

**ANALYSIS OF LIBRARY AND INFORMATION SCIENCE RESEARCH FROM
GENDER PERSPECTIVE: A CASE STUDY OF SRELS JOURNAL OF
INFORMATION MANAGEMENT**

**A Dissertation Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Philosophy**

RAKHEE PATEL

MZU Registration No. 1600776

M.Phil. Regn No. MZU/M.Phil./524 of 07.05.2019



**DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE
SCHOOL OF ECONOMICS MANAGEMENT INFORMATION SCIENCE
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INFORMATION MANAGEMENT**

BY

RAKHEE PATEL

DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE

**Dr. Manoj Kumar Verma
Associate Professor**

SUBMITTED

**In partial fulfillment of the requirement of the Degree of Master of Philosophy
in Library and Information Science of Mizoram University, Aizawl.**

FORM OF DECLARATION TO BE SUBMITTED BY CANDIDATE

ALONGWITH THE M.PHIL. THESIS

MIZORAM UNIVERSITY

September 2020

I, Rakhee Patel, hereby declare that the subject matter of this dissertation entitled, "**Analysis of Library and Information Science Research from Gender Perspective: A Case Study of SRELS Journal of Information Management**" is the record of the work done by me, the content of this dissertation did not form the basis of the award of any previous degree to me, or to do the best of my knowledge to anybody else, and that the dissertation has not been submitted by me for any research degree in any other University/Institution.

This is being submitted to the Mizoram University for the degree of Master of Philosophy in the Department of Library and Information Science.

(Rakhee Patel)

Dr. Manoj Kumar Verma

(Supervisor)

(Head)



Dr. Manoj Kumar Verma
Associate Professor

**Department of Library & Information Science
Mizoram University**

(A Central University)

Tanhril, Aizawl, Mizoram. Pin- 796004

Phone- +91-9774003201/+91-8787451116 (M)

Email: manojdlisbhu@gmail.com

CERTIFICATE

This is to certify that the dissertation entitled, “**Analysis of Library and Information Science Research from Gender Perspective: A Case Study of SRELS Journal of Information Management**” submitted by Rakhee Patel for the award of the degree of Master of Philosophy in Library and Information Science is carried out under my guidance and incorporates the student’s bonafide research. This is the candidate’s original work and is worthy of examination.

Date:

(Dr. Manoj Kumar Verma)

Place:

Supervisor

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Date:

(Rakhee Patel)

Place:

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CHAPTER: 1

INTRODUCTION

1.1 INTRODUCTION

The progress of an academic field is mapped by their research publications and research output of a particular field. Publications and articles help to develop the discipline with new knowledge and ideas, which are helpful for the advancement of the profession. In the field of library and Information science, research plays a crucial part in identifying needs, problems, and helps in tackling the challenges in librarianship. The Association of African Universities (2017) states that "without research, universities will lose their capacity to offer first-class graduate studies, and to motivate and retain best brains and consequently lose the capacity to train the new generation of research fellows and scientists".

Library and information science (LIS) is a discipline which deals with the management of LIS centers in various ways to satisfy the information need of their users and this discipline has existed in India more than a century ago. Since the inception of this field, there are continuous growth and development have arisen due to various movements and involvement of eminent personalities and social reformers but real significant changes were observed after joining of Dr. S.R. Rangnathan to this profession. He did a lot of research on various facets of library and library services and derived a lot of basic theories, principles, and postulates which helped a lot in the growth and development of this profession. He has also started LIS education in various universities, initially as certificate and diploma courses and latter BLIS, MLIS, MPhil, and Ph.D. courses. Initially, the main areas of research in the LIS field are Classification, Bibliography, Documentation, Users Study, Information Seeking Behavior, Information Literacy Bibliometrics, etc. But last two decades the whole methodology of LIS research has changed due to ICT innovation and Impact. Many new research areas like, Matrices analysis (bibliometrics, Scientometrics, Webometrics, web content analysis), digital literacy, digitization, open-source software, multilingual information retrieval, semantic web MOOCs and many more are added in the LIS field which gave a lot of recognition to this profession.

The research productivity of the LIS subject is communicated in the form of journal articles, books, technical reports, and other types of publications. It is often used as an index of the department and institutes prestige. The new ideas and concepts generated through innovation and research are implemented in libraries are the most commonly used vehicles

through which these new scientific discoveries are known to the rest of the world. The reputation and credibility of a profession are based on the quality and quantity of new knowledge produced by it.

Universities and research institutions are considered an important center for scientific studies and create lots of new human knowledge and also contributing liberty to higher education and research which imparts for the development of the nation. The research output of any institutions or universities is reflected in the form of research articles, conference papers, or other forms of publications in peer-reviewed scholarly journals

Research and teaching are interconnected. Although research universities are trying to improve their excellence of research by emphasizing the importance of research more than teaching, the role of teaching still maintains a degree of importance in research universities. (Feldman, 1987; Thomas & Harris, 2000), Brew (2003, p.4) indicates that "the research universities see 'research-led teaching' by active researchers as part of their competitive advantage". Through these findings, we can see that when academics apply their updated knowledge from research to teaching, they can improve the teaching effectiveness that leads to enhanced learning outcomes for the student and they might bring teaching and research together to produce highly qualified human resources who are both knowledgeable in their field as a result of research-led teaching and able to conduct research independently.

1.2 GENDER PERSPECTIVE IN RESEARCH

The World Health Organization (WHO) defines gender as: "Gender refers to the socially constructed characteristics of women and men, such as norms, roles, and relationships of and between groups of women and men. It varies from society to society and can be changed."

Gender is an important influential factor in research productivity and many studies found that male researchers are more productive and progressive in the research fields compare to women. There are many types of research done whose results are of mixed opinions. Webber (2011) found that in recent years there is a change in women's contribution towards research, so it is not fair to say always that women are less productive than their male counterparts. He further states that females usually have lower numbers of non-refereed

journal articles, book reviews, and book chapters than males, but females have the same number of refereed journal articles, books, textbooks, and conference presentations as males (Webber, 2011). Women are one of the important components to know as an individual or for the development in any field of knowledge. Library and Information Science field has attracted both men and women as a practitioner and as an academician, and hence it is of interest to know whether the gender difference observed in other subjects are equally applicable in library information science field. Women are the most important component of our society and they are representing half of the population of society still, continue to fail to progress through the academic hierarchy in significant numbers and their contribution to research productivity is also not good enough. But in the last three decades, our government has taken a lot of measurement to improve their conditions through various schemes. Although they are moving towards equal representation still they are underrepresented in leading positions or institutes of higher education in teaching and research. The present decade is a turning point for women in academics and their conditions will improve very soon. Several studies have been tried to analyze the women's contribution to the research output of subjects, institutes, and countries based on research output or analysis of journal publication trends. Numerous studies and data exist from all over the world in scientific fields analyzing the male and female publication output and provide the insights of research productivity based on gender analysis.

1.3 SRELS (Sarada Ranganathan Endowment for Library Science) JOURNAL OF INFORMATION MANAGEMENT

The SRELS Journal of Information Management was founded by Dr. S. R. Rangnathan in 1964 and was known as 'Library Science with a slant to Documentation'. The title of the journal was changed to Library Science with a Slant to Documentation and Information Studies from Vol.25 in 1988 and then to 'SRELS Journal of Information Management' from Vol.37 in 2000. This journal is one of the leading peer-reviewed bio monthly periodicals completely dedicated to the field of Library and Information Science serving the preferential community by publishing papers in the field of Scientometrics, Webometrics, Library and Information Science, Information management, Informatics, and Information technology in

India. The finding reveals various aspects of the characteristics and pattern of the contribution of this journal (Source: <http://www.srels.org/>).

With the advent of e-publishing, keeping with the trend, an online version is also available. In the beginning, the papers mainly focused on the research conducted at DRTC in particular, Library Classification and Library Cataloguing, Documentation, and gradually extended its coverage to new areas of interest e.g. Computer Applications, Library Management, and Information Systems. During the 1970s, when CSIR/NISSAN was launched, special issues devoted to Information Systems - planning and organization, were brought out. Now the periodical is fully multidisciplinary, covering all facets of Library and Information Science (LIS). This study attempts to map the subjects of the papers of this periodical which has spanned the last fifty years. The analysis would serve as a checklist for the areas of current and traditional subject interests in the field of LIS. The study highlights the important contributions of this periodical and made for the progress and development of LIS during the last fifty years.

1.4 SIGNIFICANCE AND SCOPE OF THE STUDY

1.4.1 Significance of the Study

Scholarly publishing is a central point for academic success because the quantity and quality of publications determine performance, evaluations, funding decisions, promotions and increments, and reputation in the academic field. It is relatively harder for Indian women to become a researcher but inside research, there are fewer differences in the topics that they choose to investigate. Numerous studies are looking at the various aspect of gender research productivity in academia. These can be broadly categorized into several key issues: women's participation in academia, impediments that hamper academic women research productivity, and evaluations of women's research productivity overall. Gender differences in terms of scientific productivity need to be monitored in the twenty-first century when the whole world is talking about women empowerment and emancipation. In the present study, the disparity in research productivity between male and female authors will find out and highlighted. Females are improving their position in the academic and scholarly world; their contribution needs to be studied at regular intervals to pinpoint the change. The study is a step forward in this regard. There are many parameters in which the research productivity

will be examined in this study like- the number of publications, gender-wise authorship patterns, the geographical distribution of articles, collaboration pattern, a different research area in LIS where male and female work, and finally gender diversity in LIS academics, etc. Thus the present study helped to find out the gender aspect in research productivity in LIS research and gender inequality if any. The goal of this investigation is to help further characterize the processes producing gender differentials in publication rates and to better understand the productivity gap.

1.4.2 Scope of the Study

The scope of the present study was to analyze the gender perspective (male and female) research productivity of library and information science research based on published papers in SRELS Journal of Information Management, a peer-reviewed journal started to publication since 1964. This journal was started by Dr. S.R. Ranganathan, the father of library and information science, and continued in print as well as online mode. This journal is also an index in the Indian citation index and under the top five LIS journals of India (Patra and Chandel, 2004). To know the publication pattern and trends of any journals, two-decade is sufficient time. Thus the period of the present study is limited to 20 years i.e. from 1999-2018. In this study, we try to analyze the productivity gap and observed whether gender differences are persistent or they change over time.

1.4.3 Literature Review:

The present study is an analysis research productivity of the subject Library and Information Science with an emphasis on Gender Perspective. There are many parameters on which the research productivity can be examined like- numbers of publications, authorship patterns, the geographical distribution of articles, collaboration pattern, leading areas of research, etc. where male and female research contribution may be analyzed and finally find out the gender diversity in LIS research. The literature under these core areas has been reviewed for the present study and chronologically arranged in descending order as below:

Bebi (2018) conducted a study on women scientists of selected research institutes in the field of physics and astronomy for a period of 2011 to 2015 and covers faculty members only. In their study, they found out that out of 583 scientists only 73 are women and the

highest number of the women faculty member is in National Physical Laboratory i.e. 15. The data showed that Aditi Sen De topped the rank list with 38 publications. They also analyzed the citation received by an institute and also the highest number of citations received by individual women scientists and noted that no women author is the first author in the highly cited paper. They also observed that male authors are the first and corresponding author in maximum numbers of papers, so they have concluded that women authors are the corresponding author in most of the papers rather than the first author.

Greenbaum (2018) examines top-producing female authors, editors, and editorial board members in five educational psychology journals (i.e., *Cognition and Instruction*, *Contemporary Educational Psychology*, *Educational Psychologist*, *Educational Psychology Review*, and *Journal of Educational Psychology*) from 2009 to 2016. The top-producing women in the field have, on average, less seniority in the field than do top male authors. Male authors have more publications, on average, and more sole authorship and first authorship, as compared to female authors. No discernible progress has been made by women in terms of editorial board memberships or editorships since 2004.

Negi (2018) examined the articles published in *Annals of Library and Information Studies* during 2008-17 for authors' gender productivity, collaborative work, and geographical distribution. The study found that the solo contributions of male authors are high in comparison to female authors. The author concluded that female productivity increases when they collaborate with a man in their research work. In their study they observed that contribution of male authors (78.7%) was high as compared to female counterparts, even collaboration between male-male authors is higher. It has been also seen that at the individual level female productivity is low even with other female authors but research productivity is high with male-female collaboration.

Kumar et al. (2018) conducted the study of the gender disparities in LIS Research Productivity during the last ten-year period (2008-2017). The study is also intended to identify the authorship patterns and gender disparities in the publication productivity. The result of the study shows that there is an increasing trend in the number of articles published by Indian authors during the year 2008-2017. Two-authored papers are top in the list has 101 (45.29%) followed by single-authored papers 73 (32.73%) and three authored papers 36

(16.14%). Most of the articles are published by a male (72.30%) and only 27.69% of articles are published by female authors.

Bebi and Kumar (2017) investigated the contribution of women faculty in the discipline of Physics in select institutions of Delhi. The study covers a total of 44 women faculties and their 802 publications from 2011 through 2015. The Scientometrics analysis of 463 journal articles has been done and they indicate that multi-authored paper was dominated and it was also noted that the majority of women-authored preferred to be the second author while writing paper jointly.

Loan and Hussain (2017) studied the differences in research productivity, patent creation, collaboration, citation, and impact between men and women across region and discipline over some time and concluded that comparatively, males have higher productivity than females for all performances indicators however the gap is narrowing over time. The authors suggested that these problems need to be addressed through national policies. They observed that men compared to women during their careers are more productive in research and it can be improved by their engagement in academic networks and to be in touch with fellow academicians and experts.

Besselaar and Sandstro (2016) have taken up the issue of performance differences between male and female researchers, and investigate the change of performance differences during the early career. Authors used various performance indicators: full/fractional counted productivity, citation impact, and relative citation impact in terms of the share of papers in the top 10 % highly cited papers. They calculated seven productivity classes of eight different fields for male and female. Comparing male and female researchers within the productivity classes they found that in life science & medical science, in psychology and humanities, there is no gender differences were found.

Ebadi and Schiffauerova (2016) focus on the Canadian funded researchers who are active in natural sciences and engineering and analyses the gender aspects of the researcher's performances, their scientific collaboration patterns as well as their share of the federal funding within the period of 2000 to 2009. The study showed that female researchers are underrepresented in the field of scientific-technological activities and the gender gap is seen

in engineering and mathematics fields that need specific attention. Their research shows the gender difference existed among Canadian researchers and considering the lower number of female researchers, it is expected to increase the female researcher which will help in reducing the gender gap. According to their findings, male performance is higher in terms of the number of publications but the impact of research in terms of citation is almost equal for both males and females. Also, it is been observed that research funding is more biased towards male researchers than females as they have more control over their scientific community as well.

Gul et al. (2016) showcase the effect of gender in the field of library and information science through an analysis of *The Electronic Library*, a prominent LIS publication, and concluded that there has been an increase in the proportion of male authors over the years with a resulting decline in female authors. It is also noted that the number of citations to works is independent of the nature of gender-wise authorship patterns. It has been also observed that male authors are more productive as teachers whereas females contribute more to working professionals or as a research scholar. It is found that productivity increases in collaboration with work in all gender combinations and also there is no significant difference in national and international collaborative works. It is also been observed that there is no such difference in citation and work is independent of the nature of gender-wise authorship pattern.

Nagarkar et al. (2015) analyzed the research productivity of life sciences faculty members at the Savitribai Phule Pune University (SPPU), Maharashtra, India. The research was conducted to know the research productivity over 15 years (1999-2013), the citations received collaborations and authorship patterns. Web of Science (WoS) database was used for bibliographic and citation data. Data were analyzed by using bibliometric techniques and software such as Hist Site, Intcoll, and Pajek.

Singh (2015) examined the productivity and publication pattern from 2004 to 2012 from Information Studies Journal on the gender perspective and show that the Karnataka is the highest (54.00%) contribution during the study period and male authors have contributed three times more (74.84%) than the female's contributor.

Garg and Kumar (2014) analyzed the contribution of Indian women scientist to the Indian scholarly output and its impact using the publications and citation data in 12 sub-disciplines of life science in a journal indexed by the Web of Science (WOS) database of Thomson Reuters for 2008-2009 and found that women scientist preferred to publish more in domestic journals as compared to their male counterparts.

Mulla and Dhanamjaya (2014) analyzed 412 research articles published in 10 volumes of 40 issues in the SRELS Journal of Information Management (SRELS-JIM) during periods of 2000-2009. This paper investigated the authorship pattern, degree of collaboration, author productivity, and further, it shows that the average number of authors per article is 1.66 and the average productivity per author is 0.60. This paper reveals various aspects of the characteristics and patterns of the contribution of this journal.

Singh and Bebi (2014) present a bibliometric study of the journal Library Herald for 10 years (2003-2012) and examine the various bibliometric parameters such as authorship pattern, gender-wise, geographical distribution, major authors, and their affiliations, topical mapping, and length of articles.

Pandita (2013) analyzed the latest publication distribution pattern of the articles published in Annals of Library and Information Studies (ALIS) journal during the last decade from 2002-2012 which covers the area like article distribution pattern, authorship pattern, reference and geographical distribution of authors, etc. In their study, it is seen that there is a slight increase in the number of articles Vol 57 has published as many 43 articles highest among all which is 10.57 per issue. The major contributor to the particular journal is B.K. Sen who has contributed a maximum of 4% (24) articles. From the data analysis, it appears that there is a growing trend among researchers to research joint authorship patterns.

Sotudeh and Khoshian (2013) in the present communication study women's performances in Nano Science & Technology in terms of their scientific productivity and impact and to contrast them to their male counterparts. The study implies the scientometrics method with a comparative approach to study a women's scientific productivity during 2005-2007 in the field of Nanoscience. Eighteen Nano S&T journals were picked out using the subject category in the Journal Citation Report (JCR) and downloaded the bibliographic data,

authors' information and identify their genders by searching Google, email or affiliation and also sent an email a simple questionnaire inquiring the researchers' gender in case of doubt. In their study they observed out of the 13,491 first authors, 10,447 published just one paper (77.44%) and 1893 authors just two articles (14.03%). The small number of researchers i.e. 1151(8.53%) has produced higher than the average number of articles from 3 to 23 articles which is found to have at least one paper each year. The scientific production of most prolific women (14 articles) has been much less than their male researchers (23).

Arensbaden *et al.* (2012) conducted a case to examine gender-wise performance differences in research productivity by using publication records of 852 social scientists. They measured the scholarly performance of researchers in terms of publication during the last three years about i.e. 1100 applicants rather than taking lifetime performance into account. They found that gender differences exist in the field of social and behavioral sciences, even in economics it still exists but much smaller in the younger generation as compared to an older generation and younger female researchers are better than younger male researchers sometimes.

Davarpanah and Moghadam (2012) examined the significant difference between male and female research output from three databases i.e. Science citation index (SCI), Social Science citation index (SSCI), and Arts and Humanity citation index (AHCI) for the study period 2005-2010. The Finding showed that there is a gap of approx 87% in research productivity between males and females in Iran and also Iranian women are more active in the areas of Chemistry, Medicine, Clinical, and general Social Sciences.

Kretschmer (2012) analyzed the gender relationships in research publications by using 14 journals of gender studies by using several methods and indicators. There are a total of 8649 papers published by 12691 authors in selected 14 journals during the study period, Out of which 10,867 of them are females and 1823 males authors. The women's participation was very high (91.6%) of all papers in comparison to male participation (17.3%) which is very less. It is also found that female scientists are relatively overrepresented as first authors in gender-related journals confirming subject dependence of the phenomenon.

Borrego et al. (2010) analyzed the scientific output and impact of 731 Ph.D. holders according to gender who were awarded their doctorate at Spanish universities between 1990 and 2002 and then analyzed their scientific output through the Thomson Reuters ISI Web of Science (WoS). It revealed no significant differences in the amount of scientific output between males and females. However, the proportion of female Ph.D. holders with no postdoctoral output was significantly higher than that of their male counterparts. The results also indicated that articles by female Ph.D. holders were cited more, even when self-citation was excluded.

Abramo et al. (2009) studied the gender-wise differences in research productivity among the research personnel working in the scientific-technological disciplines of the Italian university system. This study brings to a close that there is a gap between two genders except for star scientists and indicating better performance for men scientists and confirmed the presence of significant differences in productivity between men and women.

Baro et al. (2009) conducted a descriptive survey to discover gender differences in librarian's publication output in the Nigerian university library. For the study, they have taken a total of 55 academic librarians. The questionnaire method has been used for data collection and obtained data were further analyzed using a simple percentage to answer the research questions and the t-test was performed at 0.05 level of significance to test the formulated hypotheses. It was revealed that male librarians publish more than their female counterparts.

Borrego et al. (2008) presented an analysis of the scientific output on Ph.D. holders at Spanish University who were awarded their doctorate between 1990 and 1995. There was a total of 731 Ph.D. awarded during the marked period out of which 305 are females (41.7%) and 426 are males (58.3%). It was observed from the analysis that there is no difference in the median number of articles published by males and females and study but only 58.7% of the respondents had published at least one paper in a journal indexed by Thomson ISI Web of Science during from 1990-2006. It also found showed that articles by female Ph.D. holders were cited significantly more than by their male counterparts even when self-citation is excluded.

Hashim (2008) analyzed the ICT barriers among working women in Malaysia as in today's world everyone acquired basic ICT skills. The study was conducted in a multi-ethnic, multi-cultural, and multi-lingual society. The findings revealed that the working women in Malaysia possess an only average number of ICT skills and reduce the knowledge gap among working women in Malaysia by identifying the learning barriers, ICT skills and ICT usage and ICT adoption and findings show that working women rarely use the internet and e-mail at their workplace or home and they do not face any serious learning barrier for ICT but they find it complex due to innovation characteristics. The study also suggested that there should be proper ICT training to improve and ICT skills of the employees to become more competent at their workplace and employ proper learning approaches and methods that should be adopted in training and education. With the enhance managerial skills and ICT-based competencies after training, the working women would have a lot of knowledge-seeking skills, increased access to up-to-date information, be effective in decision making, and can establish network and linkages and with this abilities, they will have a better chance for promotion and advancement in their career.

Tower et al. (2007) conducted a study on the top six multidisciplinary journals across all the major disciplines, science, business, and social science in the world and found no much difference between men and women productivity when the percentage of women participating in the academic workforce is considered a factor. The findings are consistent and found no gender difference in Journal Impact Factor ratings, although differences occurred in the quality of research discipline-wise rather than gender-wise.

Leahey (2006) conducted a study using a probability sample of academics in two disciplines i.e. sociology and linguistics to analyze gender equality. The analysis found that the extent of research specialization is a critical intervening variable. Women are less specialized than men and thereby lose out on an important means of increasing their productivity.

Mathew et al. (2006) analyzed publication records of 168 life scientists in the field of ecology and evolutionary to find the gender differences in their research performance. A clear difference in publication rate between men and women was observed. Analysis resolved that female produce higher quality research compared to their male counterparts,

who tend to produce a greater quantity of research output while the quantity of output favored male but results show that even when the quality of research taken into account males are favored since this measure of quality is correlated with quantity. There is no such gender difference recorded in the rate of self- citation.

Penas and Willett (2006) compared publications and citations among male and female library professionals from five leading departments of librarianship and information science. The data was collected from the web of knowledge database to examine the eight broad subject areas to compare the research activities of 57 male and 48 female researchers and found that male academics publication is more than female in LIS academics and this may be because there is a greater percentage of male faculty who are professors and many studies show that position rank impacted the research productivity, so the differences in publications are not overwhelming in this study. Further, there is no significant difference found in the number of citations to published papers by males and females.

Barbara J. Bergman (2005) reviewed the history of gender inequity in libraries, salary outline issues, and attempt to define what an electronic resources librarian is and with systems librarians being used for comparison. Electronic resources librarians were surveyed for gender, salary, and other demographic information in an attempt to determine whether gender equity or gender stratification is occurring within their specialty. The majority of respondents work in the USA but 20% worked around the world. Results appear to indicate that males are not being favored over females for employment in the library specialty. Experience and geographic location were found to be the only significant factors affecting salary. Electronic resources management appears to substantially blur the line between public and technical services. This blurring could be an interesting aspect to examine more closely to see if the computerization of library resources is changing the definition of what librarians do as well as that of what libraries are.

