0.96
1994	9	1.77	88	0.95	97	0.91
1995	5	0.98	77	0.83	82	0.94
1996	2	0.39	62	0.67	64	0.97
1997	10	1.97	183	1.97	193	0.95
1998	1	0.20	97	1.04	98	0.99
1999	2	0.39	110	1.18	112	0.98
2000	4	0.79	131	1.41	135	0.97
2001	2	0.39	114	1.23	116	0.98
2002	3	0.59	145	1.56	148	0.98
2003	4	0.79	173	1.86	177	0.98

2004	6	1.18	156	1.68	162	0.96
2005	3	0.59	154	1.66	157	0.98
2006	5	0.98	213	2.29	218	0.98
2007	10	1.97	218	2.34	228	0.96
2008	13	2.56	235	2.53	248	0.95
2009	48	9.45	438	4.71	486	0.90
2010	16	3.15	454	4.88	470	0.97
2011	24	4.72	391	4.20	415	0.94
2012	18	3.54	423	4.55	441	0.96
2013	35	6.89	534	5.74	569	0.94
2014	36	7.09	497	5.34	533	0.93
2015	32	6.30	497	5.34	529	0.94
2016	42	8.27	520	5.59	562	0.93
2017	48	9.45	571	6.14	619	0.92
2018	21	4.13	554	5.95	575	0.96
2019	32	6.30	659	7.08	691	0.95
2020	37	7.28	760	8.17	797	0.95
2021	35	6.89	704	7.57	739	0.95
	508	100	9304	100	9812	0.95

Collaborative Index

The collaborative index has been calculated by using the formula given by Lawani (1980). The Collaboration Index (CI) is the simplest index presently used to explore the literature, which is to be interpreted as the mean number of authors per paper.

The Collaborative index has been calculated by using the formula given by Lawani (1980) as:

$$CI = \frac{\sum_{j=1}^A j f_j}{N}$$

Where,

j = the number authors in an paper i.e. 1, 2, 3..

fj = the number of j authored papers published in discipline during a certain period of time

N = the total number of papers published in discipline during a certain period of time

A = the total number of authors per papers

Table 6 examined the Collaborative Index (CI) values, it can be obtained by the total number of authors divided by the total number of published papers. Collaborative Index during the period of

1992 to 2021 was calculated. The highest Collaborative Index value is 7.15 in the year 2021, followed by 7.10 in 2020. The least Collaborative Index value is 3.31 in the year 1992. The average collaborative Index value is 4.79. and the collaborative Index for universal value is 5.38. The result shows that the value of the collaborative Index gradually increased from the year of 1992 to 2021.

Table 6: Collaborative Index

Year	TP	No. of Authors	Collaborative Index
1992	72	238	3.31
1993	79	276	3.49
1994	97	354	3.65
1995	82	304	3.71
1996	64	243	3.80
1997	193	811	4.20
1998	98	394	4.02
1999	112	443	3.96
2000	135	561	4.16
2001	116	503	4.34
2002	148	620	4.19
2003	177	787	4.45
2004	162	744	4.59
2005	157	758	4.83
2006	218	1049	4.81
2007	228	1053	4.62
2008	248	1141	4.60
2009	486	2133	4.39
2010	470	2399	5.10
2011	415	2098	5.06
2012	441	2343	5.31
2013	569	2980	5.24
2014	533	2855	5.36
2015	529	3006	5.68
2016	562	3017	5.37
2017	619	3411	5.51

2018	575	3343	5.81
2019	691	4014	5.81
2020	797	5657	7.10
2021	739	5287	7.15
Total	9812	52822	5.38

Highly Productive Institutions in the field of Endocrinology research

Table 7 Analyses the top 20 highly productive institutions based on the publications, citations, and Average citation per publication. According to the Web of Science database. All India Institute of Medical Sciences (AIIMS), New Delhi, has published the highest number of publications in the field of endocrinology, i.e. 720 publications, followed by Council of Scientific Industrial Research (CSIR), New Delhi has contributed 708 publications, Post Graduate Institute of Medical Education Research (PGIMER), Chandigarh, has contributed 410 publications, and Indian Council of Medical

Research (ICMR), New Delhi, has contributed 396 publications.