Corley and Gaughan (2005) analyzed the research productivity based on their research affiliation and find out how to center affiliation and not affiliation influences the research productivity among scientists. In a study, authors compare the productivity between scientists and engineers working in Carnegie Research Extensive University from exclusively department based academic scientists and engineers and centers. The analysis

resolved that women are likely to join centers the same as men at similar stages in a career. Most of the differences between male and female appeared in centers, but women appear to have greater research equality. It is concluded from the study that scientists researching university-based research centers will have access to more research resources than those other academic centers. It has been noted that female scientists spend more time writing grant proposals and they are less satisfied with their job but feel appreciated by their colleagues for their research work and contributions.

Håkanson (2005) do these findings to carry over into a field not dominated by men, such as the LIS study analyzes almost 30,000 articles from twenty years of three core LIS journals. The majority of references, 59 percent, were to works by men-only, while 27 percent were to works by women-only. Female author's reference works by other women 34 percent of the time, whereas 53 percent of references are to works by men. Conversely, male authors reference female authors 22 percent of the time, as compared to 65 percent of references to other male authors. Citation analysis indicates that male authors receive substantially more citations than female authors. Håkanson interprets these findings by stating that "the article authors of this sample assume that their publications gain more credibility if they refer to publications by men" (p. 319). In other words, the publications written by men may have more perceived value, influence, and status than those written by women. These results indicate the existence of gender bias in three core LIS print journals.

Josephine (2005) discovers why there is a need to improve women's productivity in the library and information science and to describe the problems which are making them deprived and to highlight their prospects. Library and Information productivity requires productive and timely information acquisition, processing, storage, retrieval, and delivery, and to achieve these objectives descriptive survey method has been used. The finding shows that, that the productivity of women in Nigeria has been generally regarded as low because of traditional prejudices against women and lack of data on the productivity of women in the informal sector, but the productivity of women in the library and information sector has remained high and needs improvement to encourage them to aim higher in the profession. It can be achieved by proving information technology training to them, financial support for

their aspirations towards training and retraining; motivate them to attend seminar-workshops, exchange, etc.

Goel (2002) analyzed the gender differences in R&D output contributed by psychologists in India during the period 1976-1977 to 1985-1986. He did a quantifiable assessment of R&D output with the trend of growth, gender inequality, significance, co-authorship pattern of productivity, etc and found that growth of Ph.D. dissertation is increasing during the eighties because of the shifting paradigm towards women. The study also highlighted a very big gender inequality in publications. Out of a total of 956 (69.03%) co-authored papers, 72.80% of papers were belonging to male researches and only 27.20% of the papers are by women researchers.

Prpic (2002) surveyed to analyze the gender variation in scientific productivity among the 840 young scientific populations in Croatia. The study shows that there are considerable sex differences in the case of individual productivity of female scientist's publication and productivity is strongly influenced by their position in the organization. The average gender-wise analysis shoes that male authors publish 2.4 papers per scientist while young female authors published 1.4 papers.

Mathews and Anderson (2001) analyzed gender disparities in academic publishing. They analyzed edited political science books and found that the percentage of women contributing to edited political science books is comparatively stable with the percentage of female authors in the American Political Science Association. The authors also analyzed the reason behind this and enlighten that majority of females were worked in a non-tenure track like part-time or temporary positions in colleges and they are having less institutional support in terms of resources or time needed for publications. They are more likely to involve in such activities which detract them from research and interrupt their careers like social responsibilities, families & children. Other major obstacles for women in publications are weak professional network and connectivity.

Goel (1999) examines the qualitative and quantitative analysis of gender-wise productivity on papers published in IPA (Indian Psychological Abstracts) and PA (Psychological Abstracts) from 1974 to 1997 to know the gender differences at the research level. The

percentage of women is 46% in psychology but the percentage of women to men in enrollment of higher education is 43.2% only. In their study, they showed that the number of theses by females increased during the eighties. It is also been observed that decade male has dominated the publication but trend line indicate that male participation will come down with women participation shortly.

Gupta et al. (1999) analyzed the scientific productivity paper of male and female scientists working in the Council of Scientific and Industrial Research (CSIR) India at the overall agency level as well as a group of laboratory level. Using three different approaches the comparative analysis of male and female scientists in terms of scientific productivity profiles. The productivity of scientists is evaluated on different parameters, i.e. not publishing any paper, the average number of papers per scientist, using the Lotka law approach. In their study, they include only 4309 scientist whose complete information is available in the directory of three subjects, out of which, 3920 scientists are male and 389 are females. The average number of papers written by per male and females scientists are found to be 15.44 and 13.98 respectively.

Baillie (1997) discusses the perception of employers and employees having on women returning to work after raising a family from the perspective of a recruitment agency on the points- attitude and commitment; skills and professional awareness; education and continuing professional development and support. Outlines the reasons for and problems associated with returning to work and addresses the key issues involved in offering possible solutions

McDermott (1998) explored the barriers to women's career progression in the LIS field. She summaries respondents' evidence which overwhelmingly identifies the double burden as the main barrier to women's career progression in LIS among a sample of UK women. There are two issues: one is the daily routine of domestic duties and the extra demands on time, and the other is the emotional strain that accompanies caring responsibilities, that fall to most women, in some form, at some time in their lives. The logistical problems faced by women who find that a large proportion of their time is constantly consumed by domestic and caring duties are considerable. Furthermore, the worry and guilt consume inner resources which may be needed at work.

Kyvik (1990) analyzed the differences between age and scientific productivity of male and female scientists in Norwegian universities and observed that in natural sciences, the differences are less while in medicine, social science, and humanities the differences were much more and women are 30-35% less productive than men. Here is also found that academic ranks have significant role research productivity and professors are more productive than associate professors and assistant professors. Since women are less in senior position; the difference in productivity between ranks has consequences for average productivity between male and female researchers. It is observed that women are more productive than men at lower rank positions and less productive in the same position. Further, it is noted that age has negative effects on both genders and married men and women are more productive than a single person and women with children are more productive than women without children.

Fish and Gibbon (1989) conducted a comparative study of male and female research out among economists. Out of a total of 960 Ph.D. awarded, they took 30 economists Ph.D. from women and men each who were awarded their degree during the period 1969-1984. After analyzed the data it was found that female economists had 128 paper publications out of 480 publication records while male economists had 162 publication records which 27% percent more than female publication is. The authors also examined the Mean difference between numbers of publications by male and female and it was found 0.75.

RESEARCH GAP

On the analysis of the above literature review, it has been observed that there is a sufficient number of researches conducted on research productivity and gender perspective at various levels. But no detailed study has been carried out in the proposed area of the study and hence, this study is an attempt to full fill this research gap by providing fresh insight and investigate the productivity of LIS academics by a gender perspective.

1.5 RESEARCH DESIGN

1.5.1 Statement of Problem

Since journals have been a very popular means of spreading of innovative thoughts and research communications. This work plans to inspect gender-based research productivity in the LIS field based on the publication of the SRELS Journal of Information Management. Research work is universally accepted as an influential tool for the progress of society. In recent years there has been a constant focus on women's participation in academic and research works. Though the government is encouraging female participation and contribution to research works by making women-centric policies, offering grants and support still there is a gap between man and women productivity. To know the trends and present situation of gender disparity in research productivity and issues that hamper the academic women's research productivity in the LIS field, it is necessary to conduct a detailed study on it. Therefore was very interesting and challenging to conduct a study on gender perspective in research productivity of the LIS field.

1.5.2 OBJECTIVES OF THE STUDY

The objectives of the present study are:

1. To analyse the publication trends in the SRELS Journal of Information Management during 1999-2018.
2. To identify the nature of the authorship pattern and gender-wise authorship pattern in the selected journal.
3. To study the gender distribution in the collaboration pattern.
4. To analyse the geographical distribution of articles based on gender in the selected Journal.
5. To analyse different research areas of authors in the SRELS Journal of Information Management.

1.5.3 Hypothesis

The Study proceeds with the following hypothesis.

H₁: There is no difference between the professional category-wise distribution of males and females.

1.5.4 Research Methodology

The present study is to analyze the research productivity in terms of publication of SRELS journal from a gender perspective for 20 years (from 1999 to 2018). The SRELS journal of Information Management started its publication since 1964 and till now 55 volumes published since December 2018. Research data has been collected from the journal website (<http://www.srles.com>). The observation method has been used for collecting the personal information of the author to know their gender and profession. The study includes only journal articles. The detailed curriculum vitae (CVs) of the individual authors regarding their information are collected from the updated bio-data from SRELS official website. The relevant data were analyzed using R-software. The gender of the author was identified from the first name of the authors. The downloaded data included name along with their affiliation and their performing sector to which institution belonged. To identify the gender/sex of the authors of the particular article, we directly contact the authors through affiliation if there is no affiliation or doubt, other sources of information such as institutional websites, social networking sites such as Facebook, research gate, LinkedIn and google scholar has been used to know the missing information of authors. Publication productivity of individual faculties was cross-checked with the help of internet tools like- Google Scholar, Research Gate, Academia, etc.

1.6 CHAPTERIZATION

The present study has been divided into the following chapters:

- Chapter 1: Introduction
- Chapter 2: Research Productivity in LIS: Tools and Techniques
- Chapter 3: Gender Perspective in LIS Research
- Chapter 4: Data Analysis and Interpretation
- Chapter 5: Findings, Conclusion, and Suggestions

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CHAPTER: 2

**RESEARCH PRODUCTIVITY IN
LIS: TOOLS AND TECHNIQUES**

2.1 INTRODUCTION

The development of a country is measured in terms of research productivity in the academic field. Research and publication help in strengthening the particular field and research area with new and creative ideas knowledge which is needed for the development of the profession.

In India, higher and educational institutes are the most important source in imparting technological ability and change. Research in such institutions plays an important role in the success and development of any country and well-being of its people. From the past one decade, in India research productivity in higher education has got advanced importance, and it is improved. In higher there are two functions which are performed by faculty members, one is teaching, which is curricular based functions and another is research and publishing which is one of the important activities in institutions. Researchers and scholars publish their research in form of papers in journals, books, book chapters, newspapers, articles, conference proceedings, reviews, patents, etc. through all these publications institute recognize globally. Publication of the faculty all together makes an overall impact in institutional output. As the institution grows the performance of the institutions in research must be mapped for self-assessment. It helps the institution to map the intellectual output in research.

Research is carried out for the development of knowledge, improvement of existing knowledge, to provide solutions to specific problems, and to improve processes and practices. Research has attained an important place in all fields of knowledge. In the field of library and information science, research has played a crucial role in the future development of the profession. Scholarly Journals play a very important role in the sharing of the research findings and serve as a medium for the exchange of ideas, experiences, and dissemination of new knowledge among scholars.

The research productivity of LIS professionals and educators as criteria for academic promotion has been of major concern and the subject of studies at the international level. The three traditional criteria most often used in faculty evaluation are teaching competency, research, and professional service. One or more of these criteria have been emphasized by various scholars. (Prudence Dalrymple and Jana Varlejs).

The University in the 21st century in higher education plays a crucial role in teaching, research and technology, compare two last two centuries. University is considered as producers of new knowledge, and it is not limited to teaching only but research is becoming a vital and necessary part of modern university education. Research is considered as a creation of new knowledge and through research Publication University prestige gets recognition as well as it enables academician to earn a better salary package and better tenure.

According to Cresswell (1986) "teaching and research are equally important for university teachers; they must give equal attention to research and teaching as a part of their duty because participation in research directly improves the quality of teaching. Research is required for the improvement of general knowledge, research enables the academicians to understand their selves, to analyze their abilities, and research also enables the academicians to fully understand their discipline, which is imperative for effective teaching".

2.2 RESEARCH

Research has become a vital phenomenon in all fields of human activity. It is observed that with time, research in all spheres has witnessed revolutionary progress and opened new vistas for further research and contributed significantly to the welfare of the society. In the modern era Research and Development in every field of knowledge contributes to the generation of a large volume of information and growth in literature in every discipline [Sengar, 2012].

Meanwhile, developments in information and communication technology (ICT) have also contributed to the evolution of scholarly communication by greatly changing the documentation format and dissemination of scholarly content, among other aspects. ICT developments have dramatically changed research practices in terms of scholarly communication by enhancing communication among scientists and access to information of all kinds, and by the provision of a greater variety of publication and dissemination platforms (Moller, 2006).

2.3 Definition of Research

Research in common parlance refers to a search for knowledge. Research is an art of scientific investigation. According to the advanced learner's dictionary of current English,

"Research is a careful or inquiry especially through search for new facts in any branch of knowledge."

Redman and Mory define research as a "Systematized effort to gain new knowledge."

2.3 PRODUCTIVITY

It is an act to measure the efficiency of a person, machine, factory, and system etc.in converting inputs into useful outputs. Productivity is computed by dividing the average output per period by the total costs incurred or resources (capital, energy, material, personnel) consumed in that period. Productivity is a critical determinant of cost efficiency. Productivity is the standard indicator of efficiency in any production system. It seems that it has become a norm in bibliometric studies to define research productivity as the number of publications per researcher and its impact. Productivity is the standard indicator of efficiency in any production system. It seems that it has become a norm in bibliometric studies to define research productivity as the number of publications per researcher and its impact.

2.3.1 Definition of Productivity

Paul Krugman says "Productivity isn't everything but in the long run it is almost everything."

The concept of productivity can be defined and used Research Productivity of LIS Professional in various ways. It is the relationship between quantities of output and quantities of input. (Phillips, 1990). In the present research, context productivity is taken as the writing of research output prepared for publication and published in print or electronic form for public use.

2.4 RESEARCH PRODUCTIVITY

Research Productivity is a combination of two words "Research" and "Productivity. "Research" means the very careful, observant, and vigilant study or investigation of phenomena, particularly to search and find out new particulars, information, and facts. While "Productivity" means production or output, produced in duration of time. Both words mean different to different people. Regarding higher education, research productivity means, publications of papers in professional journals, in the shape of books or presentation of

research papers in conference proceedings. To work on projects, the publication of monographs, development of experimental designs, production of artistic or creative works. Research productivity and research activity are interrelated. Research means to conduct research, collecting data, analyzing data, productivity means writing, reading, and publication of research reports in professional refereed journals, displaying on the web or to make it known to the public through any other mean, in the shape of books or making its presence on the television or radio.

According to Creswell (1986), Research Productivity includes research publications in professional journals and conference proceedings, writing a book or chapter, gathering and analyzing original evidence, working with post-graduate students on dissertations and class projects, obtaining research grants, carrying out editorial duties, obtaining patents and licenses, writing of monographs, developing experimental designs, producing works of an artistic or creative nature, engaging in public debates and commentaries.

Research productivity is an important component of the academic advancement process (Tomei et al., 2014) and is reflective of the publication output from an individual, institution, or nation. Publication output is usually considered as book chapters, journal articles, conference proceedings, and other published bibliographies, abstracts, and indexes.

2.4.1 Definition of Research Productivity

According to Creswell (1986), "Research productivity is the certain level to which lecturers engage in their research and publish scientific articles in refereed journals, conference proceedings, writing a book or a chapter, gathering and analyzing innovative facts, working with postgraduate students on dissertations and class projects, obtaining research grants, carrying out editorial duties, obtaining patents and licenses, writing monographs, developing experimental designs, producing works of a creative artist or a creative nature, engaging in public debates and commentaries".

2.5 IMPORTANCE OF THE RESEARCH PRODUCTIVITY

Mapping of Research Productivity studies has been increasingly used over the last few years. These studies are useful to understand the growth of literature, research trends, to

assess the performance of an institution or a person. The present study gives the output of growth in the research area of SRELS Journal of Information Management. This study is important as it has considered different dimensions of publications for analysis. It will also help to assess intellectual productivity in the form of a research publication from its establishment. The present study will be helpful for self-assessment for faculty members, research scholars, and library professionals. In the present study, the approach of faculty in publishing their research output in various forms like a journal, conference proceedings, books, book chapters, patents, etc. are examined to map their research productivity of the journal under this study. Thus the productivity is measure by applying different parameters like a scattering of publication in different forms of document, chronological distribution of publications, annual growth rate of publications, authorship pattern, and so on. The progress of an academic field is measured by their scholarly publishing and research productivity of a particular field. Publications and articles help to strengthen the discipline with new knowledge and ideas, which are helpful for the growth of the profession. In library and Information science, research plays a vital role in identifying needs, problems, and helps in tackling the challenges in librarianship.

In the age of information, academic libraries play an important role in the socio-economic development of a country. Libraries play an important role in transmitting the masses' knowledge to the future generation and also creating new knowledge through research. Research in library science is growing day by day due to changes in information technology. For example- library automation, OPAC, computerized SDI, CAS, use of electronic-resources, web 2.0, etc. Libraries not only play the key role of a repository of knowledge but also work as guardians to research scholars and Procter to research activities. There is numerous problem faced by library and library professionals and librarians in new technology era it is the research that helps to solve those problems which, create and expand the new human knowledge base and develop better-advanced tools and techniques for their work situation.

Productivity in research activities in this section, we intend to operationalize the concept of research productivity in simple terms and propose a proxy to measure it. Generally speaking, the objective of research activity is to produce new knowledge. Research activity

is a production process in which the inputs consist of human, tangible (scientific instruments, materials, etc.) and intangible (accumulated knowledge, social networks, economic rents, etc.) resources, and where output, the new knowledge, has a complex character of both tangible nature (publications, patents, conference presentations, databases, etc.) and intangible nature (tacit knowledge, consulting activity, etc.). The new-knowledge production function has therefore a multi-input and multi-output character. The principal efficiency indicator of any production unit (individual, research group, department, institution, field, country) is productivity: in simple terms, the output produced in a given period per unit of production factors used to produce it. To calculate research productivity one needs to adopt a few simplifications and assumptions.

2.6 Role of Research Productivity in Higher Education Institution

Institutional Ranking in higher educational institutions became common practice and business schools are highly benefited by announcing worldwide or national level ranks based on various ranking criteria. Ranking of higher educational institutions that have already accredited with minimum required infrastructure, innovative curriculum design should depend on their ability to produce new knowledge as the output of the institutions. New knowledge creation is possible only if both students and faculty members are involved in research activities and publish the new knowledge periodically for the benefit of the society and industry. Hence the effectiveness of higher education institutions should be measured based on the research productivity of the institution. The measure of the new knowledge creation ability of the institution is usually done by studying the research publications of the faculty members individually or with their students. The measure of institutional research productivity will also give insight for institutional ranking for a given year in a given country or at the world level. Thus the productivity of higher education institutions that are already accredited for their minimum required infrastructure, innovative curriculum design, and comprehensive placement support should depend on their ability to produce new knowledge in the form of publications using their active resources as the output of the institutions. Research productivity in higher education relates to both knowledge creation and knowledge dissemination through its various forms of research, teaching, and outreach activities. Research productivity forms a very distinguishing part of

the universities and as consequence, the rankings of academic Institutions based on research productivity have become increasingly important.

2.7 RESEARCH PRODUCTIVITY AND ITS MEASUREMENT

"Research productivity" is the output of the research process. It can be measured in a variety of publishing outputs such as refereed journal articles, theses, books, and chapters in books, and patents (Raston, 1998). It is also measured in terms of professional development opportunities such as conference presentations and research seminars; and the number of grant proposals submitted or the research grants received (Kaya & Webber, 2003). It is well established that research output is commonly used to measure or evaluate research productivity of higher academics or institutions around the world. The research publication is an intellectual product for disseminating new knowledge and discovering new ideas for the world. At present, research productivity, in particular the publishing outputs, becomes a criterion in recruiting, offering tenure, getting a promotion, and maintaining tenure at all research universities globally, which ensures that the newly recruited academics will become productive academic researchers in the future to serve the research goals of the universities (Cummings & Shin, 2014; Perry, Clifton, Menec, Struthers, & Menges, 2000). It is the most important criterion for the ranking of the world's universities conducted by ranking systems such as the Times Higher Education, QS World Ranking Universities, and Academic Ranking of World Universities. In general, the research productivity of academics is important for both academics in their career development and universities. High quality of research productivity enhances the prestige and reputation of a university nationally and internationally.

2.8 DETERMINANTS OF RESEARCH PRODUCTIVITY

Measuring research productivity is a complicated issue with many contributing factors. Productivity has been measured at various levels, at the individual level, at the department level, and at the institutional level. Research productivity can be measured qualitatively or quantitatively. Both of the measurements are used by world ranking systems when they rank universities annually. Other studies have also shown that other factors such as age, gender,

socioeconomic status, educational background, and experience can influence research productivity. (Dundar and Lewis, 1998).

2.8.1 Quantity Measurement

While qualitative measures evaluate the influence or impact of a publication by counting the total number of references that were made to it by researchers globally. The most frequently used quantitative measurement in research productivity is numerical publication count or the journal article count over a certain period. (Creswell, 1986; Rotten, 1990) pointed that "a common approach to measure research productivity was to count several books, articles, bulletins, technical reports and book reviews published as well as a presentation is given and grant received through reviewing curriculum vitae or other print materials".

2.8.2 Quality Measurement

Quantitative measures focus on the number of publications that academics produce in a period. Both of the measurements are used by world ranking systems when they rank universities annually. Research work of other persons reviewed professionally by one or more qualified professionals refers to peer-reviewed processes, usually for publication in scholarly journals or books. Qualitative characteristics can be counted and cannot be computed.

2.8.3 Citation Measurement

Citation is an important measure that reflects the quality of a publication. For example, there is always a positive correlation between the number of citations of a. More importantly, they indicate how this knowledge has been shared around the global scholarly community to push the boundaries of our collective understanding, irrespective of discipline. Thomson Reuters believes that the citation counts of scientists' publications can journal articles and their quality in terms of the knowledge contribution to the field. According to Times Higher Education (2014), citations indicate how a publication contributes to the sum of human knowledge predict who will win the Nobel Laureate in certain disciplines (Thomson Reuters, 2014).

2.9 Research Productivity in LIS Research and Its Tools to Measure the Research

Bibliometrics/ Scientometrics is one of the established research methods used in the Library and Information Sciences to measure research productivity. The bibliometrics was a branch of research regarding various aspects of literature and it identifies the pattern of publication, authorship, collaboration, author productivity, etc. It helps in understanding the active change in the growth of knowledge in the areas undertaken for research. The term "Librametrics" is established by, scientist Dr. S. R. Ranganathan in the year 1948 to more simplify the services of librarianship. Though many scientists used the terms in different names, the concepts are more similar and related to each other. The term "Bibliometric" is parallel to Ranaganathan's, "Librametrics", the Russian concept of "Scientometrics", "Informetrics", and some other well-established sub-disciplines like "Econometrics", "Psychometrics", "Technometrics", where mathematical tools and statistical tools were used to solve the problems of the solutions in their respective fields. The terms scientometrics are used as quantitative methods in sciences and it overlaps bibliometrics to a great extent.

2.10 BIBLIOMETRICS

Bibliometrics is an interdisciplinary research method used in all scientific fields and has wide application in other subjects also and it is most often used in the field of Library and Information Science. It has an extensive quantitative analysis of a various aspect of literature used to identify the pattern of a publication like an authorship, the degree of collaboration, place of publication, year-wise citations, co-citations, citation trend, etc. it has attracted the attention of researcher, scholars, and statistician, and libraries for over 50 years. The field of library science named it "Librametrics" and 'Bibliometrics'.

Bibliometrics can be defined as quantitative or numerical or statistical analysis of recorded communication from printed and non-printed sources. The analysis can be done by observation, measurement, and grouping or classifying. Further, this analysis deals with intrinsic and extrinsic (implicit and explicit) characteristics and behavior of documents. (Ranganathan, 1969).

Bibliometric is a quantitative method used to study science communication. Bibliometric is an analytical method that is used to analyze the bibliographic description in recorded

knowledge in form of articles, reports, periodicals, patents, software, blueprints, etc. to develop the academic literature.

Bibliometrics is the study used to measure the documents and pattern of publication in which mathematical and statistical methods have been applied. During the last few years, bibliometric studies and Scientometric studies are widely used from different disciplines of subjects for mapping research output, measuring the scientific publication, scholarly articles research growth, authorship pattern, research collaboration, author's productivity, etc.

2.10.1 Genesis of Bibliometrics

Etymologically bibliometrics is composed of two distinct parts i.e. 'Biblio' and 'Metrics'. The word "Biblio" is derived from the Latin and Greek word "Biblion", "bible" meaning 'book' or 'paper' and "Metrics" is derived respectively from the Latin and Greek word "Metrikos" in simple words which means measurement, which has been used in mathematical and statistical techniques for the study of documents and pattern of publications. The use of statistical bibliography was first used by Cole and Eales in 1971 and conducted a study by counting and categorizing publications by country of origin and by field. In 1922 Hulme introduced the term "Statistical Bibliography". The technique was explained as: to shed light on the process of written communication and of the nature and course of development of discipline through counting and analyzing the various fact of written communication. Later the term of 'Statistical Bibliography' was used by Fusseler in 1948 and 1949 and in 1962 it is used by Raising, in 1969 it is used by Allan Pritchard and he stated that, "The term 'Statistical bibliography' is clumsy, not very descriptive and can confused with statistics itself or bibliographies on statistics."(Pritchard, 1969, p.348). bibliometrics is relatable to Ranganathan's 'Librametrics', and in Russian concept, it is 'Scientometrics', Informatics and also there are some other well-established sub-disciplines like 'Econometrics', 'Psychometrics', 'Sociometrics' and 'Biometrics' where mathematical and statistical calculus has been applied to study and solve the problems in various fields.

2.10.2 Definition of Bibliometrics

The term Bibliometric is given by Pritchard (1969) and it is defined as "the application of Mathematical and Statistical method to measure quantitative and qualitative changes in

different media." The word bibliometric made with two Greek words 'biblion' the meaning is a book and 'metrics' the meaning to measurement. Bibliometric has emerged as the most active field of Library and Information Science. It is one of the quantitative techniques used by the Library and Information professionals to evaluate written communications. Potter (1981) defined bibliometric as "the study and measurement of the publication patterns of all forms of written communication and their authorship". According to Pandita (2013), most of the bibliometric studies are undertaken to access the research productivity of an institution, organization, publication of a particular subject or field, research result published in a particular journal, or any other similar activity which is confined to literature or research growth and its evaluation through quantitative techniques published during a particular period.

The British Standard Glossary of Documentation of Terms (1976) explained bibliometrics as, "the study of the use of documents and patterns of publication in which mathematical and statistical methods have been applied", which is similar to Pritchard's definition.

Oxford English Dictionary defines Bibliometrics as "The branch of library science concerned with the application of mathematical and statistical analysis to bibliography; the statistical analysis of books, articles, or other publications".

Fairthorne (1969) defined as "quantitative treatment of properties of recorded discourse and behavior appearing to it. Bibliometric is also explained as a quantitative analysis of bibliographic features of the body of literature."

Bonitz (1982) defined it as "Bibliometric is a methodological sub-discipline of library science, including the complex of mathematical and statistical methods, used for the analysis of scientific and non-scientific documents, library networks, indexing languages, information systems, communication systems, etc."

Sen (1997) according to him "bibliometrics deals with documents and its components while metric studies about information are informatics."

Egghe (1988) explained "the development and application of mathematical models and techniques to all aspects of communication. Bibliometrics is the quantitative study of

literature as it is reflected in bibliographies. It's a task, immodestly enough, is to provide evolutionary models of science, technology, and scholarship."

According to Lancaster Bibliometrics is "the discipline of measuring the performance of a researcher, a collection of articles, a journal, a research discipline or an institution". This process involves the 'application of statistical analyses to study patterns of authorship, publication, and literature use'.

Bibliometrics is nothing but the counting of publications and citations i.e. measuring the output and the impact of scientific research. Bibliometrics means evaluating and ranking people and institutions, countries, and research outputs. Thus bibliometrics, Scientometrics, Informatics, Webometrics, or cyber metrics are studies to measure bibliographic details in the form of typical bibliography, scientography, informagraphy, webography, or cybergraphy respectively.

2.11 TYPES OF BIBLIOMETRICS

Bibliometrics are called quantitative science and it is divided into two areas. Rolland Stevens considers bibliometrics as a quantitative science and divides it into two basic categories:

(1) Descriptive and (2) Evaluative

2.11.1 Descriptive Bibliometrics

Descriptive bibliometrics includes the study of the number of publications in a given field or productivity of literature in the field to compare the amount of research in different countries, the amount produced during different periods, or the amount produced in different subdivisions of the fields. The kind of study is made by a count of the papers, books, and other writings in the fields or often by a count of these writings, which have been abstracted, in a specialized abstracting journal.

The descriptive bibliometrics further includes the study of the number of publications in a given field or productivity of literature in the field to compare the amount of production during different periods or the amount produced in the count of the papers, books, and other writings in the field or often by a count of these writings which have been abstracted in

specialized abstracting Journals. Evaluative Bibliometrics includes the study of literature used by research workers in a given field. Such a study is often made by counting the reference cited by a large number of research workers in their papers (Farooqi, 2008).

2.11. 2 Evaluative Bibliometrics

Evaluative bibliometrics is the study of literature used by research workers in a given field. Evaluative bibliometrics, as introduced by Narin (1976), is the application of bibliometrics which focuses particularly on the evaluation of scientific activity, and more, in particular, on quality aspects of scientific performance. In general, evaluation in itself is focused on the control of quality, so that, more specifically, research evaluation is focusing on the safeguarding of scientific quality.

2.12 BIBLIOMETRIC LAWS:

The three fundamental laws which laid the formation of bibliometrics

a). Lotka's Inverse Square Law of Scientific Productivity (1926)

Alfred Lotka in 1926 proposed the 'Inverse-square law of scientific productivity' for measuring the scientific productivity of authors in a given discipline. The Lotka distribution is based on the number of authors writing 'n' papers is $\frac{1}{n^2}$ of the number of authors writing one paper. While studying the decennial index of chemical abstract 1907-1960 Lotka noticed that the number of authors against the number of contributions made by each author and he found that in each case the points were closely scattered about a straight line, having a slope of approximately two to one. Based on these data, Lotka deduced a general equation, for the relation between the frequency 'y' of persons making 'x' contributions as follows

$$x^n y = constant$$

"In the case examined it is found that the number of persons making 2 contributions is about one-fourth of those making one contribution, the number making 'n' contributions is about $\frac{1}{n^2}$ of those making one and the proportion of all contributions is about 60 percent" (Lotka,1926).

b). Bradford's Law of Scattering of Scientific Papers (1934)

Samuel Clement Bradford in 1934 formulated the law of scattering in the area of Applied Geophysics and Lubrication. This law explains the pattern of scattering of literature on a subject in various periodicals. The statistical regularity given by Bradford law provides an objective means of determining zones of relative richness.

c). ZIPF'S Law of Word Occurrence (1993)

Zipf (1993) developed and extended an empirical Law, as observed by Estoup, governing a relation between the rank of a word and the frequency of its appearance in a long text. If 'r' is the rank of a word and 'f' is its frequency, then mathematically Zipf's law can be stated as follows:

$$rf = c,$$

where 'c' is constant.

His law states that in a long textual matter if words are arranged in their decreasing order of frequency, then the rank of any given word of the text will be inversely proportional to the frequency of occurrence of the word.

2.13 SCIENTOMETRICS

Scientometric is the quantitative study on the science-based published research literature and communication. This could include identifying emerging areas of scientific research, examining the development of research over time, or geographic and organizational distributions of research (Glossary of Thompson, 2008). Scientometrics/ bibliometrics terms are the analysis of the structure of literature using various tools, counting, rank-frequency distributions, and vitiations analysis, although the structure of literature is basic to all disciplines. The studies of metrics family, specifically bibliometric and Scientometric have left no doubt of their utility in achieving magnificent results. Here we believe that bibliometrics studies are very helpful to library and information science research users, but there are many limitations in the applications of their laws. Scientometrics is the study of measuring and analyzing science, technology, and innovation. Major research issues include the measurement of impact, reference sets of articles to investigate the impact of journals and institutes, understanding of scientific citations, mapping scientific fields, and the production of indicators for use in policy and management contexts. In practice, there is a

significant overlap between scientometrics and other scientific fields such as bibliometrics, information science, and science of science policy (<http://enWikipedia.org/wiki/scientometrics>; accessed date 31st July 2020).

2.14 BIBLIOMETRICS INDICATORS

Quantitative bibliometrics is widely used to evaluate the performance of the scientist. There are three types of bibliometric indicators

- Quantity indicators measure the productivity of a particular researcher or research group.
- Performance indicators measure the quality of a journal, researcher, or research group.
- Structural indicators measure connections between publications, authors, or research fields. (Lundberg J).

In the past few years, quantitative indicators are most widely used by scientists and research managers worldwide for scientific output. Science indicators are classified into two categories of indicators, i) research inputs and ii) research outputs. Research input indicators include funds, researchers, technical support staff, equipment. Research output indicators include measures of esteem, migration, honorific awards, publication counts, and citation. (Parmeswaran, Ramakrishna & Rajendran, 1987).

2.15 BIBLIOMETRICS INDICATORS USED TO MEASURE THE RESEARCH PRODUCTIVITY

2.15.1 H-index for Scientists

The H-Index is developed by Jorge Hirsh in 2005, a physicist at the University of California., San Diego to quantify the scientific productivity of physicists and other scientist based on their publication record. Hirsch wanted to create a numerical indication of the contribution a researcher has made to the field. Hirsch has demonstrated that h has high predictive value for whether a scientist has won honors like national academy membership or the Nobel Prize.

According to Hirsch, the h index is defined as: “A scientist has index h if h of his or her N_p papers have at least h citations each and the other $(N_p - h)$ papers have $\leq h$ citations each.”

2.15.2 The g-Index

The g-index is calculated based on the distribution of citations received by a given researcher's publications, such that: given a set of articles ranked in decreasing order of the number of citations that they received, the g-index is the unique largest number such that the top g articles received together at least g^2 citations. The g-index is an index for quantifying the scientific productivity of physicists and other scientists based on their publication record. It was suggested in 2006 by Leo Egghe.

2.15.3 i-10-Index

The i10-index is the newest in the line of journal metrics and was introduced by Google Scholar in 2011. It is a simple and straightforward indexing measure found by tallying a journal's total number of published papers with at least 10 citations (Google Scholar Blog, [accessed Aug 24, 2020]).

2.15.4 Collaboration Index (CI)

The Collaborative Index (CI) (Lawani, 1980) is entered as the mean number of authors per joint papers. For this analysis, the researcher has omitted the single-authored publication which is equal to 1 always. To determine the number of authors per joint authored paper, the following formula has been used

$$\text{Collaboration Index} = \frac{\text{Total joint authors}}{\text{total joint papers}}$$

2.15.5 Degree of Collaboration (DC)

It explains the prevalence of the proportion of single-authored papers and multi-authored papers in research output. Author collaboration is the act whereby two or more people agree to execute a certain project, to be it intellectual or non-intellectual. The degree of collaboration (Subramanian, 1983) in discipline was defined as the ratio of the number of collaborative research papers to the total number of research papers published in the discipline during a certain period, which can be calculated for both publications and

citations. The degree of collaboration in respect of a discipline or an organization is the ratio of multi-authored papers published during a year and the total number of papers published during the year.

It is mathematically calculated as:

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

where,

Nm = is the number of multi-authored papers

Ns = is the number of single-authored papers.

In other words,

$$C = \frac{\text{Total number of collaborative Papers}}{\text{Total number of published papers}}$$

2.15.6 Author Productivity (AP)

The productivity of faculties which is normally referred to as research productivity is measured in terms of their research publication output which is published in different forms like papers, books, patents, etc. These measures of research productivity have been generally accepted and used since the beginning of the twentieth century. It examines the prevailing trend in carrying out the research process in science in terms of the extent to which the research performance is concentrated by single authors. (Yoshikane et al., 2009) in their article published in Scientometric Journal have given the formula to calculate average author per paper (AAPP) and productivity per author (PPA).

The formula is mathematically represented as below.

$$\text{Average Author Per Paper (AAPP)} = \frac{\text{No. of Authors}}{\text{No. of Papers}}$$

$$\text{Productivity Per Author (PPA)} = \frac{\text{No. of Papers}}{\text{No. of Authors}}$$

2.15.7 Collaborative Coefficient (CC)

The collaboration coefficient means the ratio of the number of collaborative papers to the total number of the paper published. To measure the extent and strength of collaborative coefficient is suggested by (Ajiferuke, 1998). The collaboration coefficient is a measure of the extent of collaboration based on assigning equal weightage to the authors in a multi-authored. It is measured on fractional productivity defined by Price & Beaver which is given by the formula. The collaboration coefficient (CC) counted by the formula which is suggested by Ajiferuke et.al. (1988) as:

$$CC = 1 - \frac{\sum_{j=1}^A (\frac{1}{j}) f_j}{N}$$

where

j =the number of authors in an article

f_j =the number of j authored articles

N =total number of authors per articles

A =total number of authors per articles

2.15.8 Relative Growth Rate (RGR)

The growth rate of whole papers published has been measured by the basis of the RGR and Dt model, given by Mahapatra (1985). The relative growth rate is increased in the number of publications or pages per unit of time. A specified period of the interval can be calculated from the following equations.

$$RGR = \frac{W_2 - W_1}{T_2 - T_1}$$

Where,

RGR=Growth rate over the specified period of interval

$W_1 = \log_e$ (natural log of the initial number of contributions)

$W_2 = \log_e$ (natural log of the final number of contributions)

$T_1 =$ the unit of initial time

$T_2 =$ the unit of the final time

$$\text{Doubling Time } (Dt) = \frac{0.693}{R}$$

where,

R=Growth rate

Doubling Time (Dt)

2.15.9 Doubling Time

From the calculation, it is found that there is a direct equivalence existing between the relative growth rates and doubling time. If the number of publications/ pages of a subject double during a given period, then the difference between the logarithm of the numbers at the beginning and the end of the period must be number 2. If one uses a natural logarithm, this difference has a value of 0.693. (Beaie and Acol, 2009).

2.16 FACTORS THAT AFFECT RESEARCH PRODUCTIVITY

Various factors affect research productivity performances. Those factors are related to university policies or maybe the personality of academic faculty such as government policies, university objectives, researcher's preferences and attitudes, research topic, and research type. Other factors that also affect research productivity are teaching load, financial research support, allocation of working time to research activities, length of tenure probation period etc.

2.16.1 Research and Skill Competencies

Leadership skills in an individual help in making a better decision and these skills are valuable but unfortunately, most often in the case of women their work is not valued and it affects their research work. Researchers' unique characteristics and research competency are closely interrelated with research productivity as they have more influence on individual productivity. (Nuqui and Cruz 2012,) research productivity is influenced by the skills and technical competencies of researchers. Experience and training in research help researchers in good research output. Utilization of knowledge, communication skills, networking, collaboration, and teamwork affect research productivity. (Wichian, et al., 2009) Self-motivation, essential

skills, and experience are the influential factors that encourage faculties to research effectively. (Lertputtarak,2008)

2.16.2 Tenure and Promotion Requirements

Faculty research productivity is significantly influenced by the extent of research promotion of institutions in terms of promotion of the research environment and in providing mentors assistance (Nuqui & Cruz, 2012) Moreover, completing research projects funded by government or various agencies is an important factor to receive high merit on annual evaluation in the institution opined by the faculties having more than ten years rated research experience (Nichols, 2004)

2.16.3 Availability of Resource and Productivity

Research productivity can be increased by two kinds of resources i.e financial and human resources such as research scholars, research assistants, research associates, project fellows, and other technicians. It is observed that scientists having more experience and equipped with more Ph.D. scholars, project fellows, are producing more research work compared to other scientists having less experience and small human and financial resources (Kyvik, 1991).

2.16.4 Organizational Support

The organizational environment can influence scientists with good work and an increase in their research productivity. There is a close relationship between commitment to organizations and attitudes and behaviors of employees to their work. The commitment of employees will be increased when their personal goals and values are identical to those of the organization. As a result, their work performance and effectiveness are enhanced. Researchers agree that committed employees not only remain in these organizations for a long time but also enhance the organization's effectiveness because they always give their best efforts to enhance work performance to meet the organizations' target (Meyer & Allen, 1997). However, higher institutions and universities can assist, guide, and provide training and motivate, to provide support and lectures that have ample compliance to do research and in turn, it will result in

better research outputs and significant outcomes can be produced if the university cans (Lertputtarak, 2008).

2.16.5 Size of the Institution

The size of a faculty member and students in an organization plays a crucial role in major research production. It is been reported that faculty in major research institutions publish more research than faculty in small colleges or small institutions (Bailey1992).

2.17 OTHER INDIVIDUAL FACTORS

There are many factors associated with individual research productivity such as educational background, attitudes, commitment, creativity, ability, and IQ, etc. In the study, it is reported that for nurturing research productivity, different approaches have been adopted such as recruitment and incentives, and focused on six unconventional approaches such as training, good health, positive environment, creativity, regular writing, and crowd wisdom. (Brian 2009)

2.17.1 Age

Age is one of the important factors included in research productivity and various finding has been observed between age and research productivity. Hedjazi and Behravan (2011) found that scientists are more productive in their early stages of career and it declines gradually. Diamond's (1986) life-cycle model of human capital investment states that when academics get older or have a tenured position, they might have other administrative duties that occupy their time. Such activities make them reduce their investment in, or commitment to, research activities. Goodwin and Sauer (1995) particularly indicated that scholars are more productive at the initial stage when they are holding a temporary position.

2.17.2 Professional experience

Professional experiences of researchers help them in their research output and it has an insignificant effect on their research productivity. Professional experience over the years helps academicians to produce quality research papers.

2.17.3 Salary

Several studies reported that salary or wages often reflects the research productivity level. Higher salary attracts faculty members or researchers to produce more research publications and it is served as an incentive for higher productivity in return of performance from faculty members.

2.17.4 Freedom

Freedom of doing research work increases the research performance of faculties and results in research productivity. If researchers have been given freedom in their research work then they can collaborate with all kinds of research activities such as attending seminars/conferences and collaborating with the international researcher to increase research productivity.

2.17.5 Academic Rank

Studies have found that there is a direct correlation between the rank of academics and their research productivity. Kim (2014) note that in Korea many junior researchers publish their papers in an international journal to be productive and for permanent tenure, while their senior researcher published in domestic journals. However, Tien and Blackburn (1996) also indicated that after obtaining tenure, academics, especially those of high ranks, such as professor, continued to be highly productive in research. Mostly, professors always have higher research productivity than associate professors and assistant professors do (Smeby & Try 2005).

2.17.6 Institutional Support

Institutional support is seen as an important factor in research productivity. A good library with an adequate number of journals and books, internet connectivity, a good number of human resources, etc. Kelly and Wakm (1986) stated that 'Institutional and departmental support for research is seen as an important factor in research productivity.

2.17.7 Faculty Size

Faculty size in the organization or institution is the deciding factor for high research productivity. It has been found that a small number of faculties in colleges cannot compete in

the area of research productivity with large universities or institutions. The large faculty size helps in collaboration and producing more number of research publications.

2.17.8 Promotion

Promotion is one of the motivating factors in research productivity. Fox (1985) suggests that promotion or rewards structures in higher education can influence or motivate faculties, researchers, and project fellows to do more research publications.

2.17.9 Stress

Stress is one of the common factors among academician research scholars as well as in all areas of life. (Gmelch et.al., 1986) reported that there are five areas of stress among faculty, members: (i) reward and recognition (ii) Time constraints (iii) Departmental influence (iv) professional identity (v) student interaction are the major stress closely related to research activity which affects both research and teaching.

2.17.10 Motivational Factor

Chen et al. (2006) investigated the impact of various motivational factors on the research productivity of academics in every discipline. Based on the expectancy theory, which is a part of the motivation theory, the researchers considered research motivations as the types of rewards. It was predicted that academics' motivation to conduct research would be greatest when they believed their research performance would lead to some rewards. There are two categories of motivational; factors that drive academic research (i) Intrinsic factor: For example individual, personal satisfaction, peer recognition (ii) extrinsic factor: Salary, tenure, and promotion.

2.18 FACTOR THAT INFLUENCE RESEARCH PRODUCTIVITY

Blackburn and Lawrence (1995) arranged five factors that influence research productivity. Those factors are grouped into an environmental factor, institutional factor, social factor, demographic factor, personal development career factors.

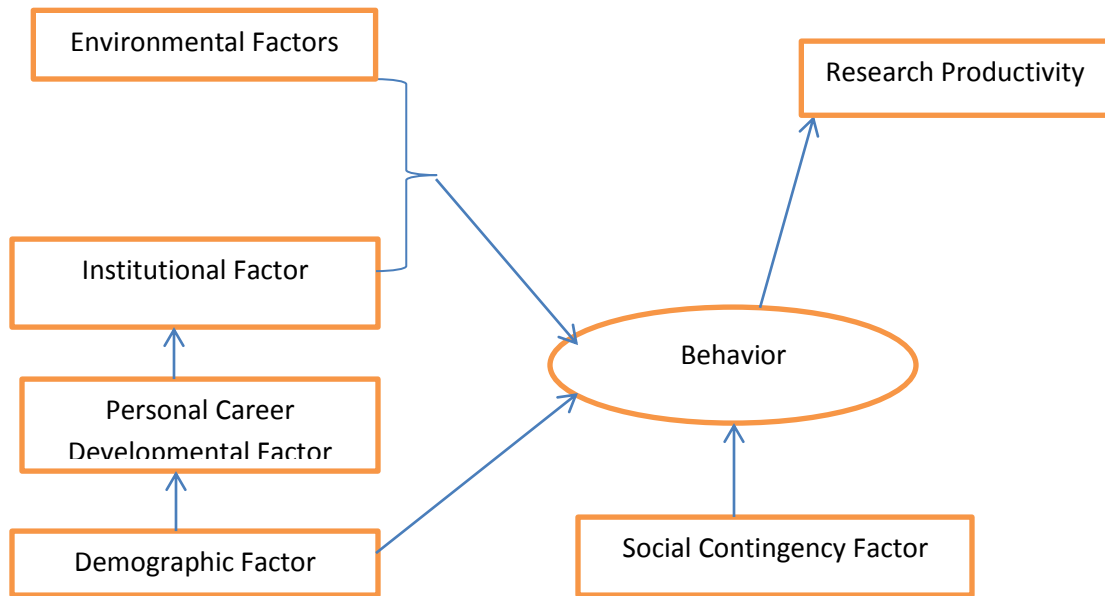


Figure 2.1: Factors influencing research productivity by Blackburn and Lawrence (1995)

2.18.1 Demographic Factor

A demographic factor includes personal characteristics of academicians such as age, gender marital status years of experience, academic status, etc. These factors affect women in their research work and publication which interfere with their academic career and their ability to carry out research. Due to this, they are underrepresented compare to men in academic institutions.

2.18.2 Social Factors

Social factors have a direct effect on researchers or academic staff because it includes the faculty member's health, gender, education, and socio-cultural beliefs about women's roles and abilities which have been found in many studies. According to Smith et al. (2007), the existence of negative stereotypes can lead to changes in women's perceptions about their ability and competence in science and can further lead to poorer performance, even when women are highly capable of succeeding in these areas.

2.18.3 Environmental Factors:

Environmental factors are those factors that relate to the work environment and cultural climate within which academic lecturers have to deal every day. The cultural climate at the workplace can be a positive influence on their research productivity, such as the relationship between academic lecturers and their supervisors, commitment to research, academic honesty, academic freedom, academic integrity, leadership, and faculty collaboration towards a community of scholars. Academic environment and positive cultural climates generally provide both socializing and reinforcing organizational messages about values, norms, and expectations concerning research (Kuh and Whitt, 1998)

2.18.4 Institutional Factors

Institutional factors are those practices, policies, and conditions that have a role in the success or failure of both female and male academics career advancement within a university setting (National Academy of Science,2007; Robinson, 2012). According to various studies access to institutional resources and facilities is another institutional factor that affects the academic performance of both men and women(Strebler, Thompson and Heron,1997; Keith et al, 2002, National Academic of Sciences, 2010) Nonetheless as female have less access to networks and senior mentors, they have less chance of progressing in the same way as men (Bagilhole and Goode, 2001) this effects women professionally and left socially isolated which makes them difficult to stay informed about the relevant information within the institution. Many studies indicated that women publish the same as men when they are provided similar resources and characteristics such as type of institution, access to funding and resources, tenure, working load, institution policy, etc.