In terms of citations received per publications for total publications of these top 25 institutions. Madras Diabetes Research Foundation, Chennai, has received the highest citations i.e. 12042 with 36.6 average citations per paper (ACPP), followed by King Edward Memorial Hospital and Seth Gordhandas Sunderdas Medical College, Mumbai, with 4521 citations, and it's ACPP is 30.34, and Department of Science Technology (DST), New Delhi, received 3794 citations with 28.53 average citations per paper.

Table 7: Highly Productive Institutions in the field of Endocrinology research

Sl. No.	Institution / organization	TP	TC	ACP	H-index
1	All India Institute of Medical Sciences (AIIMS), New Delhi	720	11794	16.38	53
2	Council of Scientific Industrial Research (CSIR), New Delhi	708	17152	24.23	61
3	Post Graduate Institute of Medical Education Research (PGIMER), Chandigarh	410	6182	15.08	36
4	Indian Council of Medical Research (ICMR), New Delhi	396	7359	18.58	43
5	Madras Diabetes Research Foundation, Chennai	329	12042	36.6	54
6	Banaras Hindu University (BHU), Varanasi	266	3541	13.31	30
7	CSIR Central Drug Research Institute (CDRI) Lucknow, Uttar Pradesh	235	3594	16.83	35
8	Sanjay Gandhi Postgraduate Institute of Medical Sciences,)Lucknow, Uttar Pradesh	206	3510	17.04	28
9	Indian Council of Agricultural Research (ICAR) New Delhi	205	3505	17.1	30

10	University of Delhi, Delhi	190	2044	10.76	24
11	Panjab University, Chandigarh	189	3033	16.05	32
12	Department of Biotechnology (DBT), New Delhi	180	4012	22.29	38
13	ICMR National Institute of Nutrition (NIN), Hyderabad, Telangana	175	2333	13.33	26
14	University of Madras, Chennai, Tamil Nadu	166	2894	17.33	29
15	Manipal Academy of Higher Education (MAHE), Manipal, Karnataka	158	2294	14.52	22
16	King Edward Memorial Hospital and Seth Gordhandas Sunderdas Medical College, Mumbai	149	4521	30.34	30
17	Institute of Post Graduate Medical Education Research (IPGMER), Kolkata	146	1828	12.52	22
18	Defence Research Development Organisation (DRDO), New Delhi	144	2441	16.95	25
19	Indian Institute of Science (IISc), Bangalore	141	2377	16.86	28
20	ICMR National Institute for Research in Reproductive Health (NIRRH), Mumbai	140	2457	17.55	28