2.18.5 Personal Development of Career Factors

Personal development career factors were derived from grouping self-knowledge and career in Blackburn and Lawrence's (1995)^s model. Personal career development factors come from the academic and personal qualifications of academic lecturers themselves such as academic individuals' ability and interest, commitment towards research, attitude towards the institution, research experience, skills and training, advanced qualification and, rank, and tenure status.

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CHAPTER: 3

GENDER PERSPECTIVE IN LIS

RESEARCH

3.1. INTRODUCTION:

"Empowering women is a pre-requisite for creating a good nation; women are empowered by education; empowerment of women is essential as their thoughts and their value systems lead to the development of the good family, good society, and ultimately a good nation. Therefore there is a need for the compulsory elementary education of girls for the future generation".

Former President A.P.J Abdul Kalam

“You can tell the condition of a nation by looking at the status of its women”

Jawaharlal Nehru on women

One of the main objectives of education is to create a substantial population of such educated manpower (men and women) who could recognize the world well adequately and capable to bring about a change leading to adequate health and education services, a better environment, and the abolition of unfamiliarity and deficiency (limitations), which continue to stragulate the developing societies. (Rao, 2004). According to UNESCO, "higher education is no longer a luxury; it is essential to national, social and economic development". The quest to achieve Education for All (EFA) is fundamentally about assuring that children, youth, and adults gain the knowledge and skills they need to better their lives and to play a role in building more peaceful and equitable societies. This is why focusing on quality is imperative for achieving EFA.

For the sustainable development of the nation, a higher education system is essential and it includes national, social, and economic development of the country. Thus, a well-established and there is a need for a value-based higher education system that empowers youth for self-sustainability by inculcating employment skills and hence reducing poverty. India's higher education system is the third-largest in the world and since the independence of the country, day by day it is growing.

**Growth of Higher Education : Universities / Colleges/ Students Enrolment / Teaching Staff :
1950-51 - 2016-17**

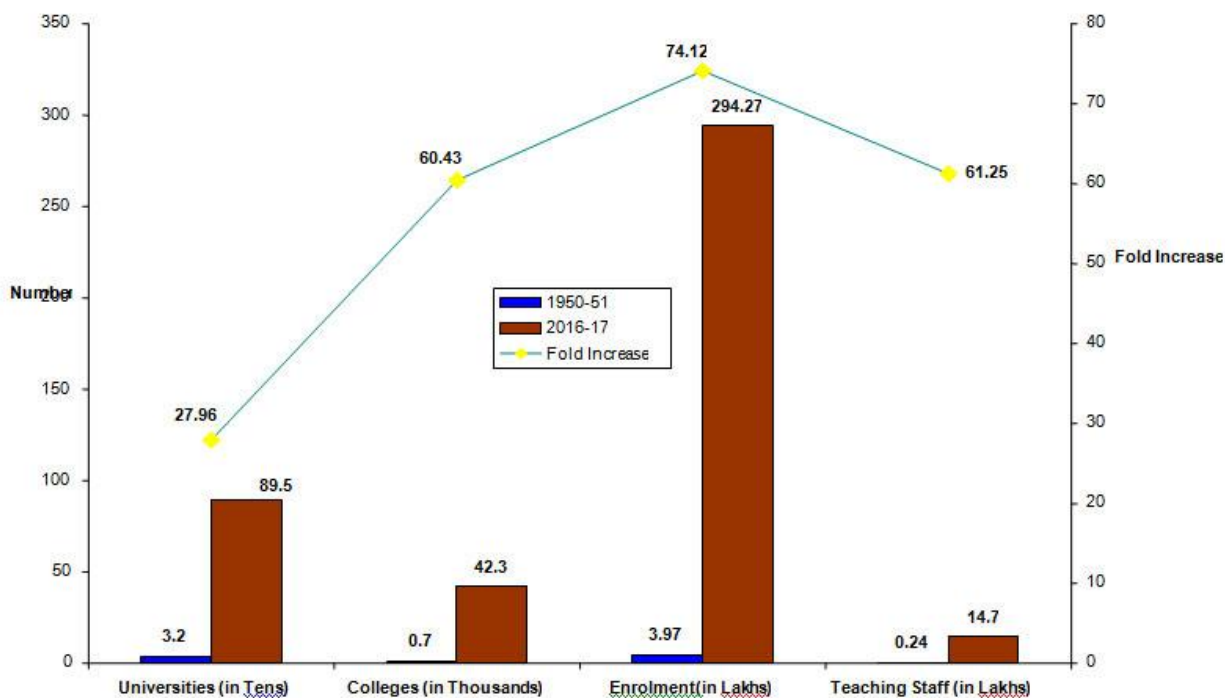


Figure-3.1: Growth in Higher Education system

(Source: <https://www.ugc.ac.in/stats.aspx>)

The figure-3.1 clearly shows that the members of higher education institutes grew from 700 in 1951-52 to 42300 and enrolment 3.97 Lakhs to 294.27 Lakhs in 2016-17. With the increase in the number of institutions and enrolment in higher education, the number of the teaching staff also increased from 0.24 lakh to 14.7 lakhs in the same time duration i.e. 1951-52 to 2016-17. (Source: Government of India, 2007). As it is already mentioned above the Indian higher education system is the third-largest in the world after the USA and China and it is centrally governed by University Grants Commission (UGC). In 2020, India has over 1000 universities (with 50 central universities, 402 state universities, 125 deemed universities, 334 private universities, 7 Institute under State Legislature Act, and 155 Institutes of National Importance which include IIMs, AIIMS, IITs, IIITs, IISERs, and NITs among others) and 52,627 colleges (as government degree colleges, private colleges, standalone institutes, and post-graduate research institutions, functioning under these universities as reported by the MHRD in 2020 (Source: [https:// en. Wikipedia.org/wiki/Higher education in India](https://en.wikipedia.org/wiki/Higher_education_in_India)).

Nowadays, gender issue has become one of the most sensitive issues in the world. We hear a lot about gender equality and liberty, and this is not limited to one profession but seen across every sphere of life (Atinmo and Jimba, 2002). Gender inequality is not localized to a particular profession or part of the world but is prevalent in all societies of the world across the professions including the academic world (Baro et al., 2009). The males are dominant in academics or institutions over the years in the top positions compare to women but in the present scenario, the situation is changing as women share top positions in the academic hierarchy and the situation are changing very fast in the last few decades. Women's contribution to academics is one of the social development indicators throughout the world. For a long period, the gender gap is one of the most important factors in the quantity and quality of scholarly activity because gender is also an obstacle, particularly for females in academic work as this area are also dominated by men for a long time as it resulted from the low contributions from females compared to males in overall academic output across the world. (Barnett et al., 1998; Carret al., 1998; Van Arensbergen et al., 2012).

3.2 WOMEN STATUS IN INDIA

To understand the status of women in India we have to see it from different aspects like socio-culture context and political context etc. together. The World Bank describes the picture of Women's Status in India as under: "Women are a vital part of the Indian economy, constituting, one-third of the national labor force and a major contributor to the survival of the family." The socio-cultural scenario in society shows the picture of women where she got a prominent role and sometimes gets neglected and restricted freedom in society". The prosperity of the nation has a direct relation to the status of women in society. In the history of Indian civilization, women dominated the men in social scenes for a long time, they were the head of the families, and men were busy with the hunting. In India from the ancient period in holy literature such as Rig-Veda reveals that women are equally important as men, they have equal rights to access and gain the highest knowledge of the absolute Brahma. Women were admitted to full religious rights and were also having complete educational opportunities for the development of their personality (Tripathi, Prabha Chandra, 2000). Women in ancient India were more dignified and were given equal rights and importance in society. Women were given more freedom regarding their decisions and also for choosing

their life mates. The ancient system of "Swayamvara" which is mentioned in holy scripts and many epics are the evidence of this and child marriage customs in the present time were not found in the ancient period. Later in the Vedic period, they started to lose their importance as well as position and status in society.

However several women enjoyed educational rights and acquired fame for learning, but the social status, in general, was not the same as that was in the Rig Vedic period. But in the later period during the invasion of Muslims in India and their influence in society the position of women started degrading. (As mentioned in the historical books) Due to Islamic influence, women were forced to live within four walls of their houses and cover up the face with a long veil. Society slowly restricted the freedom of women and was not allowed to voice their opinion in family decisions as well in political, social, and economic matters of the society. But after independence, there was a tremendous change in society and it is seen that women in India have made considerable progress on social, economic, and political aspects and yet they have to struggle many odds and evil in the male-dominated society.

As per Census 2011, India's population is 121.06 Cr with 48.5% female population. There are 949 female to 1000 males in rural India against 929 females to 1000 males in urban India. India's population accounted for 17.5% of the total world population and it occupied second place. The Gender Gap in literacy rate has declined from 21.6 in 2001 to 16.3 in 2011. The gender gap in literacy rate has declined by 24.7% in 2011 in respect of 2001. The sex ratio was 930 in 1971 and it has increased to 940 according to 2011. Women account for roughly half the world's population, perform two-thirds of the hours worked, receive one-tenth of the world's income, and have less than one-hundredth of the world's property registered in their names. Female deprivation is particularly acute in developing countries with high levels of poverty, though in affluent nations women also suffer low status due to conservative attitudes. (Borup E, Women's Role in Economic Development Allen and Unwin, Publication London, 1970, pp 74.)

3.3 WOMEN DURING THE PRE-INDEPENDENCE PERIOD

Due to the menace of socio-cultural activities in society and the negligence of women in society, the male has completely dominated the orthodox Hindu society. In the nineteenth century during British Raj, the spread of western education and philosophy made the men concerned about the status of women and led the movement by many reformers, like Raja Ram Mohan Roy movement against women injustice and inequality underwent a change. He was strictly against the societal evil practices and Sati Dahi that prevails at his time and abolishes such practices. Due to his efforts, Lord William Bentinck banned the custom of sati in 1829. Reformers like Mahatma Jyotirao Govindrao Phule opened the first girl school in India and also opened a school for a girl who belongs to the lower caste in 1848. There are many more such reformers like Ishwar Chandra Vidyasagar who fought for the spread of education for the upliftment of women in India. The situation changed in the first half of the twentieth century under the wise leadership of Mahatma Gandhi. He was the one who liberated women largely from purdah custom and other social evils. He was strongly against child marriage and in favor of widow remarriage. In Gandhi's movement of free India Women defended their equality with men and able to come out of the four walls of their homes to fight the battle of freedom shoulder to shoulder with their brothers. According to him women should be released from the slavery of the kitchen and given the right for doing other duties. They should come forward and share responsibilities in building up the nation. It was due to his efforts for female participation in the struggle for independence became visible. They came out of their homes to organized meetings and processions, to spread the message of Swadeshi, to sell khadi, to give away their jewelry and ornaments, to picket near the shops of foreign cloth. He spread the message of equality of gender to the masses and criticized the desire of Indian people to have a male child instead of a female (Patel, Sujata, 1988). Figure-3.2 shows some important freedom fighters who actively participated in the freedom fight.



Figure-3.2: Women Freedom Fighters

(Source: <https://spectrumchart.blogspot.com/2017/03/chart-683-indian-women-freedom-fighters.html>)

3.4 WOMEN DURING THE POST-INDEPENDENCE PERIOD

Women's status after independence has changed remarkably after enacting laws, rules, policies, and measures by the government of India. These laws help the women for safeguarding their interest and upliftment and betterment of their status in the country. Due to these constitutional laws and policies, women in India are having equal rights in respect of caste, gender, and religion, etc. After India got independence the position of women has been changed drastically in various disciplines such as politicians, lawyers, doctors, administrators, and teachers and competes with men in various spheres of life. Women's participation in Indian politics and social service is very also remarkable. We cannot forget the name of Indira Gandhi who shines so brilliantly in India's politics. She is the second longest-serving prime minister of India and ruled the country with her excellence and also known for her political intransigency and centralization of power and India got victory over the Pakistan war in 1971 which result in the creation of a new country Bangladesh (Figure-3.3).



Figure-3.3: Prime Minister Indira Gandhi with Bangladesh Prime Minister Sheikh Mujibur Rahman
(Source:<https://www.thehindu.com/news/national/delhi-dhaka-to-boost-maritime-ties/article29483369.ece>.)



Figure-3.4: Mother Teresa-A saint with a Private Struggle

(Source:<https://edition.cnn.com/2016/09/01/opinions/mother-teresa-deserves-sainthood-parini/index.html>)

When it comes to the social service field, Indian women have done excellent jobs. A well-known name Mother Teresa cannot be forgotten (Figure-4). She got the noble prize in the year 1979 for her selfless service to the poor, deprived people of our country, and also to the needy and handicapped people of the world in general. Women in India have become successful in improving their status. Social reformers and political and legal environment enable them to prove themselves as an equal partner in promoting the social economic and political development of the society. After the independence government of India has passed many laws and various steps have been taken to improve women's status. A National Commission on Women in 1992 was set up for matters concerning women and various other

programs were also established in areas of education, health, employment for the development of women in rural as well as in the urban area (Figure-3.5).



Figure-3.5: Mrs. Rekha Sharma, Chairman, National Commission for Women with PM

(Source:<http://ncw.nic.in/the-commission/>)

The Indian Constitution has given ‘Right to Vote’ and equal status and rights with men after independence. All professions are open to both men and women and there will be no discrimination between genders it will be selected only through a merit basis. Presently women in India enjoy more liberty and equality, they have the right to cast vote, a contest in parliament, Legislative assembly, Gram Panchayat, and also take part in the current affairs of the country. The current participation of women in 17th Lok Sabha is only 17% (78) as shown in figure-6, but it is highest since independence and only 10% in Rajya Sabha. Even though this is very little in terms of the total percentage, it is still better than all the previous years. If we compare the representation of women from the first Lok Sabha elections in 1952 to the current in 2019 we see a clear rise.



Figure-3.6: Women MPs elected in 17th Lok Sabha Election, 2019

(Source: <https://feminisminindia.com/2019/05/28/women-mps-lok-sabha-2019/>)

Even though the proportion of women MPs minimal when compared with men, the trends do show an upward rise in the number of women contesting and winning each year as clearly shown in figure-3.7.

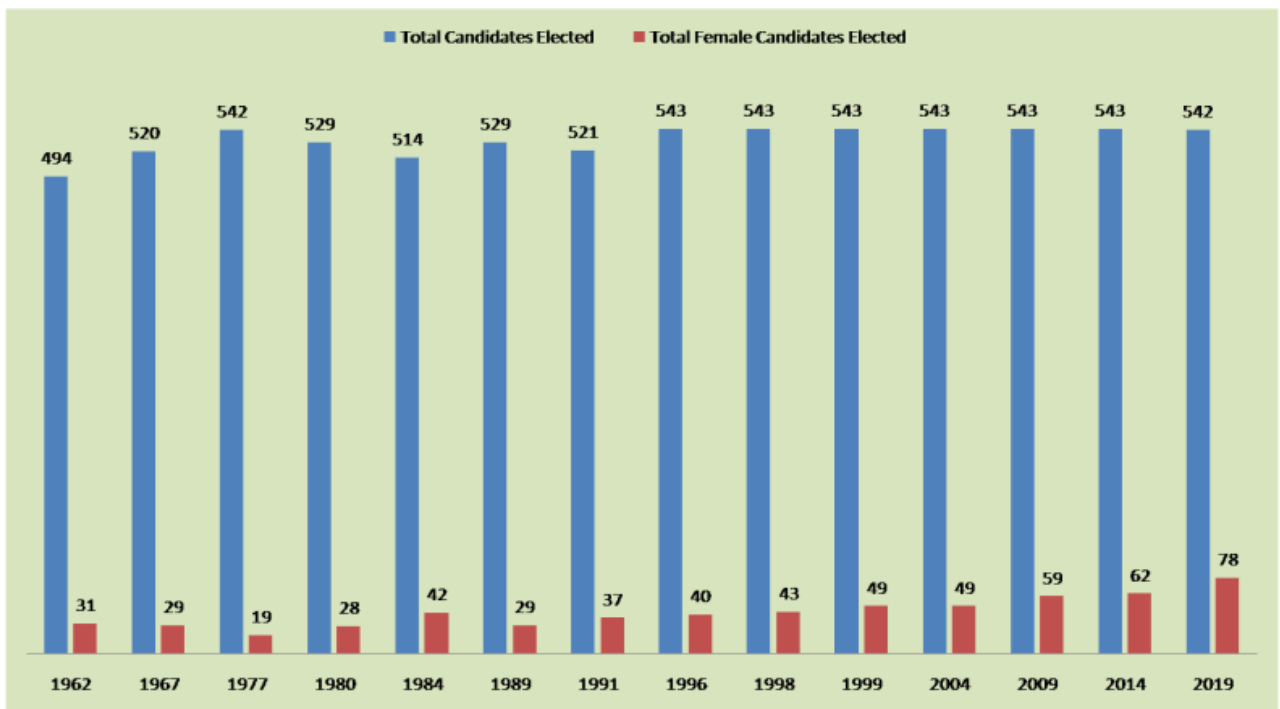


Figure-3.7: Women participation in Parliament of India since 1962

(Source: <https://feminisminindia.com/2019/05/28/women-mps-lok-sabha-2019/>)

Since the post-independence participation of women in higher education has increased considerably and can be considered as an important indicator of social and economic progress in India. Hence, it is important to motivate and encourage them in participating in the decision-making process, accessing the educational opportunities, getting engaged in employment, and sustaining their livelihoods in an enhanced manner. The National Policy on the Empowerment of Women in India, 2001, is regarded as one of the important strategies in the development process and led to changes within the socio-economic environment. Women's status is transformed in various ways and they are getting an important place in social, political, cultural, economic, and religious fields.

Table-3.1: Status of Indian Women in Gender Equality

MasterCard Worldwide Index of Women's Advancement						
Market	Overall Score 2012	Five Indicator Scores				
		Tertiary Education	Business Owners	Business & Govt. Leaders	Workforce Participation	Regular Employment Opportunities
Australia	83.3	134.5	56.6	73.1	81.6	405.5
New Zealand	83.1	137.7	46.8	77.1	83.2	111.1
Philippines	77.8	125.8	47.1	192.3	62.8	98.1
Singapore	77.4	98.1	46.0	65.5	74.0	113.6
Vietnam	75.0	107.2	37.5	32.7	90.1	71.6
Thailand	74.6	133.2	38.5	36.0	79.9	95.2
China	73.7	118.4	42.6	24.0	84.3	82.8
Hong Kong	73.7	104.2	29.0	48.4	75.1	110.1
Taiwan	73.5	107.0	30.4	34.3	78.8	109.0
Malaysia	68.3	135.9	32.5	58.7	57.1	111.2
Indonesia	67.9	103.3	35.9	45.9	61.0	94.4
Japan	64.8	89.6	29.4	15.0	69.0	105.3
Korea	63.5	73.1	42.2	17.3	68.9	102.8
India	48.4	69.5	32.5	65.8	35.9	52.9

Women are getting enrolled in higher education and institutions. They are pursuing various bachelor's degrees, masters' degrees, and diploma degrees, and acquiring employment

opportunities and getting employed in institutions and other government organizations. Presently women are working as doctors, administrators, managers, politicians, educators, lawyers, entrepreneurs, engineers, researchers, scientists, and so on. The place of women in society is changing and notable because of the change in values and customs.

In the nineties, Women education is one of the key development objectives in the economic development of a country and it is important to examine under which policies, programs, and projects the empowerment program has been undertaken for women in education and research areas. Even then, there are drastic changes in the status of women in the last century in the country, even then there is a lot of inequality is there till today in comparison to other countries. As per the MasterCard Worldwide Index of Women's Advancement survey report, conducted in 2012 among 14 Asia-Pacific countries to analyze the women status based on 5 parameters i.e. tertiary education, business Owner, Business and Government Leaders, workforce participation and regular employment opportunity and overall India performance is not quite satisfactory and a majority of the parameters it stands on the bottom line only. (Source:https://trak.in/tags/business/2012/03/03/indian-women-gender-equality-infographic/#Growth_Trend)

3.5 WOMEN PARTICIPATION IN HIGHER EDUCATION

Educational fulfillment is the most important step towards improving the quality of life, knowledge, awareness level, and also the level of skill of people in society. Better literacy and educational level have a positive impact on overall development and productivity. Literacy and level of education are basic indicators of the level of development achieved by a society. Female in higher education and literacy, leads to greater awareness as well as also contribute to the improvement of socio-economic conditions and for society at large. It will help in social upliftment and every aspect of development may be it population control, health, hygiene, employment of weaker sections of the society, etc. (Figure-3.8).

The term education consists of various stages from school to elementary education and higher education. By acquiring higher education the individual becomes efficient enough to fight against social evils, economic, moral, cultural issues. In India “right to education” act gives free and compulsory education as a fundamental right to every child age between 6 and 14 under the Indian constitution but for higher education, still many challenges had to

overcome. The major challenge has gendered a disparity about individuals willing to attain higher education. Even during the 21st century, the patriarchal society in India restrains women from making up for higher education. The gender gap is still prevalent in higher education which is evident from the higher enrollment ratio for men and women.



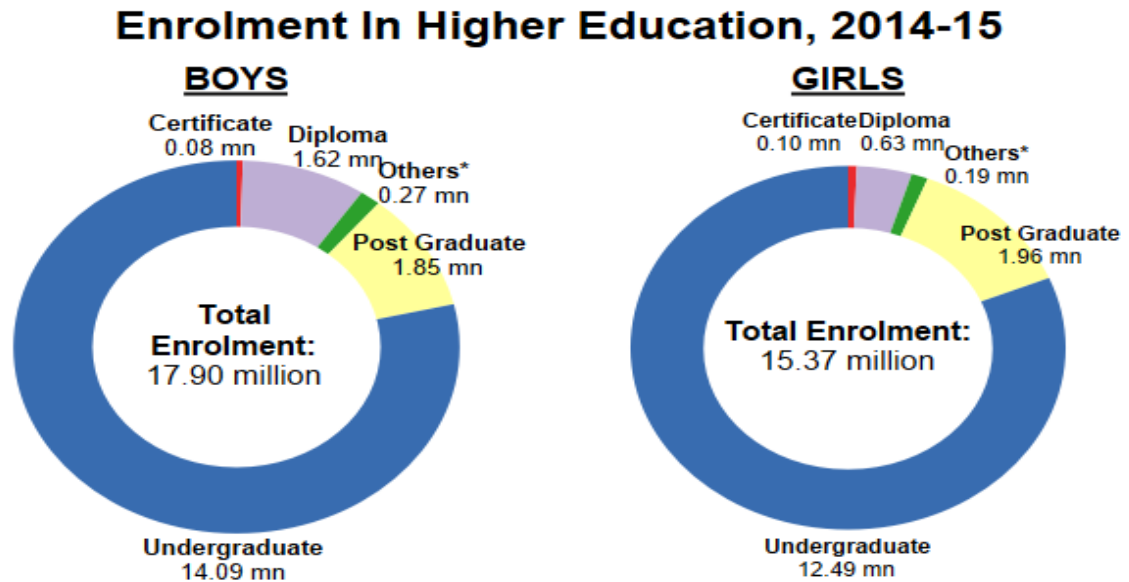
Figure-3.8: Forwarded Steps of Women toward Higher Education

(Source:<https://scroll.in/article/812591/more-indian-women-are-going-to-college-but-fewer-are-working>)

According to all India survey on higher education, 2015 (released by MHRD in December 2015; All India Survey on Higher Education) and shown in figure-9, There are total 33.3 million enrolments in higher education in India in 2014-15, out of which 17.9 million were male and 15.4 million female which clearly showing the unbalance gender equality in higher education. It is further mentioned that the total women enrolment in 2014-15 is 46%, with an improvement of 1.7% in the year 2012-13 (44.3%). There is also an increase in the number of female-only universities that have increased from 11 to 16 from 2013-2014 to 2018-2019 and 10.82% of colleges are exclusively for girls.

The subjects opted for higher studies are also gender-specific and stereotyped. Gender inequality is measured on several factors like health, education, economic, and political inequalities between men and women in India. But in international ranking inequality in India ranked differently based on given factors and these indicators are controversial. Gender inequality in India affected women and when India's population is examined as whole women are disadvantaged in many ways like India's sex ratio, women's health over their lifetime, their educational acquirement, and economic status. It is an important issue for policymakers to understand the female contribution in higher education at the national or

institutional level. For this, the government needs to promote and monitor women's contribution in different fields. However, the status of women in science and their contributions to science has received considerable attention recently.



NOTE: Others include Integrated, P.G. Diploma, M.Phil and Ph.D.*

Figure-3.9: Enrollment in Higher Education During 2014-15

(Source:<https://scroll.in/article/812591/more-indian-women-are-going-to-college-but-fewer-are-working>)

Prime Minister of India, Narendra Modi, and associated with the theme for International Women's Day, March 8, 2020 — "I am Generation Equality: Realizing Women's Rights, it is imperative to take forward the momentum of empowerment of girls and women through education in all institutes. In particular, it is time to focus on the inclusion of female participation in higher education institutes and address a set of fundamental questions".

The women's participation in higher education can be analysed in two parts: women enrolments in higher education and Women participation in teaching in higher education institutions. Certainly, our country completed a long distance in both the areas in women's participation in it was evaluated since the independence of the country but still, it is no satisfactory level and required a lot of effort more to make gender balance ratio.

Women's enrolment in higher education is increasing continuously since independence till today. At the time of independence, the total enrolment of women was less than 10% of the total enrolment has risen to 48.6% in 2018-19. The total enrolment in higher education has grown considerably to 37.4 million, with 19.2 million male and 18.2 million female in 2018-19 and females per 100 male students have also increased significantly in central universities, deemed universities, and government-aided institutions (Source: Hindustan Times Article: Enhancing gender equality in India's higher education published on 6 March 2020. Available on <https://www.hindustantimes.com/analysis/enhancing-gender-equality-in-India-s-higher-education-opinion/story-CuQKoLDc4ujMG PScy4ejJI.html>).

3.6 WOMEN' ENROLLMENT IN HIGHER EDUCATION

The journey of higher education growth has started in the country since independence and continued until today. In 1950-51 there is only 30 degrees awarding universities/institutes and 695 colleges in the country and it reached 895 degrees awarding universities/ institutes and 42338 colleges in 2016-17 as shown in figure- 10A. In the same way, the student's enrolments also drastically increased in the same time frame (i.e. 1950-51 to 2016-17) from 397000 to 29427000 students (Figure-10B). This is a long-distance journey covered by the Indian higher education system in the last 70 years with all the challenges arises from time to time.

To measure the women's participation in higher education, the enrollment rate in higher education may be one parameter that analyses the participation of women in higher education in the form of students. If it analyzed women's participation from the beginning time of independence, it is very clear that there is a huge gape in men and women ratio in higher education enrolments. In 1951-52, the total enrolments in higher education were 397000 out of which only 43000 are women which are nearly 11% only of total enrolment.

More or less the same conditions continued till 1980-81 but there was a slight increase in the latter decade i.e. 1980-81 to 1990-91 in the ratio of enrollments. 1990-91 to 2000-01 may be recognized as changing decade in women enrolments in higher education and from then year by year it was increased and in 2016-17, out of a total 29427000 enrolment, 14156000 women enrolments which were very near to gender equality but another side of the mirror is that it will take about 68 years to reach this level.

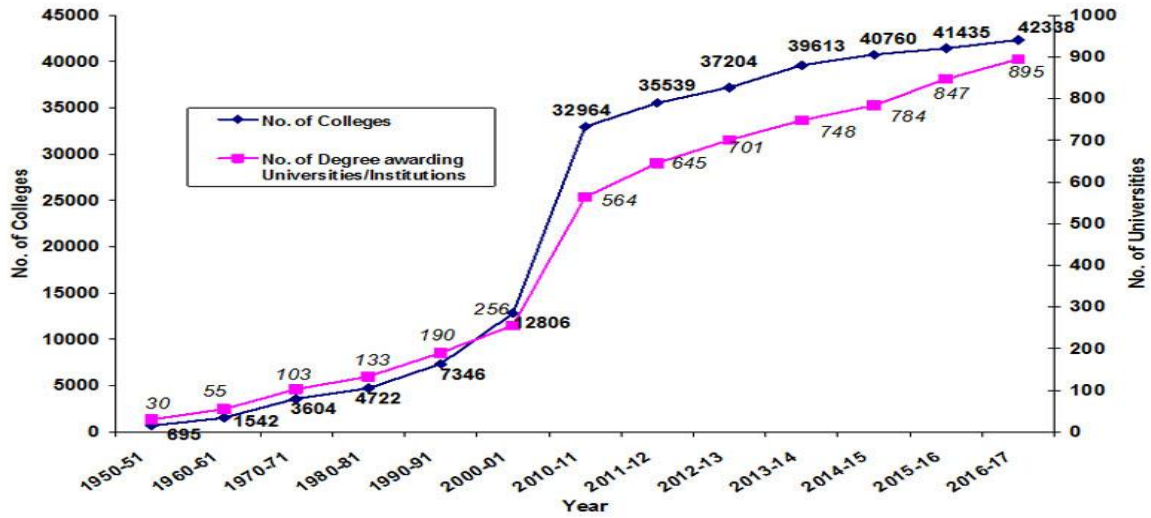


Figure-3.10A: Growth of Higher Education Institution in India during 1950- 2017

(Source: <https://www.ugc.ac.in/stats.aspx>)

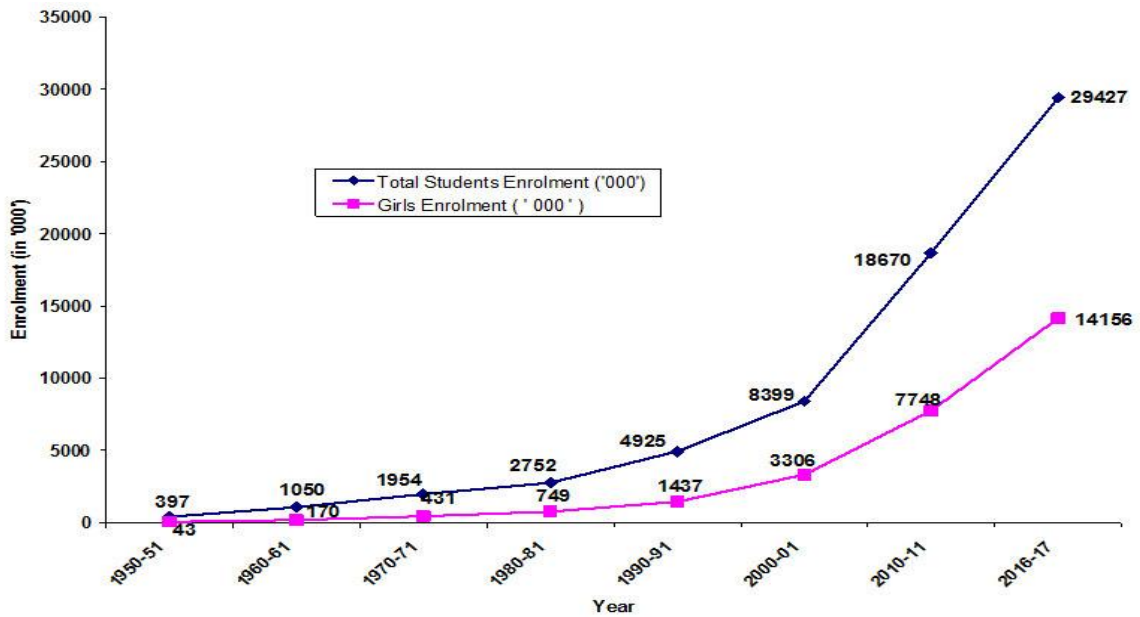


Figure-3.10B: Women Enrolment in Higher Education Institution in India during 1950-2017

(Source: <https://www.ugc.ac.in/stats.aspx>)

India travels a lot from the bottom to equality concerning gender equality in higher education. Table- 3.2 shows the women enrolment ratio /100 men from 1950-51 to 2018-19

Table: 3.2 – Number of Female Enrolled in Higher Education in India

Year	Women Enrolment rate (per 100 Males)
1950-51	13
1960-61	21
1970-71	28
1980-81	36
1990-91	46
2000-01	58
2005-06	62
2006-07	62
2007-08	63
2008-09	65
2009-10	67
2010-11	78
2011-12	80
2012-13	81
2013-14	85
2014-15	85
2015-16	92
2016-17	94
2017-18	97
2018-19	100

(Source: Source: Compiled from Educational Statistics at a Glance, Ministry of HRD 2015-16)

and found that to come actual equality in gender enrolment took exactly 69 years after independence and to achieve this level, many efforts have been taken by the government time to time.

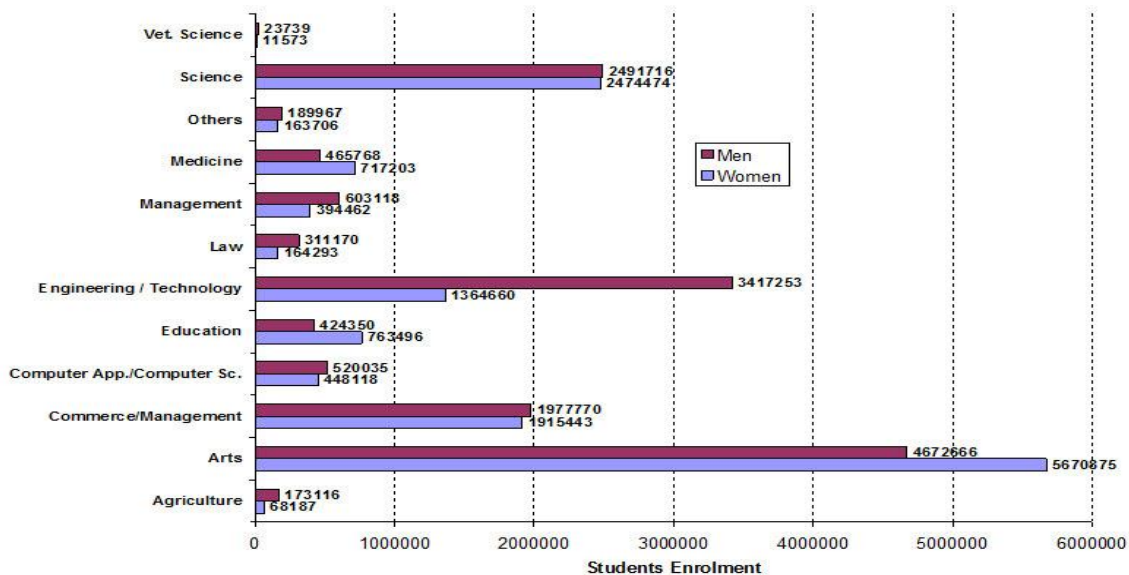


Figure-3.11: Faculties Wise: Gender-Wise Enrolment in Higher Education during 2016-17

(Source: <https://www.ugc.ac.in/stats.aspx>)

The figure-11 showing about discipline wise enrolment of male and female students during the year 2016-17 and analysis very clearly shows that maybe the last few decades there is significant growth in women enrolment and it reached nearly equal but this growth was not equal in all disciplines.

Certainly, in some discipline, the growth was very fast and satisfactory but in some disciplines (like veterinary science, engineering & technology, law, and agriculture) still we are far away from gender equality but another significant achievement is that in some disciplines (like Medicine, Education, Arts) have more participation of women than men while in rest of disciplines, even the women participation is not equal but nearly to equal and satisfactory and believed that it will reach up to equal in near future.

Further, as per the AISHE 2018-19 data, the total enrolment in higher education has been estimated to be 37.4 million with 19.2 million males and 18.2 million females. Females constitute 48.6% of the total enrolment but their contribution to labor is just 27 percent. Women form only 24 percent of entry-level professionals, out of which about 19% reach senior-level management roles and, yet, paid 20 percent fewer salaries than men. 40,813 students were awarded a Ph.D. level degree during 2018 with 23,765 males and 17,048 females. The female literacy rate for 2011 increased sharply from 53.7 in 2001 to 64.6 in

2011. On the other hand, the male literacy rate increased sharply from 75.3 in 2001 to 80.9% in 2011 and a decrease in the male-female literacy gap from 26.6 percent in 1981 to 16.7 percent in 2011. Distance enrolment constitutes about 10.62% of the total enrolment in higher education, of which 44.15% are female students.

Gross Enrolment Ratio in Higher Education (18-23Years): The Gross Enrolment Ratio (GER) for a class-group is the ratio of the number of persons in the class-group to the number of persons in the corresponding official age-group. Gross Enrolment Ratio (GER) in Higher education in India is shown in table-3.3 and found that it is 26.3%, which is calculated for 18-23 years of age group. GER for the male population is 26.3% and for females, it is 26.4%. Gross Enrolment Ratio (GER) which is calculated for 18-23 Years of age group has increased from 11.6% in 2005-2006 to 26.30% in 2018-2019.

Table: 3.3– The Gross Enrolment Ratio for Men and Women from 2004-05 to 2018-19

Gross Enrollment Ratio (GER)			
Year	Men	Women	Total Increase in GER (%)
2005-06	13.5	9.4	11.6
2006-07	14.5	10.0	12.4
2007-08	15.2	10.7	13.1
2008-09	15.8	11.4	13.7
2009-10	17.1	12.7	15.0
2010-11	20.8	17.9	19.4
2011-12	22.1	19.4	20.8
2012-13	22.7	20.1	21.5
2013-14	23.9	22.0	23.0
2014-15	25.3	23.2	24.3
2015-16	25.4	23.5	24.50
2016-17	26.0	24.5	25.20
2017-18	26.3	25.4	25.80
2018-19	26.3	26.4	26.30

(Source: Compiled from Educational Statistics at a Glance, Ministry of HRD 2018-19)

The above table shows that the Gross Enrolment of women in higher education is increasing continuously over the years from 9.4% in 2005-2006 to 24.8% in 2018-2019. The above table clearly says women's enrollment is always remained less or not even at par with men across all years as compared to men from the past 14 years. (Source: AISHE 2018-2019). In India, special efforts are being made by the Government to ensure that every member of the nation has easy access to education. Especially the Twelfth Five Year Plan (2012-17) is considered to be a big push in terms of 'Education' where the targeted efforts would also lead towards increased enrolments. The continuous increase in the Gross Enrolment Ratio of women in India is inspiring and it is a signal that women and society are realizing the importance of higher education more efforts are to be made to decrease the gender disparity.

Table: 3.4– Women Enrolment: Faculty-Wise: 2018-2019

S. No.	Faculty	Women Enrolment	Percentage to Total Enrolment
1	Arts/Oriental Learning	5539097	41.13
2	Science	2685403	19.94
3	Commerce Management	2141673	15.91
4	Education	680953	5.06
5	Engineering Technology	1360021	10.10
6	Medicine	676162	5.02
7	Agriculture	65640	0.49
8	Veterinary Science	9879	0.07
9	Law	159216	1.18
10	Others	147707	1.10
	Total	13465751	100.00

(Source: University Grants Commission Annual Report 2018-19, New Delhi)

Higher education involves different disciplines or faculties, individuals can opt for any subjects as per their interest and capability. Table- 3.4 shows the faculty-wise enrolment of women in the year 2018-19 into different subject fields. It also reveals that the majority of women are opting for arts and humanities for higher education which is highest followed by

commerce and management and science. But their enrolment in professional and technical courses like Engineering & Technology, Medicine, and Law is extremely low. The difference in choosing a subject is very huge and women have to work hard to break the stereotype that technical fields like engineering and technology are not meant only for men.

The faculties of higher education should be chosen by women as per their interests and capabilities as with the help of higher education women would give direction to their career and will be ready to make value addition to their lives and society at large. Therefore the faculties of higher education should not be divided into the basis of gender.

3.7 Women Participation in Higher Education as Teachers

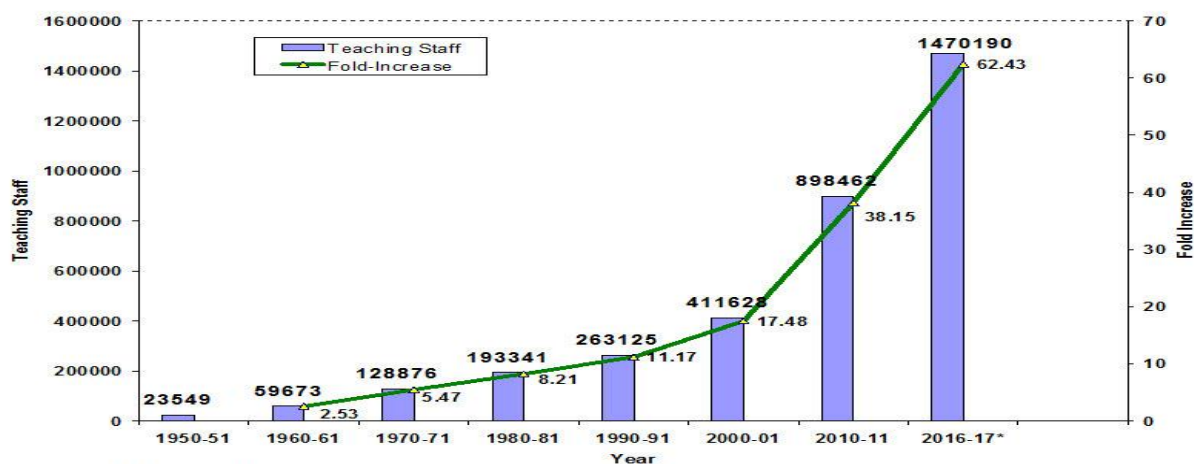


Figure 3.12 Women participation in Higher Education as Teachers

(Source: <https://www.ugc.ac.in/stats.aspx>)

The total number of teachers in higher education has grown from 13, 67,535 in 2013-14 to 14, 16,299 in 2018-19. Out of the total teachers, 57.8% are male and 42.2% are female teachers, an increase of 4.35% in female teachers. At the all-India level, there are 73 female teachers per 100 male teachers in 2018-19 compared to 64 six years ago. The number of teachers at the university level is around 1.90 lakh, of which 36.65% are female as compared to 1.56 lakh teachers in 2013-14 (32%). Among non-teaching staff, the average number of females per 100 males is 49.

3.8 Funding & Awards for Women in Science in India:

Women scientists are an important workforce in the field of science & technology (S&T). However, it has been observed in many studies that due to various factors, they may not be getting enough opportunities in academics and research institutes especially science, engineering, agriculture, medicine, etc. disciplines and participation of women are very less in comparison to men. Thus, the Government of India took many initiatives and steps to fulfill this gender gap through different policies and programs. The Department of Science and Technology (S&T) of the Government of India has started several programs for the promotion of women in science. With the government, some private organizations are also working to providing gender-specific schemes for women in a science discipline to attract and motivate women towards the S&T field. Through these schemes, collaborative efforts have been made to give women a strong position in the scientific profession, help them re-enter into the mainstream, and provide a platform for a further charge into the field of science and technology. The important schemes are:

- Women Scientist Scheme by DST
- Women Scientist Scheme by DBT
- National Women Bio-Scientist Award SERB
- Women Excellence Award Women in Science lectures by EMBO
- Post-Doctoral Fellowship for Women
- L'Oreal India for Young Women in Science Scholarships
- Indo-U.S. Fellowship for Women in STEMM
- National Post-Doctoral Fellowship Funding & Awards for Women in Science in India

3.9 Women Enrollment in LIS Subject:

Library and Information Science is one of the professional courses offered by Indian universities. (Raju, 1997) highlights that LIS education in India has gone a long way since independence and many library schools have started offering courses at the graduate and postgraduate levels. It has been estimated that about 120 library schools in Indian universities are offering BLIS, MLIS, MPhil, and Ph.D. programs.

Table-3.5 shows the gender-wise enrolment in various under-graduates and post-graduates programs in Library and Information Science. It is observed that total enrolment in two undergraduate programs is 49546 and in two post-graduation programs are 10667. Table 6 is about the details of the gender-wise enrolment of students of Ph.D., M.Phil, P.G., and U.G. programs in Library and Information Science.

Table 3.5: Programme-Wise Enrolment of LIS Discipline (based on actual response)

Degree	Program	Male	Female	Total
B.Lib.Sc.	Bachelor of Library Science	2977	3328	6305
B.Lib.I.Sc.	Bachelor of Library & Information Science	23059	20182	43241
M.Lib.Sc.	Master of Library Science	2820	3001	5821
M.L.I.Sc.	Master of Library & Information Science	2228	2618	4846

(Source: AISHE 2018-19)

The library science program has been categorized into the bachelor of library science, bachelor of library and information science, and into Master of Library Science and Master of Library Information Science. It is evident from the table that there is 3328 female enrolment compare to 2977 males in B. Lib. Sc., 20182 female enrolments compare to 23059 male in BLIS., 3001 female enrolments compare to 2820 male in M. Lib. Sc. and 2618 female compare to 2228 male in MLIS. The data shows that female enrolment is higher in the entire stated program except in the BLIS program where male enrolment higher compares to female enrolment.

Further, table-3.6 shows the program wise (Ph.D., M. Phil, Post-Graduation, and Under Graduation program) distribution of male and female enrolment in library science and found that enrolment of male students is higher i.e. 506 male students in Ph.D., 83 male students in M. Phil, and 26230 male students in Under Graduate program compare to 361 Ph.D., 81 M.Phil., 23230 U.G. level as female students. Except for Post-Graduation, where females have more enrolment (5832) than males.

Table 3.6: Course wise enrolment in LIS in the year 2018-19

Program	Male	Female	Total
Ph.D.	506	361	867
M. Phil	83	81	164
Post-Graduation	5344	5831	11175
U.G.	26230	23230	49890

(Source: AISHE 2018-19)

3.10 LIBRARIANSHIP AS A PROFESSION FOR WOMEN

Librarianship as a profession in India was for the scholar librarians till the early part of the 20th century. Mostly men of letters only were custodians of libraries and the written cultural heritage (Schiller, 1974). However, the first woman credited with occupying any key-post in India was Ms. Anandibai Prabhu Desai who was the superintendent at the Children's library in Baroda in the 1930s. It is seen from the various surveys that in developed countries women are still accounted for 80% of the library profession, but in most countries, there is a dual career structure for men and women. In India, the situation is slightly different from developed countries. Women in the library profession were admitted during the first half of the 20th century. In 1940 the first batch of students was admitted to a training course conducted by the Bengal Library Legislative Association, Calcutta and in 1942 there was the first qualified female librarian in India who took a job at the Bengal legislative Assembly. Till 1975 also it is felt that the profession of a librarian in India is not significant. Though it was felt that the library profession would be very right for women because nature has bestowed women with qualities of patience, sympathy, and perseverance. Despite progress in the librarianship profession, the emergence of females in large numbers in administration is impacting the nature of the profession. Slowly it is bridging the gap which is dominated by male but in the 21st century, there is a new gender divide emerged. This new gender divide is emerging due to new technology in the LIS profession and it cannot be ignored as it is needed in the growing information technology. New advanced technologies used in the library like RFID technology, Barcode techniques, etc. have made library jobs more technical and to carry out the job efficiently. In today's scenario, the term librarianship is

called a library and information science (LIS) Profession. Current trends in the LIS profession and the sign of gender gap that associate males with technology and female with the administrative and service work will further take this profession into a new emerging gender divide of technology. Further the current trends in the LIS profession give men a more advanced technology-driven name called library scientist or bureaucratic or technological roles and women filled with only work at the administrative level as a librarian. Women LIS professionals need to have good command over computer knowledge to carry their routine job more efficiently. To compete with their male counterparts women LIS professionals need to have more knowledge about the latest development in the field and for that, they should attend workshops, seminars, conferences, etc. Women professionals have formed a women library association recently and about 100 women professionals have joined in the forum. They improved their library knowledge, communication skills, and soft skill to interact with library users and provide useful information in anticipation. Women professionals are organizing and also very keen on attending National seminars and conferences across the country, where they share their ideas and discuss challenges they face in management and also getting an award for their work and excellence. They are now holding a key position in the offices and administrations namely Executive Committee Member of Library Associations. Women have leadership quality which is familiar in total quality management of library and they take leadership by guiding and conducting orientation program, awareness program to the library users to motivate the users, students, and faculty towards knowledge development and frequently conduct various workshops and training programs to access various subject databases and get fruitful results.