Most Preferred Journals in Endocrinology research

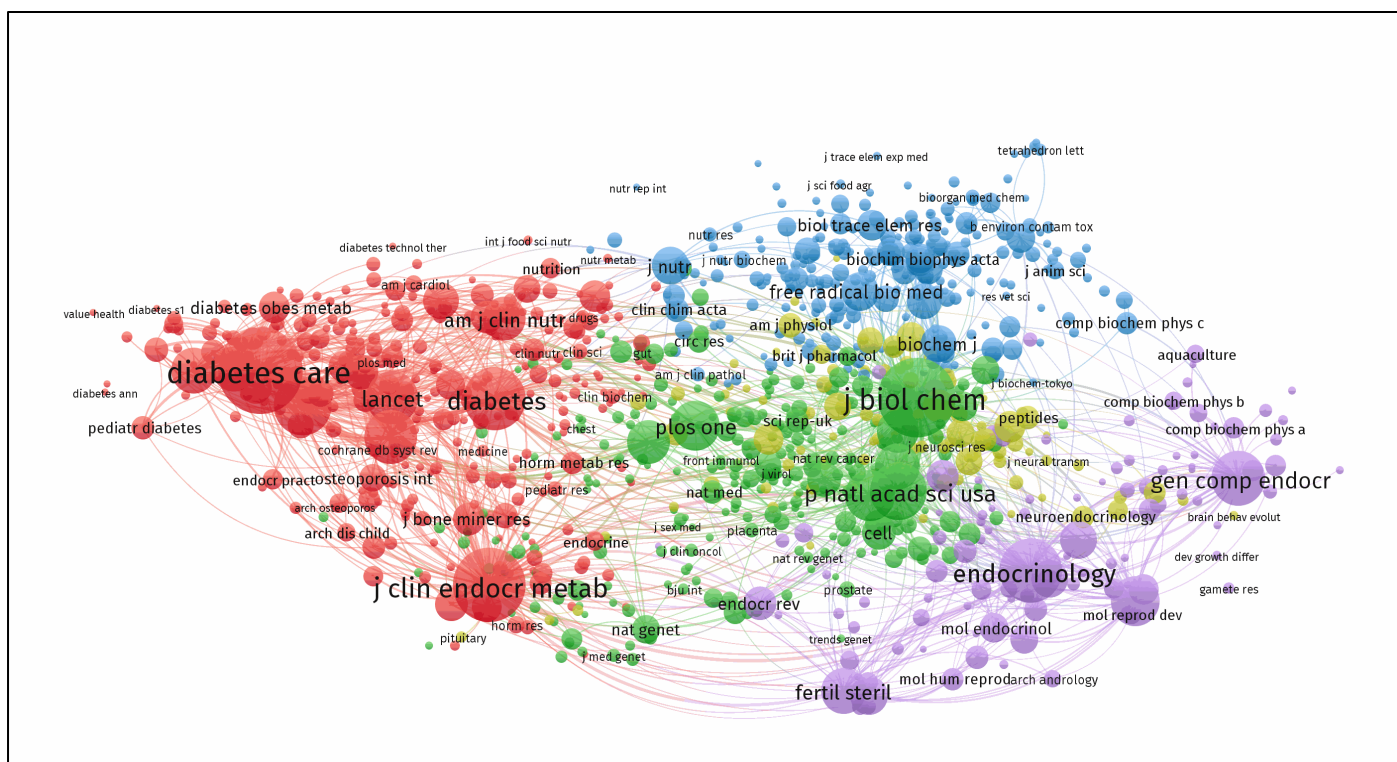
Table 8 identifies the most preferred journals (top 20) in the field of endocrinology. Based on average citations per paper (ACPP), The Diabetes Care from the USA has received the highest (i.e.97.16) average citation per paper,

followed by Journal of Clinical Endocrinology Metabolism from the USA (40.29), Journal of Trace Elements in Medicine and Biology from Netherlands (25.9), Comparative Biochemistry and Physiology C Toxicology Pharmacology from Netherlands (23.61), Diabetes Research and Clinical Practice from Netherlands (23.2), and Diabetic Medicine from USA (23.11).

Table 8: Most Preferred Journals in Endocrinology research

Sl. No.	Journal	TP	TC	ACP	Country	Impact Factor
1	Annals of Nutrition and Metabolism	495	1217	2.46	Switzerland	2.528
2	Biological Trace Element Research	484	7559	15.62	Germany	2.43
3	International Journal of Diabetes in Developing Countries	466	2067	4.44	Germany	0.495
4	Osteoporosis International	459	3251	7.08	Germany	3.591
5	Diabetologia	456	7182	15.75	Germany	7.113
6	Free Radical Biology and Medicine	428	9838	22.99	Netherlands	7.376
7	Diabetes Research and Clinical Practice	382	8864	23.2	Netherlands	5.602