According to Kalpanadas Dasgupta (1977), women choose librarianship as a career due to the following reasons:

- i) Women who don't want to prepare themselves for teaching regularly, but they want employment librarianship is considered as a good alternative where the work is academic.
- ii) Indian society is stereotyped towards women who are reflected in the upbringing of boys and girls, the security of women is the factor in India,

the workplace which ensures security has a very important role in women's employment.

- iii) The qualities required in the librarianship profession are more appropriate for Indian women.
- iv) The librarianship profession does not demand mobility in service, and Indian women are least interested in moving outside the workplace due to family constraints.
- v) Job in a library is considered safe because there is least interaction with male colleagues and it allows women to remain unattached with other public males.

Murgai (2004) explains that the gender divide is occurred due to female dominance in the workforce and it is found that female attitude towards professional status is lacking and due to this library profession associated with lower status. This lack of status caused many problems for the profession, including the continuing challenges of recruitment, persistent low salaries, and the poor image of librarianship.

Overall, librarianship has been considered to be a female-dominated profession as perceptions but it is observed that it is dominated by males at managerial and administrative levels. Women have always made up of a large majority of librarians but occupying the lower position and minority of males are occupying high-level positions and key positions in the profession which creates a gender divide in the library profession.

3.11 GENDER GAP IN LIBRARIANSHIP PROFESSION

The past few decades have brought revolutionary changes in the field of librarianship due to advancements in information technology and communication. The twenty-first-century library requires a skilled human workforce to meet the needs of the growing demands of users and must possess skills in selection, content management, knowledge management, organization of information on the internet and intranet, research services, maintaining digital library services, and bringing information resources to the desktop. In the current century, libraries are committed to providing better services to users in time to satisfy their needs. For all these reasons, women leaders need to prepare themselves in carrying

out their jobs more efficiently and achieve library goals, because it is the leaders who determine the mission and target of an organization.

Librarianship is seen as a “women profession” because the number of women outnumbers the men in the profession by a ratio of approximately four to one. However, as is the case in other occupations, while women may be numerically dominant, the positions of power within the profession are, to a large extent, held by men. In other words, there is a division or "gender gap" in the types of work performed by women and men within the profession of librarianship, and this division is reflected in an inequitable distribution by the femininity of prestige and salary.

Librarianship in the 20th century was a profession defined by a gender divide in which females performed lower service functions while a minority of males dominated higher status management positions. Over the last century, women have consistently made up a large majority of librarians, and librarianship is widely considered to be a female-dominated profession. Interestingly, the field has also seen the emergence of a minority-dominated male management force, despite the overwhelming majority of female librarians. This gender divide between female librarians as the majority occupying lower positions and the minority of male librarians assuming higher-level and higher-paying management positions have greatly impacted the status of librarianship as a profession throughout the last century.

Table 3.7: Gender Gap in Librarianship Profession

Name of the Organisation	Male	Female
Central University	34	6
IIT	22	1
NIT	24	7
IIM	18	2
Total	99 (85.21%)	16 (14.78%)

(Source: <https://www.mhrd.gov.in>)

From the above table, it is seen that in selected Indian Institutions such as IIT, IIM, NIT, and Central University in top library managerial positions are male-dominated. The table shows the depressed status of women in Librarianship despite there are a majority of female librarians it is dominated by male management force. The ratio between female librarian and male librarian in IIT is only one out of twenty-two, in IIM it is one out of nine, in Central Universities it is one out of six, and in NIT it is approximately one out of four. Librarianship is viewed by many to be a "woman's profession" because the number of women outnumbers the men but the current professional Status in top Indian Institutions there is a gender divide between female librarians as the majority occupying lower positions and the minority of male librarians holding higher-level management positions has impacted the status of librarianship as a profession.

3.12 GENDER STUDIES IN LIS RESEARCH

As already discussed that gender equality is an important pillar for the sustainable development of the entire society and many efforts have been already taken care of by the government to make it balance in all sectors including education. To give the current status and input about gender equality, many gender-based studies and surveys have been conducted from time to time across the world which shows the scenario of women participation in different fields. In Library and information science also many studies have been conducted from time to time to find out the women's participation in LIS research and its trends.

Reece-Evans 2010 studied gendered affinity in citation and reference behavior and the results of the findings reveal that from 1995-2007 men published more articles than women in Libraries and Information Research. It is also seen that both men and women referred more male-authored articles in their research; that men referenced male-authored articles at a greater rate than women referenced female-authored articles; that articles by women received more citations overall; and that men cited articles by men at a greater rate than they cited articles by women. The imbalance in citation and reference patterns suggests that gender influences both male and female authors' choice of references, as well as the number of citations that authors receive.

If a gendered system of accumulated advantage indeed exists, then women are at a disadvantage. Instead, female LIS professionals should enjoy the increased status, productivity, and opportunities for promotion that an equitable scholarly publishing system would bring.

Gender bias within journal authorship and citation reference is one such pattern of research and the role of gender in scientific publishing and questioned the assumption that citations are an objective indication of scholarly merit. To test the hypothesis that researchers tend to cite more authors of their sex than they do authors of the opposite sex. It was analyzed that female authors cite publications by women at a five percent higher rate than male authors; that male authors tend to cite other male authors at a much higher rate than female authors; and that both men and women cite male authors at a much higher rate than female authors. Ferber concludes that this imbalance in citations “unquestionably has substantial consequences in a field where men constitute a large majority any affinity between authors of the same sex works to the disadvantage of those in the minority (Ferber,1986).

Ferber further (1988) explores gender and citation patterns in different other fields, with results similar to those of her earlier study. Both men and women tend to cite authors of the same sex more and male authors were cited more often overall. Ferber calls this phenomenon the “citation gap” and notes that the gap tends to decrease when numbers of female academics in a field increase. She further concludes that women face many obstacles in the male-dominated field to achieve professional status.

According to Hur-Li Lee (2002) "Since the 1970s, American women's studies librarianship has represented activist professionalism." This research agenda embraces an activist role by including in our focus not just the information needs of women's studies as an academic field, but also a feminist analysis of the librarianship profession and its practices.

Despite so many implementations of programs and policies, there are significant gaps between the policies and in actual practice at the community level. To understand the basic social structure of a country the analysis of population is very crucial and assists the

Government for framing policies to eliminate the gender gap and gender discrimination in all of its forms. Owing to this fact, the important statistics on population characteristics from the gender perspective.

3.13. GENDER-BASED ANALYSIS (GBA) IN LIS RESEARCH

Various studies have been undertaken for Research Productivity in Library Science in India to know the research output and to overcome the challenges to explore new ideas to solutions. Kumar et.al (2018) studied the gender disparity in 17 prominent journals in the field of Library and Information science and found that there is an increase in the proportion of male authors compared to female authors over the years. The number of female authors was much lower than men which showed that females are generally underrepresented in academia. However, female productivity increases when they collaborate with a man in their research work, and the professional status of both gender are productive as working professionals (Negi, 2018). Gul et.al, (2016) in their study indicated that researcher faces limitations such as social, financial, geographical, time constraints in general and gender particularly by female authors through an examination of the publication output in the electronic journal of library and information research.

Gender-based analysis is a tool for measuring and understanding the social process or change in society and coming up with more effective, neutral, and unbiased options for decision-makers, policies, programs, and legislation. When gender is explicitly considered as a category of analysis, information on the actual realities of women and men, girls and boys, is presented so that similarities and differences can be examined. Also, information on the nature of relationships in the family, society, and the economy is revealed. Using gender-based analysis means taking into account this information in exploring how policy options could impact on individual women and men, and societal structures. This contributes to an enhanced knowledge base for decision-makers.

Gender analysis involves the collection and use of sex-disaggregated data that reveal the roles and responsibilities of women and men. These data are fed into the policy process to enable assessments of how existing and future policies and programs potentially affect women and men differently. Gender analysis also involves assessing how gender-

inequitable power relations may impact negatively on the achievement of a range of development goals, including the goal of gender equality and equity.

Gender analysis needs to be both quantitative and qualitative. The use of gender-sensitive indicators in such areas as participation rates in scientific education and careers and decision-making, and data on the differential impacts of policies and programs can provide useful quantitative data. This should be complemented by qualitative data, which trace historical, political, economic, social, and cultural forces to clarify how and why gender differences came about.

3.14 CONCLUSIONS

Women today are making a mark in the so-called male-dominated world. Today women are breaking all the stereotype minds leading the huge institution, corporate offices, or university library at ease, placing and implementing their strategic decisions. There is a new gender divide that seems to be emerging in the Library science profession because of the changing nature of the profession. Females are associated with management positions and men are associated with technology this created a new gender divide and more study is required on the role of gender and status of management position as compared to technical position to see there is a gender divide in the library profession. It seems that to redefine the profession and its status in the information industry, women are once again threatened with relegation to lower status and lower salaries. There is much to be learned from the past about factors for the gender divide in the Library profession and it took a long process to overcome it. Perhaps we can avoid another century-long struggle to bridge this potential gender divide through a dialog about its emergence and the impact of dividing the profession according to "librarian" and "information scientist" roles.

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CHAPTER: 4

DATA ANALYSIS AND

INTERPRETATION

4.1 INTRODUCTION

The bibliometric study is undertaken to measure the research productivity of an organization, institution, and publication of a particular subject or field of research in a particular journal, their research growth evaluated through quantitative technique published during a particular period. The present study is conducted to investigate and to map the intellectual research productivity of SRELS of Information Management concerning the women's contributions. The analysis of data involves a critical examination of the data with the objectives for determining the pattern of relationship among the variables. The data is further analyzed as per the objectives of the present study and it is presented in the form of tables, figures, and graphs using Pie charts, Bar charts, line charts, etc.

4.2 YEAR WISE ARTICLE DISTRIBUTION

While mapping the research growth in publications, the year-wise analysis was made and it is useful to figure out the speed of research work and its growth in the form of research productivity. The period of evaluation is grouped in twenty years span. Table 5.1 shows that the year-wise analysis of the research output of the SRELS Journal of Information Management. It is also observed that 926 articles were published by 1681 authors who contributed to the SRELS Journal of Information Management in 20 years i.e. 1999-2018. It displays 926 total numbers of articles published from volume 36-55 during the year 1999-2018. The analysis shows that the highest number of articles published in the year 2013 is 70 (7.56%) followed by 66 (7.13%) articles in the year 2012 and 64 (6.91%) in the year 2014 and the lowest number of articles are published 23 (2.48%) in the year 2000 followed by 29 (3.13%) in the year 1999. It is also observed from the table that the highest number of contributors is 128 (7.61%) in the year 2013 followed by 124 (7.38%) in the year 2016 and it is found that the lowest number contributors are 37 (2.2) in the year 2000 followed by 39 (2.32%) in the year 1999. It is noted from the table that there is no consistency in the growth of the authors and articles. The average article per year is 46.30 and an average author per year is 84.05 in the present study.

Table-4.1: Year-Wise Article Distribution of Articles

Year	Volume	Number of Articles	Percentage	Number of Authors	Percentage
1999	36	29	3.13	39	2.32
2000	37	23	2.48	37	2.20
2001	38	35	3.78	55	3.27
2002	39	39	4.21	63	3.75
2003	40	34	3.67	62	3.69
2004	41	38	4.10	62	3.69
2005	42	37	4.00	65	3.87
2006	43	34	3.67	70	4.16
2007	44	36	3.89	62	3.69
2008	45	50	5.40	90	5.35
2009	46	45	4.86	77	4.58
2010	47	62	6.70	122	7.26
2011	48	63	6.80	119	7.08
2012	49	66	7.13	123	7.32
2013	50	70	7.56	128	7.61
2014	51	46	4.97	99	5.89
2015	52	60	6.48	108	6.42
2016	53	64	6.91	124	7.38
2017	54	47	5.08	84	5.00
2018	55	48	5.18	92	5.47
	Total	926	100.00	1681	100.00

4.3 YEAR WISE GROWTH DISTRIBUTION OF PUBLICATION:

Table 5.2 expresses the year wise growth of the rate of the number of articles published during the proposed study period of SRELS Journal of Information Management and analysis resolved that there is no stability and consistency in the growth rate of publication.

The highest growth rate (38.88%) was recorded in the year 2008 followed by 37.78% in the year 2010. It is clear from the table that the highest negative growth is recorded in -34.29% in 2014 followed by -26.57% in the year 2017. The study shows that there is no stability in the growth rate of articles.

Table-4.2: Year-Wise Growth Distribution of Publication

Year of Publication	Number of Articles	Year Wise Growth Rate (%)
1999	29	0
2000	23	-24.12
2001	35	52.17
2002	39	11.43
2003	34	-10.26
2004	38	11.76
2005	37	-2.63
2006	34	-8.10
2007	36	5.88
2008	50	38.88
2009	45	-10.0
2010	62	37.78
2011	63	1.61
2012	66	4.76
2013	70	6.06
2014	46	-34.29
2015	60	30.43
2016	64	6.67
2017	47	-26.56
2018	48	2.12

4.4 YEAR WISE DISTRIBUTION OF AUTHORS BY GENDER

Table 4.3 describes the year-wise distribution of authors by gender. It is seen from the table that there is a total number of 1681 authors out of which 1233 (73.35%) are male authors and 448 (26.65%) are female authors for the study period 1999-2018. Thus total female contributors are only one fourth in comparison of male contributors

Table-4.3: Year-Wise Distribution of Authors by Gender

Year	Volume	Male	%	Female	%	Total	%
1999	36	30	2.43	9	2.01	39	2.32
2000	37	27	2.19	10	2.23	37	2.20
2001	38	47	3.81	8	1.79	55	3.27
2002	39	52	4.22	11	2.46	63	3.75
2003	40	49	3.97	13	2.90	62	3.69
2004	41	45	3.65	17	3.79	62	3.69
2005	42	48	3.89	17	3.79	65	3.87
2006	43	49	3.97	21	4.69	70	4.16
2007	44	47	3.81	15	3.35	62	3.69
2008	45	63	5.11	27	6.03	90	5.35
2009	46	60	4.87	17	3.79	77	4.58
2010	47	89	7.22	33	7.37	122	7.26
2011	48	84	6.81	35	7.81	119	7.08
2012	49	85	6.89	38	8.48	123	7.32
2013	50	88	7.14	40	8.93	128	7.61
2014	51	75	6.08	24	5.36	99	5.89
2015	52	73	5.92	35	7.81	108	6.42
2016	53	98	7.95	26	5.80	124	7.38
2017	54	59	4.79	25	5.58	84	5.00
2018	55	65	5.27	27	6.03	92	5.47
Total		1233	100.00	448	100.00	1681	100.00

. The highest number of male authors is counted 98 (7.59%) in the year 2016 and the highest number of female authors is 40 (8.93%) in the year 2013 and the lowest count of female authorship is 8 (1.79%) in the year 2001. As matter of fact, male authors are dominating female authors from the past two decades.

4.5 YEAR WISE DISTRIBUTION OF AUTHORSHIP PATTERN

Table-4.4: Year-wise Distribution of Authorship Pattern

Year	Single Author	Two Authors	Three Authors	Four Authors	More than four Authors	Total Articles
1999	19 (5.52)	10 (2.21)	0 (0)	0 (0)	0	29 (3.13)
2000	11 (3.20)	10 (2.21)	2 (1.96)	0(0)	0	23 (2.48)
2001	15 (4.36)	20 (4.42)	0(0)	0(0)	0	35 (3.78)
2002	23 (6.69)	10(2.21)	4 (3.92)	2 (10)	0	39 (4.21)
2003	13 (3.78)	15 (3.32)	5 (4.90)	1 (5)	0	34 3.67)
2004	17 (4.94)	19 (4.20)	1 (0.98)	1 (5)	0	38 (4.10)
2005	12 (3.49)	22 (4.87)	3 (2.94)	0 (0)	0	37 (4.00)
2006	10 (2.91)	17 (3.76)	5 (4.90)	1 (5)	1 (12.5)	34 (3.67)
2007	18 (5.23)	14 (3.10)	2 (1.96)	1 (5)	1 (12.5)	36 (3.89)
2008	17 (4.94)	27 (5.97)	5 (4.90)	1 (5)	0	50 (5.40)
2009	17 (4.94)	25 (5.53)	3 (2.94)	0 (0)	0	45 (4.86)
2010	19 (5.52)	30 (6.64)	10 (9.80)	3(15)	0	62 (6.70)
2011	19 (5.52)	36 (7.96)	5 (4.90)	2 (10)	1 (12.5)	63 (6.80)
2012	23 (6.69)	34 (7.52)	7 (6.86)	0 (0)	2(25)	66 (7.13)
2013	24 (6.98)	34 (7.52)	12 (11.76)	0 (0)	0	70 (7.56)
2014	9 (2.62)	25 (5.53)	10 (9.80)	0 (0)	2 (25)	46 (4.97)
2015	21 (6.10)	32 (7.08)	6 (5.88)	1 (5)	0	60 (6.48)
2016	24 (6.98)	26 (5.75)	8 (7.83)	6 (30)	0	64 (6.91)
2017	18 (5.23)	22 (4.87)	6 (5.88)	1 (5)	0	47 (5.08)
2018	15 (4.36)	24 (5.31)	8 (7.83)	0 (0)	1 (12.5)	48 (5.18)
	344 (100)	452 (100)	102 (100)	20 (100)	8 (100)	926 (100)

(Parenthesis shows percentage)

Table 4.4 is confined to the authorship pattern and distribution of authorship patterns of publications during the study period. In these tables, all the articles were divided into 4 categories i.e. single author, two authors, three authors, four authors, and more than four authors. The analysis resolved that among the entire authorship pattern the two authored publications are highest with 452 (48.81%) publications followed by single author i.e. 344 (37.15%) and 102 (11.02%) publications were made by three authors and 20 (2.16%) by four authors and only 8 (0.9%) contributions were made by more than four authors. Further, the analysis reveals that more authors desire to write in collaboration and single-author paper is lower than co-authored publication.

4.6 YEAR WISE AUTHORSHIP PATTERN BY GENDER

Table 4.5 presents five different possible combinations of authorship patterns. Two combinations represent authors s works (male only, female only) and three represents the involvement of authors in groups (male-male, male-female, female-female).

The study further indicates different combinations of authorship patterns of male-female researchers. The second and third column shows single male authors and single female authors work at an individual level and the next three columns represent the involvement of authors in groups of male-male, female-female, and male-female authors. It is clear from the study that male-male authors 308 (33.26%) contribute most, followed by works produced by male-female authors 231 (24.95%), works produced by the only male are 243 (26.24%), works produced by the only female are 98 (10.58%), and work produced by the female-female is 46 (4.96%).

Table -4.5: Year-Wise Authorship Pattern by Gender

Year	Only Male	Only Female	Male-Male	Male-Female	Female-Female	Total	Female cont.
1999	13 (5.35)	6 (6.12)	8 (2.60)	1 (0.43)	1 (2.17)	29 (3.13)	8
2000	7 (2.88)	4 (4.08)	6 (1.95)	6 (2.60)	0(0)	23 (2.48)	10
2001	11 (4.53)	4 (4.08)	16 (5.19)	4 (1.73)	0(0)	35 (3.78)	8
2002	19 (7.82)	4 (4.08)	10 (3.25)	5 (2.16)	1 (2.17)	39 (4.21)	10
2003	8 (3.29)	5 (5.10)	13 (4.22)	8 (3.46)	0(0)	34 (3.67)	13

2004	13 (5.35)	4 (4.08)	11 (3.57)	7 (3.03)	3 (6.52)	38 (4.10)	14
2005	7 (2.88)	5 (5.10)	15 (4.87)	7 (3.03)	3 (6.52)	37 (4.0)	15
2006	7 (2.88)	3 (3.06)	10 (3.25)	12 (5.19)	2 (4.35)	34 (3.67)	17
2007	14 (5.76)	4 (4.08)	8 (2.60)	9(3.90)	1 (2.17)	36 (3.89)	14
2008	8 (3.29)	9 (9.18)	20 (6.49)	9 (3.90)	4 (8.70)	50 (5.40)	22
2009	12 (4.94)	4 (4.08)	18 (5.84)	9 (3.90)	2 (4.35)	45 (4.86)	15
2010	12 (4.94)	6 (6.12)	19 (6.17)	24 (10.39)	1 (2.17)	62 (6.70)	31
2011	13 (5.35)	6 (6.12)	21 (6.82)	20 (8.66)	3 (6.52)	63 (6.80)	29
2012	14 (5.76)	9 (9.12)	24 (7.79)	14 (6.06)	5 (10.87)	66 (7.13)	28
2013	17 (7.00)	7 (7.14)	21 (6.82)	19 (8.23)	6 (13.04)	70 (7.56)	32
2014	8 (3.29)	1 (1.02)	17 (5.52)	18 (7.79)	2 (4.35)	46 (4.97)	21
2015	15 (6.17)	5 (5.10)	17 (5.52)	19 (8.23)	4 (8.70)	60 (4.48)	28
2016	19 (7.82)	5 (5.10)	23 (7.47)	15 (6.49)	2 (4.35)	64 (6.91)	22
2017	16 (6.58)	2 (2.04)	15 (4.87)	10 (4.33)	4(8.70)	47 (5.08)	16
2018	10 (4.12)	5 (5.10)	16 (5.19)	15 (6.49)	2 (4.35)	48 (5.18)	22
Total	243 (100)	98 (100)	308 (100)	231(100)	46 (100)	926(100)	375

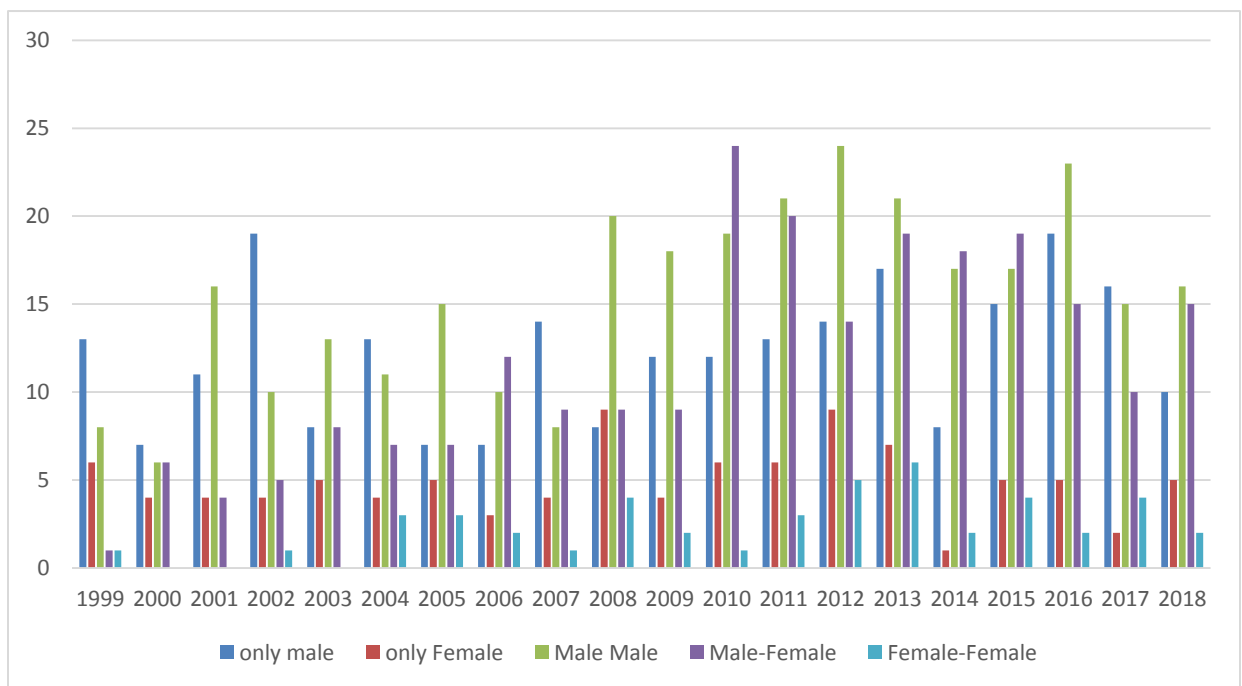


Figure 4.1 Year-Wise Authorship Pattern by Gender

Further, it can be concluded that the contribution of female authors is lower when they work at the individual level or in association with other female authors.

4.7 PATTERN OF GROWTH OF FEMALE AUTHORS

Data presented in table 5.6 indicate that in the first decade of 1999-2008, the number of papers with female authors was 131, which increased to 249 during the period 2009-2018. However, just from 14% papers by female authors during the period 1999-2008, it increases to 26.9% in the latter decade of 2009-2018. This concludes that the number of papers by female authors increased almost double in a later decade. The similar, trend was also seen in the increase in the number of female authors from the first decade to the later decade of the study period.

Table 4.6: Pattern of Growth of Papers Authored by Female

Years	Papers with Female authors	No. of Female authors (%)	No. of Male authors (%)	Total authors
1999-2000	18	19 (25)	57 (75)	76
2001-2002	18	19 (16.1)	99 (83.9)	118
2003-2004	28	30 (24.2)	94 (75.8)	124
2005-2006	31	38 (28.2)	97 (71.8)	135
2007-2008	36	42 (27.6)	110 (72.4)	152
1999-2008	131 (14)	148(33)	457 (37.1)	605
2009-2010	46	50 (25.1)	149 (74.9)	199
2011-2012	58	73 (30.1)	169 (69.9)	242
2013-2014	53	64 (28.2)	163 (71.8)	227
2015-2016	52	61 (26.3)	171 (73.7)	232
2017-2018	40	52 (29.5)	124 (70.5)	176
2009-2018	249 (26.9)	300 (67)	776 (62.9)	1076
Total	380	448 (26.6)	1233 (73.4)	1681

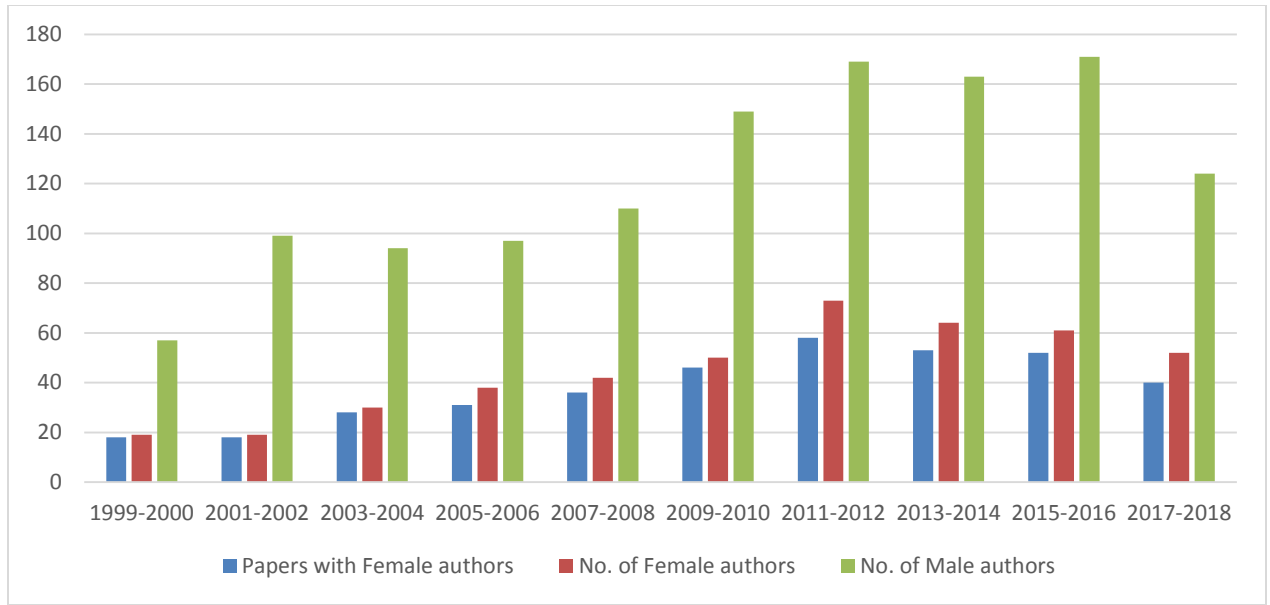


Figure 4.2 Pattern of Growth of Papers Authored by Female

4.8 GENDER WISE RESEARCH PRODUCTIVITY OF SRELS JOURNAL

Table 4.7 reflects the average number of males per paper and the average number of females per paper. The table describes research productivity by male and female authors from 1999-2018. A total of 926 articles are published in SRELS Journals of Information Management and it also clearly shows from the analysis of data that a total of 1681 authors have contributed their publications in this journal, out of those 1233 authors are male and 448 are female authors.

The research productivity by genders in terms of the average author per paper was analyzed by using the given by Yoshikane et al. (2009) and it is mathematically represented as below:

$$\text{Average Author Per Paper} = \text{No. of Authors} / \text{No. of Papers}$$

Based on that the average male author per paper (AMPP) and average female author per author (AFAPP) as below were also calculated by the following formula:

$$\text{Average male author paper (AMPP)} = \text{No. of male author} / \text{No. of papers}$$

$$\text{Average female author paper (AFPP)} = \text{No. of the female author} / \text{no. of paper}$$

$$\text{Average female author paper (AFPP)} = \text{No. of the female author} / \text{no. of paper}$$

Table-4.7: Male –Female Research Productivity

Year	No. of Articles	No. of Authors	Male	AMPP*	Female	AFP**
1999	29	39	30	1.03	9	0.31
2000	23	37	27	1.17	10	0.43
2001	35	55	47	1.34	8	0.23
2002	39	63	52	1.33	11	0.28
2003	34	62	49	1.44	13	0.38
2004	38	62	45	1.18	17	0.45
2005	37	65	48	1.30	17	0.46
2006	34	70	49	1.44	21	0.62
2007	36	62	47	1.31	15	0.42
2008	50	90	63	1.26	27	0.54
2009	45	77	60	1.33	17	0.38
2010	62	122	89	1.44	33	0.53
2011	63	119	84	1.33	35	0.56
2012	66	123	85	1.29	38	0.58
2013	70	128	88	1.26	40	0.57
2014	46	99	75	1.63	24	0.52
2015	60	108	73	1.22	35	0.58
2016	64	124	98	1.53	26	0.41
2017	47	84	59	1.26	25	0.53
2018	48	92	65	1.35	27	0.56
Total	926	1681	1233	1.33	448	0.48

*AMPP- average male author per paper

** AFP- average female author per paper

The analysis resolved that there are a total of 926 papers published for twenty years and it is found that 0.48 is the average number of female authors per article which is very less compared to male authors i.e. 1.33. The further analysis of AMPP found that 1.63 is the highest in 2014 and lowest 1.21 in 2015 and the highest AFP is 0.62 in 2006 and the lowest is 0.23 in 2001.

4.9 GEOGRAPHICAL CONTRIBUTIONS OF ARTICLES

Geographical contribution gives an overview of the research articles output from the different countries and states, and also the collaboration of national and international authors.

4.9.1 State-Wise Distribution of Contributors

Table 5.8 shows a geographical overview of articles from different states of India and Indian authors and trying to find out the state-wise and gender-wise contributions of the authors in the SRELS Journal of Information Management.

Further study reveals the contribution of authors from different states of India. It shows that the majority of articles were published from Karnataka 324 (33.28%) followed by West Bengal with 103 (10.73%), followed by Tamil Nadu which is 8.35% of the total contribution. It is found from the table that the lowest amounts of research articles are contributed by Bihar 0.1% followed by Tripura with 0.21%.

Table-4.8: State-Wise Distribution of Male-Female

States	Articles (%)	Male (%)	Female (%)	Total (%)
Karnataka	324 (33.28)	454 (39.44)	137(33.17)	591 (37.79)
West Bengal	103 (10.75)	133 (11.56)	36(8.72)	169(10.81)
Tamil Nadu	80 (8.35)	85(7.38)	40 (9.69)	125(7.99)
Kerala	58 (5.32)	54(4.69)	27(7.26)	81(6.78)
Punjab	58 (6.05)	49 (4.26)	34 (8.23)	83(5.31)
Maharashtra	51 (6.05)	76(6.60)	30 (6.54)	106(5.18)
Uttar Pradesh	43 (4.49)	43(3.74)	21 (5.08)	64(4.09)
Delhi	42 (4.38)	44(3.82)	16 (3.87)	60(3.84)
Andhra Pradesh	34 (3.55)	30(2.61)	16 (3.87)	46(2.94)
Madhya Pradesh	22 (2.30)	34(2.95)	6 (1.45)	40(2.56)
Gujarat	21 (2.09)	21(1.82)	8 (1.94)	29(1.92)
Orissa	20 (2.19)	24(2.09)	6(1.45)	30(1.85)
Uttarakhand	18 (1.88)	17(1.48)	8(1.94)	25(1.60)
Haryana	17 (1.77)	17 (1.48)	2 0.48)	19(1.41)

Rajasthan	17 (1.77)	19(1.65)	3 (0.73)	22(1.21)
Jammu & Kashmir	11 (1.15)	11 (0.96)	8(1.94)	19(1.21)
Assam	6 (0.63)	9(0.78)	0	9(0.58)
Jharkhand	5 (0.52)	7(0.61)	1(0.24)	8(0.51)
Telangana	5 (0.52)	2 (0.17)	4(0.96)	6(0.38)
Chhattisgarh	4 (0.42)	3(0.26)	2 (0.48)	5(0.38)
Himachal Pradesh	3 (0.31)	3 (0.26)	0	3(0.38)
Mizoram	3 (0.31)	4 (0.35)	2(0.48)	6(0.32)
Goa	3 (0.31)	4(0.35)	2(0.48)	6(0.32)
Meghalaya	3 (0.31)	3(0.26)	2 (0.48)	5(0.19)
Pondicherry	2 (0.21)	2(0.17)	0	2(0.13)
Sikkim	2 (0.21)	1(0.09)	1(0.24)	2(0.13)
Tripura	2 (0.21)	1 (0.09)	1 (0.24)	2(0.13)
Bihar	1 (0.10)	1(0.09)	0	1(0.06)
Total	958 (100)	1151 (100)	413 (100)	1564

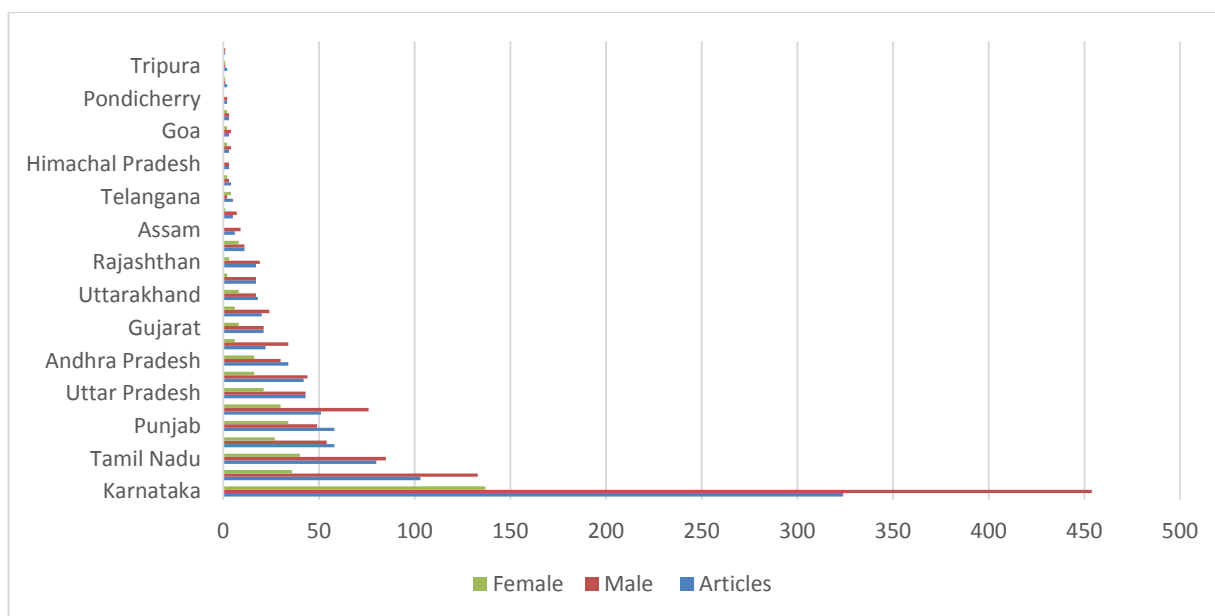


Figure 4.3 State-Wise Distribution of Male-Female

The further analyses show the same kind of trend among the male authors from where they contribute most. It is seen that the majority of male contributors are highest from Karnataka with 454 (39.44%) followed by West Bengal with 133 (11.56 %), followed by Tamil Nadu

which is 85 (7.38 %). The trend among female contributors is not similar to their male counterparts throughout the study.

The analyses show the top state belongs to Karnataka state from where females contribute most is 137 (33.17%) followed by Tamil Nadu with 40 (9.69%) and with 36 (8.72%) from West Bengal. It is also noted from the table that the female authors are dominated by male authors in most of the states except Telangana. The reason behind Karnataka has got the highest number of contributions because of the place of publication of the SRELS Journal of Information Management.

4.9.2 Country Wise Distribution of Contribution

The following table shows the geographical contribution of the articles, three parameters have been taken for observing the male-female publication from each country. From the study it comes to know that a publication made by Indian authors is 856 (92.44%) which is more as compared to the rest of the countries, this is because the SRELS journal of Information Management is published in India. The USA stands second among the contributions i.e. 19 (2.05%) followed by Kenya and Sri Lanka who contributed 8 (0.86%), and 4 (0.43%) from Iran and Saudi Arab. Nigeria, Rwanda, U.K, UAE, contributed 3 (0.32%) and Bangladesh, Canada, Germany, Italy, and 2 (0.22%) from Bangladesh, Canada, Germany, Italy, and the remaining 7 articles contributed from 6 countries authors.

Table 4.9: Country Wise Distribution of Contribution

Country	Male	Female	Male-Female	Total
India	507 (92.86)	127 (88.19)	222 (94.07)	856 (92.44)
USA	14 (2.56)	5 (3.47)	0	19 (2.05)
Kenya	7 (1.28)	0	1 (0.42)	8 (0.86)
Sri Lanka	1 (0.18)	7 (4.86)	0	8 (0.86)
Iran	2 (0.37)	1 (0.69)	1 (0.42)	4 (0.43)
Saudi Arab	4 (0.73)	0	0	4 (0.43)
Nigeria	0 (0)	1 (0.69)	2 (0.85)	3 (0.32)
Rwanda	3 (0.55)	0	0	3(0.32)
U.K	1 (0.18)	2 (1.39)	0	3(0.32)
UAE	2 (0.37)	0	1 (0.42)	3(0.32)
Bangladesh	1 (0.180)	0	1 (0.42)	2 (0.22)

Canada	0 (00)	0	2 (0.85)	2(0.22)
Germany	1 (0.180)	0	1 (0.42)	2(0.22)
Italy	2 (0.37)	0	0	2(0.22)
Belgium	0	0	1 (0.42)	1 (0.11)
China	0	0	1 (0.42)	1(0.11)
France	0	1 (0.69)	0	1(0.11)
Indonesia	0	0	1 (0.42)	1(0.11)
Thailand	1 (0.18)	0	0	1(0.11)
West Africa	0	0	1 (0.42)	1(0.11)
Total	546 (100)	144 (100)	236 (100)	926 (100)

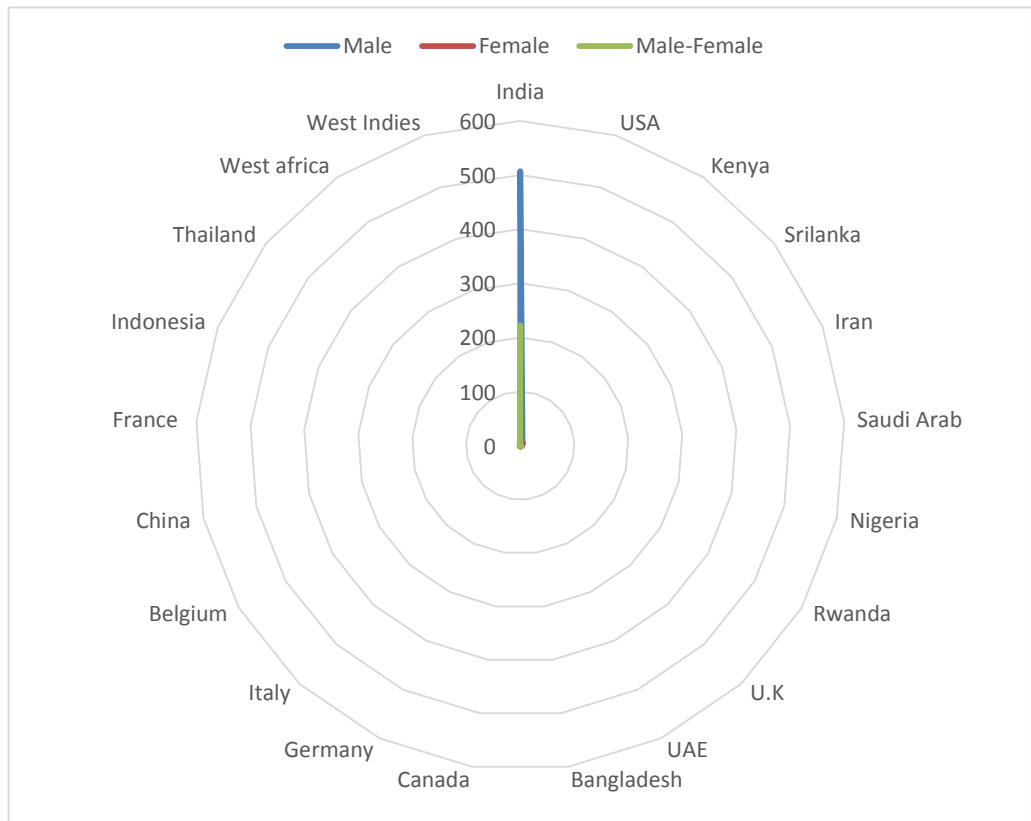


Figure 4.4 Country Wise Distribution of Contribution

The contribution made by the male from all the countries 546 (58.96%) and female contribution is 144 (15.55%) and male-female contribution is 236 (25.48%). The study concluded that there is a female dominance in countries like Sri Lanka, Nigeria, United

Kingdom. It is found that contributions from Asian countries are more compared to the rest of the world during the study period of 20 years.

4.9.3 Pattern of National and International Collaboration among Gender

The table describes a total of 926 articles published by different male-female authors published in domestic and international collaboration. Out of 926 articles, 860 (92.87 %) were produced in domestic collaboration and 55 (5.94 %) articles were produced in international collaboration, and rest 11(1.88 %) is in both domestic and international collaboration.

Table-4.10: Pattern of National and International Collaboration among Gender

Pattern of Collaboration	Female Output (%)	Male Output (%)	Male-Female Output (%)	Total (%)
National	127 (88.19)	510 (93.41)	223 (94.49)	860 (92.87)
International	17 (11.81)	29 (5.31)	9 (3.81)	55 (5.94)
National-International	0 (0)	7 (1.28)	4 (1.9)	11 (1.88)
Total	144 (100.0)	546 (100.0)	236 (100.0)	926 (100.0)

(Parenthesis contain percentage)

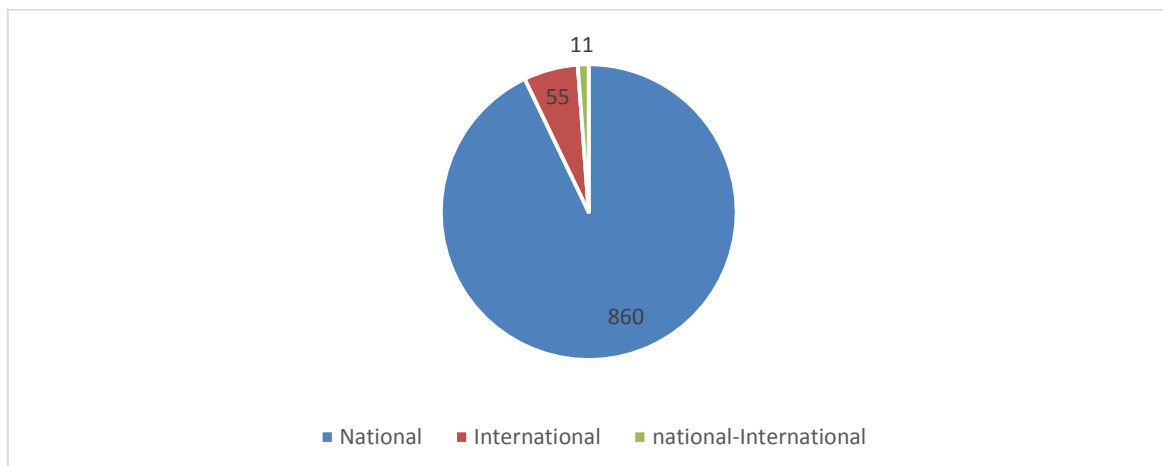


Figure 4.5 Pattern of National and International Collaboration among Gender

The number of papers written in domestic collaboration is more than sixteen times of paper published in international collaboration. Further data reveals that the share of international articles written by female authors is lesser compared to their counterparts.

4.10 PATTERN OF CO-AUTHORSHIP BY GENDER

A pattern of co-authorship has been measured under bibliometrics study by various parameters such as Collaboration Coefficient, Degree of Collaboration, Collaboration Index, and Modified Collaboration Coefficient. It also attempts to analyze the collaboration pattern of the SRELS journal in line with the gender perspective.

4.10.1 Collaboration Index (C.I.)

To compare the extent of collaboration in two fields (or subfields) or to show the trend towards multiple authorships in a discipline, many studies have used either the mean number of authors per paper, termed the Collaborative Index by Lawani (1980). It is a measure of the mean number of authors. Although it is easily computable, it is not easily interpretable as a degree, for it has no upper limit moreover; it gives a non-zero weight to single-authored papers, which involve no collaboration.

The Collaboration Index (CI) formula is given by the Lawani (1980) as:

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

where

j =the number of authors in an article

f_j =the number of j authored articles

N =total number of authors per articles

A =total number of authors per article.

Table- 4.11: Collaboration Index (CI)

Type of authorship	Female	Male	Male-Female	Total
Single Author	98 (68.6)	243 (44.51)	0	341 (36.83)
Two Author	43 (29.86)	239 (43.77)	174 (74.58)	456 (49.24)
Three Author	3 (2.08)	50 (9.16)	48 (20.34)	101(10.91)
Four Author	0	12 (2.20)	9 (3.81)	21(2.27)
Five Author	0	1 (0.18)	4 (1.69)	5(0.54)
Six Author	0	0	1 (0.42)	1 (0.11)
Seven Author	0	1 (0.18)	0	1 (0.11)
Total	144 (100)	546 (100)	236 (100)	926 (100)
Collaboration Index	1.34	1.71	2.35	1.81

It is seen that the collaboration index of the male-female publications which are published during the period 1999-2018. Further study reveals the collaboration index of the male publications; Female publications and male-female publications are counted 1.34, 1.71, and 2.35 respectively during the study period. The average collaboration index for the same study period which consists of 926 publications is calculated to 1.81. It is also noted that articles in this journal have been maximum co-authorship up to seven authors.