8	General And Comparative Endocrinology	348	5012	14.4	Netherlands	2.823
9	Diabetes Technology Therapeutics	224	2087	9.32	New York, USA	6.118
10	Andrologia	207	2367	11.43	New Jersey, USA	1.458
11	Journal of Pediatric Endocrinology Metabolism	197	1155	5.86	Germany	1.634
12	Steroids	164	3334	20.33	Netherlands	2.716
13	Diabetes Care	163	15837	97.16	Virginia, USA	19.11
14	Diabetic Medicine	153	3536	23.11	USA	4.359
15	Journal of Trace Elements in Medicine and Biology	136	3522	25.9	Netherlands	3.755
16	Hormone Research in Paediatrics	130	912	7.02	Switzerland	2.324
17	Comparative Biochemistry and Physiology C Toxicology Pharmacology	128	3022	23.61	Netherlands	3.219
18	Metabolic Brain Disease	128	1829	14.29	Germany	2.638
19	Molecular And Cellular Endocrinology	128	2852	22.28	Netherlands	3.871
20	Journal of Steroid Biochemistry and Molecular Biology	103	1625	15.78	Netherlands	3.785



International collaboration among research institutions in India

Table 9 identifies the international collaboration of India with the 20 countries during the period of 1991 to 2021 in the field of Endocrinology. India has the highest collaboration with the USA with 1297 publications and 43387 citations, (33.45 ACPP and H-index 91), followed by second

highest collaboration with England amounting to 588 publications with 25460 citations (43.3 ACPP and H-index 76), Australia ranked third with 301 publications and 18994 citations (63.1 ACPP and H-index 60), Canada with 284 publications and Peoples R China with 239 publications ranked fourth and fifth respectively followed by other countries, as shown in table 9.

Table 9: International collaboration among research institution in India

Sl. No.	Country	TP	TC	ACP	H-index
1	USA	1297	43387	33.45	91
2	England	588	25460	43.3	76
3	Australia	301	18994	63.1	60
4	Canada	284	14014	49.35	56
5	Peoples R China	239	16799	70.29	55
6	Germany	229	12852	56.12	47
7	Italy	214	14156	66.15	45
8	France	196	6701	34.19	39
9	Denmark	193	13552	70.22	42
10	Japan	190	13410	70.58	42
11	Switzerland	161	7765	48.23	41
12	Sweden	157	8616	54.88	36
13	Brazil	152	10588	69.66	45
14	Spain	130	7628	58.68	36
15	Netherlands	125	9513	76.1	37
16	Saudi Arabia	123	2199	17.88	23
17	Argentina	122	3767	30.88	31
18	South Africa	122	6018	49.33	38
19	Turkey	118	2591	21.96	26
20	South Korea	117	5780	49.4	28

Highly Cited Papers in the field of Endocrinology research

Table 10 reveals the highly cited papers from India in the field of endocrinology during the period of 1992 to 2021. There were 10 highly

cited papers on endocrinology which have received more than 1000 citations. These 10 papers received 11815 citations. The paper title on International Association of Diabetes and Pregnancy Study Groups Recommendations on the Diagnosis and Classification of

Hyperglycemia in Pregnancy received the highest citations i.e.3034, published in *Diabetes Care* in the year 2010, followed by Global Prevalence and Major Risk Factors of Diabetic Retinopathy received second highest citations i.e. 2352, published in the journal *Diabetes Care* during the year 2006, The Indian Diabetes Prevention

Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1) received citations i.e. 1158, published in the journal *Diabetologia*, in the year 2006. This indicates that more research is being carried out on newly developing areas.

Table 10: Highly Cited Papers in the field of Endocrinology research

Sr. No.	Citations	Year	Title	Authors	Vol & Issue No.	Journal Name	Page No.
1	3034	2010	International Association of Diabetes and Pregnancy Study Groups Recommendations on the Diagnosis and Classification of Hyperglycemia in Pregnancy	Metzger, BE; Gabbe, SG; Yasuhi, I	33(3)	Diabetes Care	676-689
2	2352	2012	Global Prevalence and Major Risk Factors of Diabetic Retinopathy	Yau, JWY; Rogers, SL; Wong, TY	35(3)	Diabetes Care	556-564
3	1158	2006	The Indian Diabetes Prevention Programme shows that lifestyle modification and metformin prevent type 2 diabetes in Asian Indian subjects with impaired glucose tolerance (IDPP-1)	Ramachandran, A; Snehalatha, C; Vijay, V	49(2)	Diabetologia	289-297
4	1012	2009	Global vitamin D status and determinants of hypovitaminosis D	Mithal, A; Wahl, DA; Morales-Torres, J	20(11)	Osteoporosis International	1807-1820
5	892	2019	Clinical Targets for Continuous Glucose Monitoring Data Interpretation: Recommendations From the International Consensus on Time in Range	Battelino, T; Danne, T; Phillip, M	42(8)	Diabetes Care	1593-1603
6	830	2009	Efficacy and Safety Comparison of Liraglutide, Glimepiride, and Placebo, All in Combination With Metformin, in Type 2 Diabetes The LEAD (Liraglutide Effect and Action in Diabetes)-2	Nauck, M; Frid, A; Matthews, DR	32(1)	Diabetes Care	84-90

7	762	2017	International Consensus on Use of Continuous Glucose Monitoring	Danne, T; Nimri, R; (...); Philli p, M	40(12)	Diabetes Care	1631 - 1640
8	645	2008	Obesity and the Metabolic Syndrome in Developing Countries	Misra, A and Khurana, L	93(11)	Journal of Clinical Endocrinology & Metabolism	S9-S30
9	608	2009	Liraglutide vs insulin glargine and placebo in combination with metformin and sulfonylurea therapy in type 2 diabetes mellitus (LEAD-5 met+SU): a randomised controlled trial	Russell-Jones, D; Vaag, A; Simo, R	52(10)	Diabetologia	2046 - 2055
10	522	2001	High prevalence of diabetes and impaired glucose tolerance in India: National Urban Diabetes Survey	Ramachandran, A; Snehalatha, C; Nair, JD	44(9)	Diabetologia	1094 - 1101

MAJOR FINDINGS OF THE STUDY

The following important findings are:

- i. The highest number of research publications were found in the year 2020 i.e., 797 and lowest number of publications in the year 1996 with 64 publications respectively.
- ii. It is identified that Biochemistry and Molecular Biology has highest number of publications (1981) produced on endocrinology.
- iii. It is observed from the study that out of top 20 authors, Mohan, V has ranked first with contribution of 359 publications with 10833 citations and lowest number of publications was contributed by Gupta, Atul i.e. 81 publications with 981 citations.
- iv. It is found that the majority of the contributions were three authored publications i.e., 1541 and least number of contributions were ten authored with 289 publications.
- v. It is identified that the All-India Institute of Medical Sciences (AIIMS), New Delhi, has contributed the highest number of publications i.e., 720, followed by Council of Industrial Research (CSIR), New Delhi, has contributed 708 publications.
- vi. It is noticed from the study that Annals of Nutrition and Metabolism from Switzerland has contributed the highest number of publications i.e., 495, followed by Biological Trace Element Research from Germany which has contributed 484 publications.
- vii. It is identified that USA has highest collaborated country with India i.e., 1297,

publications followed by England has contributed 588 publications.

- viii. It is found that “International Association of Diabetes and Pregnancy Study Groups Recommendations on the Diagnosis and Classification of Hyperglycemia in Pregnancy” is a highly cited paper with 3034 citations.

CONCLUSION

In this study, an attempt is made to find out the authorship pattern in endocrinology in India during the period of 1992 to 2021 as reflected as the Web of Science (WOS) database. Endocrinology is one of the most important discipline in the field of medicine, yet the research in endocrinology is gradually increasing and there is an upward trend in India however, there is some fluctuation in trends of publications. India has the most worldwide publication share among the highest twenty most efficient countries in the field of endocrinology. Nevertheless, there is scope for improvements and India can contribute much more looking at the potential that India possesses in endocrinology research. Indian medical and science research funding agencies including the Government should provide sufficient funding and other infrastructure facilities endocrinology. This study is an attempt to ascertain and forecast the trends of Indian research in endocrinology and its allied fields.

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