4.10.2 Degree of Collaboration (D.C.)

The degree of collaboration (Subramanian, 1983) in discipline was defined as the ratio of the number of collaborative research papers to the total number of research papers published in the discipline during a certain period, which can be calculated for both publications and citations. However, DC does not differentiate among levels of multiple authorships.

The Degree of collaboration (DC) is a measure of the proportion of multiple-authored papers which is suggested by Subramanian (1983) as:

$$DC = 1 - \frac{f_1}{N}$$

where,

f_1 =Number of single-authored articles

N = Total number of articles published in a year.

DC for female authors is:

$$DC = 1 - \frac{98}{144}$$

$$=0.32$$

Similarly, the DC for male, male-female, and average can be calculated.

Table- 4.12: Degree of Collaboration

Type of authorship	Female	Male	Male-Female	Total
Single Author	98 (68.6)	243 (44.51)	0	341 (36.83)
Two Author	43 (29.86)	239 (43.77)	174(74.58)	456 (49.24)
Three Author	3 (2.08)	50 (9.16)	48 (20.34)	101(10.91)
Four Author	0	12 (2.20)	9 (3.81)	21(2.27)
Five Author	0	1 (0.18)	4 (1.69)	5(0.54)
Six Author	0	0	1 (0.42)	1 (0.11)
Seven Author	0	1 (0.18)	0	1 (0.11)
Total	144 (100)	546 (100)	236 (100)	926(100)
Degree of Collaboration (D.C.)	0.32	0.55	1	0.63

The study shows the degree of collaboration of the 20 years which is the selected study period 1999-2018. The degree of collaboration of the male publications, Female

publications, and male-female publications are counted 0.55, 0.32, and 1.0 respectively during the study period. The average degree of collaboration for the same study period which consists of 926 publications is calculated to 0.63.

4.10.3 Collaboration Coefficient (C.C.)

The collaboration Coefficient as defined by Ajiferuke et al.,(1988) lies between 0 and 1, with 0 corresponding to single-authored papers. However it is not 1 for the case where all papers are maximally authored, i.e. every publication in the collection has all authors in the collection as co-authors. Collaboration Coefficient (CC) was designed to remove the above short-comings about CI and DC.

The collaboration coefficient (CC) counted by the formula which is suggested by Ajiferuke et.al. (1988) as:

$$CC = 1 - \frac{\sum_{j=1}^A (\frac{1}{j}) f_j}{N}$$

where

j =the number of authors in an article

f_j =the number of j authored articles

N =total number of authors per articles

A =total number of authors per articles

Table 4.13 indicates the collaboration coefficient of the selected study period i.e. 1999-2018 and is calculated on the male publications, female publications, and male-female publications separately and found that 0.16, 0.30, and 0.55 respectively during the study period while the average collaboration coefficient was found 0.34 for the same study period of 926 publications.

The study shows the distribution output by one, two, three, four, and five, six, and seven authored papers. The co-authorship pattern has been studied to figure out how male-female

output varies for different genders as a team. In this study, data has been categorized into one-authored papers, two authored papers, and three authored papers, and so on. The value for the collaboration coefficient is different for the male and female authors and the average value of CC is 0.34 during the period 1999- 2018.

Table- 4.13: Collaboration Coefficient (CC)

Type of authorship	Female	Male	Male-Female	Total
Single Author	98 (68.6)	243 (44.51)	0	341 (36.83)
Two Author	43 (29.86)	239 (43.77)	174(74.58)	456 (49.24)
Three Author	3 (2.08)	50 (9.16)	48 (20.34)	101(10.91)
Four Author	0	12 (2.20)	9 (3.81)	21(2.27)
Five Author	0	1 (0.18)	4 (1.69)	5(0.54)
Six Author	0	0	1 (0.42)	1 (0.11)
Seven Author	0	1 (0.18)	0	1 (0.11)
Total	144 (100)	546 (100)	236 (100)	926(100)
Collaboration Coefficient (C.C.)	0.16	0.30	0.55	0.34

When papers are written solely by female authors the value of CC is lowest i.e.0.30 whereas it is highest for papers jointly written by both the gender i.e.0.55. It is clear from the analysis that female co-authorship decreasing significantly when it is more than two authors. Twenty years of the study show that female-female co-authorship is zero for more than three authors. The high value of CC in the study indicates that multi- authorship is dominating male-female authorship hence it can be concluded that female authors prefer to collaborate with male authors rather than female-female collaboration.

4.10.4 Modified Collaboration Coefficient (MCC)

The derivation of the new measure is almost the same as that of CC, as given by Ajiferuke, Burrell, & Tague (1988). Imagine that every paper carries with it a single "credit", this credit

being shared among the authors. Thus if a paper has a single author, the author receives one credit; with 2 authors, each receives 1/2 a credit and, in general, if we have X authors, each receives 1/X credits (this is the same as the idea of fractional productivity as described by Price and Beaver as the score of an author when he is assigned 1/n of a unit for one item for which n authors have been credited.)

Hence the average credit awarded to each author of a random paper is $E[1/X]$, a value that lies between 0 and 1. Since we wish 0 to correspond to single authorship, we define the Modified Collaborative Coefficient (MCC):

$$MCC = \left(\frac{N}{N-1}\right) \left\{1 - \frac{\sum_{j=1}^A \left(\frac{1}{j}\right) f_j}{N}\right\}.$$

The given below table depicts the modified collaboration coefficient for the study 1999-2018. The modified collaboration coefficient (MCC) is given by Savanur and Srikanth (2010) as given below:

Table- 4.14: Modified Collaboration Coefficient (MCC)

Type of Authorship	Female	Male	Male-Female	Total
Single Author	98 (68.6)	243 (44.51)	0	341 (36.83)
Two Author	43 (29.86)	239 (43.77)	174(74.58)	456 (49.24)
Three Author	3 (2.08)	50 (9.16)	48 (20.34)	101(10.91)
Four Author	0	12 (2.20)	9 (3.81)	21(2.27)
Five Author	0	1 (0.18)	4 (1.69)	5(0.54)
Six Author	0	0	1 (0.42)	1 (0.11)
Seven Author	0	1 (0.18)	0	1 (0.11)
Total	144 (100)	546 (100)	236 (100)	926(100)
Modified Collaboration Coefficient (M.C.C.)	0.16	0.30	0.55	0.34

4.10.5 RELATIVE GROWTH RATE AND DOUBLE TIME OF PUBLICATION

It has been observed that RGR of publication is gradually decreasing during 1999-2018. It is seen that RGR decreased from the rate of 0.55 in 2000 to 0.05 in the year 2018. The growth of all publications has been measured based on RGR and Dt model. RGR is calculated to analyze the increase in the number of publications on time and Dt is directly related to RGR. The mathematical representation of the mean relative growth rate of articles over a specific period is derived from the following formula developed by Mahapatra (1985):

$$RGR = \frac{W2 - W1}{T2 - T1}$$

where RGR = Growth Rate over the specific period of the interval

$W1 = \log_e$ (natural log of the initial number of contributions)

$W2 = \log_e$ (natural log of the final number of contributions)

T1= the unit of initial time

T2= the unit of the final time

Double Time of Publication

Doubling Time is defined as “The number of years required for the population of an area to double its present size, given the current rate of population growth.” (Beaie and Acol, 2009). There is a direct equivalence that exists between the relative growth rate and doubling time. If the number of publications/ pages of a subject double during a specified period, then the difference between the logarithm of the numbers at the beginning and the end of the period must be number 2. If one uses a natural logarithm, this difference has a value of 0.693. The corresponding doubling time for publications and pages can be calculated by using the following formula.

$$\text{Doubling time for Publications } D(t) = \frac{0.693}{R}$$

Table 4.15 shows the relative growth rate and doubling time of publications published in the SRELS Journal of Information Management during 1999-2018. The analysis resolved that

there are a lot of variation in relative growth rate and doubling time of publications. It cleared from the table that RGR decreases from 0.55 to 0.05 from 2000 to 2018. From the beginning, there was a continuous decrease in RGR except 2008 and 2010 when RGR value was little increased from previous years and the lowest RGR was reported in 2018.

Table 4.15: Relative Growth Rate and Double Time of Publication

Year	Number of articles	Cumulative No. of Article	W ₁	W ₂	RGR	Dt
1999	29	29	0	3.37	--	0
2000	23	52	3.37	3.92	0.55	1.26
2001	35	87	3.92	4.47	0.55	1.26
2002	39	126	4.47	4.84	0.37	1.87
2003	34	160	4.84	5.08	0.24	2.89
2004	38	198	5.08	5.29	0.21	3.3
2005	37	235	5.29	5.46	0.17	4.08
2006	34	269	5.46	5.59	0.13	5.33
2007	36	305	5.59	5.72	0.13	5.33
2008	50	355	5.72	5.87	0.15	4.62
2009	45	400	5.87	5.99	0.12	5.78
2010	62	462	5.99	6.14	0.15	4.62
2011	63	525	6.14	6.26	0.12	5.78
2012	66	591	6.26	6.38	0.12	5.78
2013	70	661	6.38	6.49	0.11	6.3
2014	46	707	6.49	6.56	0.07	9.9
2015	60	767	6.56	6.62	0.06	11.55
2016	64	831	6.62	6.72	0.10	6.93
2017	47	878	6.72	6.78	0.06	11.55
2018	48	926	6.78	6.83	0.05	13.86

The corresponding doubling time gradually increases with time from 0 to 13.86 from 1999 to 2018 continuously except 2008 and 2010 when it little decreased from previous year. The

highest dt. the time recorded in 2018 i.e. 13.86. Further, it found that there was a correlation with RGR and Dt. time and when the rate of relative growth rate decreases, the doubling time value increases.

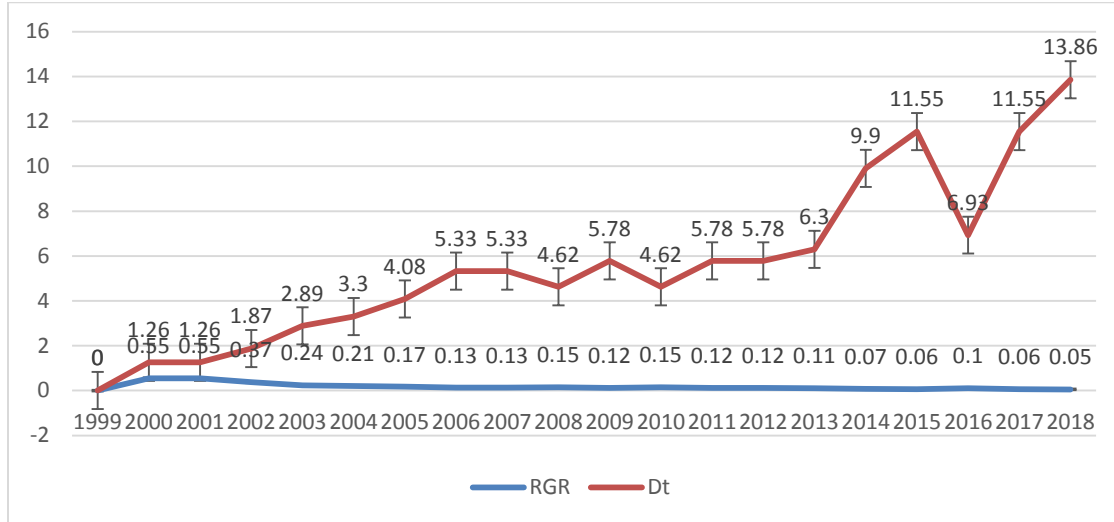


Figure 4.6 Relative Growth Rate and Double Time of Publication

4.10.6 Relative Growth Rate and Double Time of Publication of Female Author

It has been observed that RGR of publication for female authors is decreasing during 1999-2018. It is seen that RGR decreased from the rate of 0.81 in 2000 to 0.05 in the year 2018. The growth of all publications has been measured based on RGR and Dt model. RGR is calculated to analyze the increase in the number of publications on time and Dt is directly related to RGR. The mathematical representation of the mean relative growth rate of articles over a specific period is derived from the following formula developed by Mahapatra (1985):

$$RGR = \frac{W2 - W1}{T2 - T1}$$

Where RGR = Growth Rate over the specific period of the interval

$W1 = \log_e$ (natural log of the initial number of contributions)

$W2 = \log_e$ (natural log of the final number of contributions)

T1= the unit of initial time

T2= the unit of the final time

Table- 5.16: Relative Growth Rate and Double Time of Publication of Female Author

Year	No. of Female articles	Cumulative no. of Article	W ₁	W ₂	RGR	Dt
1999	8	8	0	2.08	--	0.000
2000	10	18	2.08	2.89	0.81	0.86
2001	8	26	2.89	3.26	0.37	1.873
2002	10	36	3.26	3.58	0.32	2.166
2003	13	49	3.58	3.89	0.31	2.235
2004	14	63	3.89	4.13	0.24	2.886
2005	15	78	4.13	4.36	0.23	3.013
2006	17	95	4.36	4.55	0.19	3.647
2007	14	109	4.55	4.69	0.14	4.95
2008	22	131	4.69	4.88	0.19	3.647
2009	15	146	4.88	4.98	0.10	6.93
2010	31	177	4.98	5.18	0.20	3.465
2011	29	206	5.18	5.33	0.15	4.62
2012	28	234	5.33	5.46	0.13	5.331
2013	32	266	5.46	5.58	0.12	5.775
2014	21	287	5.58	5.66	0.08	8.663
2015	28	315	5.66	5.75	0.09	7.7
2016	22	337	5.75	5.82	0.07	9.9
2017	16	353	5.82	5.87	0.05	13.86
2018	22	375	5.87	5.93	0.06	11.55

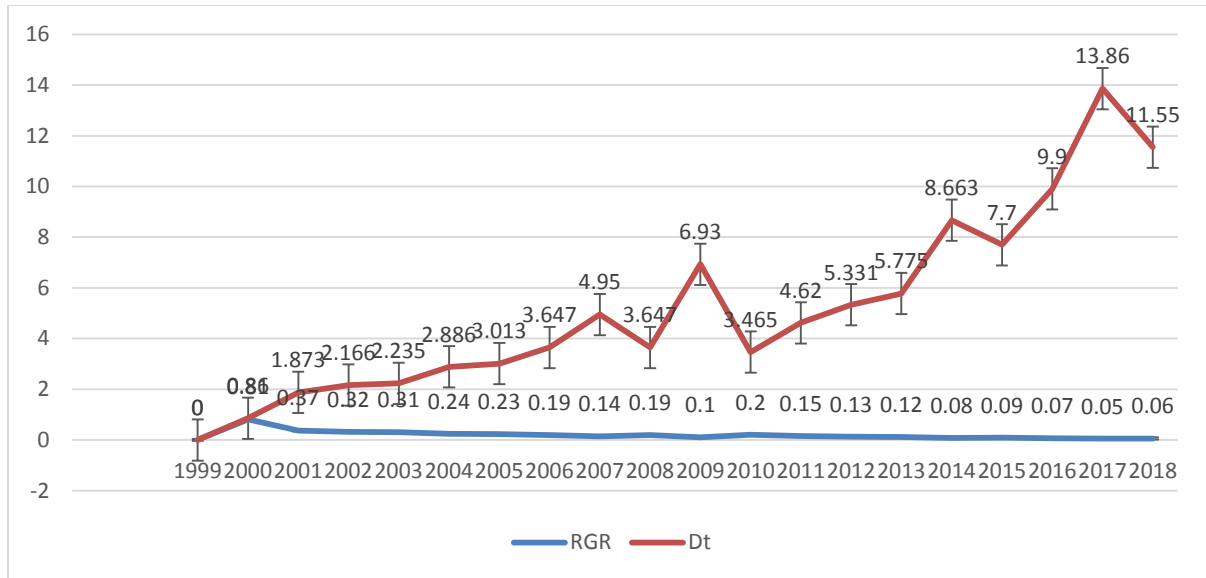


Figure 4.7 Relative Growth Rate and Double Time of Publication of Female Author

Double Time of Publication

There is a direct equivalence that exists between the relative growth rate and doubling time. If the number of publications/ pages of a subject double during a specified period, then the difference between the logarithm of the numbers at the beginning and the end of the period must be number 2. If one uses a natural logarithm, this difference has a value of 0.693.

The corresponding doubling time for publications and pages can be calculated by using the following formula.

$$\text{Doubling time for Publications } D(t) = \frac{0.693}{R}$$

Table 5.16 shows the relative growth rate and doubling time of publications published in the SRELS Journal of Information Management during 1999-2018. The analysis resolved that there are a lot of variation in relative growth rate and doubling time of publications. It cleared from the table that RGR decreases from 0.81 to 0.06 from 2000 to 2018. From the beginning, there was a continuous decrease in RGR except 2008 and 2010 when RGR value was little increased from previous years and the lowest RGR was reported in 2017. The corresponding doubling time gradually increases with time from 0 to 11.55 from 1999 to 2018 continuously except 2008 and 2010 when it little decreased from the previous year.

The highest Dt. the time recorded in 2017 i.e. 13.86. Further, it found that there was a correlation with RGR and Dt. time and when the rate of relative growth rate decreases, the doubling time value increases.

4.11 ANNUAL GROWTH RATE OF FEMALE AUTHORS

It is observed from the table 5.17 that the annual growth rate (AGR) of the total female contribution of the SRELS journal of Information Management year-wise in twenty years. The annual growth rate is a useful tool to identify trends of publications. In the table, the formula used to calculate the annual growth rate of the female contributor and uses the previous year as base. The annual growth rate (AGR) is calculated on the formula given by (Kumar and Kaliyaperumal, 2015)

Table 4.17 Annual Growth Rate of Female

Year	Female Contributions	AGR
1999	8	0
2000	10	25
2001	8	-20
2002	10	25
2003	13	30
2004	14	7.69
2005	15	7.14
2006	17	13.33
2007	14	-17.65
2008	22	57.14
2009	15	-31.82
2010	31	106.67
2011	29	-6.45
2012	28	-3.44
2013	32	14.29
2014	21	-34.38
2015	28	33.33
2016	22	-21.42
2017	16	-27.27
2018	22	37.5

To determine the annual growth rate of publications, the following formula has been used

$$AGR = \frac{End\ Value - First\ Value}{First\ Value} \times 100.$$

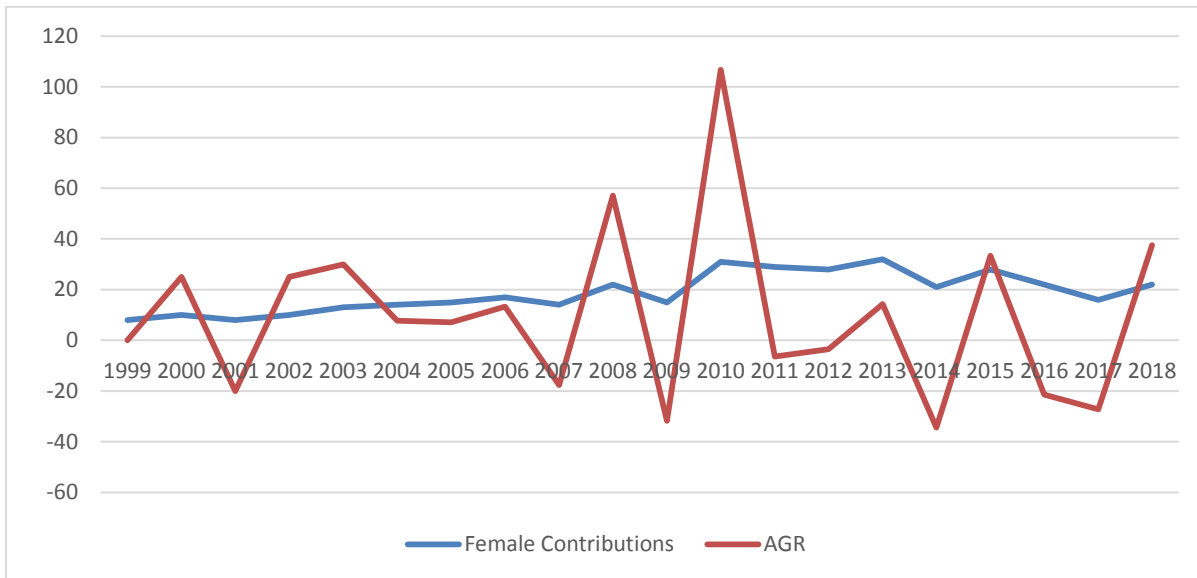


Figure 4.8 Annual Growth Rate of Female

It can be concluded from the observation there is a fluctuation in the annual growth rate. The reason for the fluctuation maybe because there is no constant growth of publications. The AGR of publications has not seen an increasing trend. Further observation is that in the year 2010 AGR is the highest with 106.67 followed by the year 2008 with AGR 57.14 on the other hand the lowest AGR is noted in the year 2014 with -34.38 followed by the year 2009 with -31.82.

4.12 RELATIVE PRODUCTIVITY AND RELATIVE POSITION OF FEMALE

To express an accurate estimate of 'females' contribution, it is important to calculate the sum of female's fractional contribution of the proposed study period 1999-2018. The authors have calculated the same for the 926 published papers from 1999 to 2018. For this purpose, the authors have adopted the methodology used by Garg and Kumar (2014) for measuring

the productivity of Indian women scholars in Life Sciences. To achieve these authors multiplied each female fraction by the number of articles in the respective category. This can be understood by one example, there are 174 articles in the category of $\frac{1}{2}$ female fractions (Table 5.18), which means that there are 2 authors per article and one of them is female. Based on this calculation, women's fractional contribution is 87 out of 174 ($\frac{1}{2} * 174 = 87$).

Table-4.18: Ratio of Female Authors to the Total Number of Authors

Ratio	Number of Papers	Total
(1)	(2)	(1)*(2)
$\frac{1}{1}$	98	98
$\frac{1}{2}$	174	87
$\frac{1}{3}$	36	12
$\frac{1}{4}$	7	1.8
$\frac{1}{5}$	4	0.8
$\frac{1}{6}$	1	0.2
$\frac{2}{2}$	43	43
$\frac{2}{3}$	12	8
$\frac{2}{4}$	2	1
$\frac{2}{5}$	0	0
$\frac{3}{3}$	3	3
$\frac{4}{4}$	0	0
Total	380	254.8

It is clear from the given table that the sum of the fractional contributions for women is 255 articles which are 27.5 % of total published papers including 144 articles exclusively written by female authors. Article per author share as a measure of productivity at the individual

level for women authors is $255/448 = 0.57$ and for males it is $546/1233 = 0.44$. From the above calculation, it is clear that female productivity at the individual level is higher than male productivity.

After analyzing the data it is found that in all the joint authored papers, women authors were the first author in 76 papers constituting about 32.2%. Similarly, in 94 (39.8%) papers women authors occupied the second position and in the rest 66 (28%) papers women authors occupied either the third or fourth position. This implies that women authors occupied the first or second position in about $\frac{3}{4}$ (72%) of the papers authored jointly by and female scholars.

4.13 RESEARCH AREA WHERE RESEARCHER WORK

Table 5.20 reflects the subject area of interest where authors contribute most; it shows the most trending area of the Library and Information Science field. The table has selected a list of the research area in the LIS field.

It is seen that out of 926 publications the subject where authors are more interested in Bibliometric/ Scientometric top with 201 publications, which is 21.71 % of the total contributions. The second interesting area among the authors is user studies with 153 (16.52%) followed by Digital literacy studies with 115 (12.42%). In another category, we have included papers that are not directly related to library science research.

The further analysis shows that the highest number of male authors i.e. 297 (24.09%) working in the field of 'Bibliometric/ Scientometric and second highest is 218 (17.68 %) male authors in the field of 'user study' followed by digital literacy with 137 (11.11%).

It is also observed that the highest female authors also preferred to contribute to Bibliometric/ Scientometric with 98 (21.88%) followed by 'user study' with 65 (14.51%) female authors followed by digital literacy with 65 (14.51%) of female authors.

From the study, it may be concluded that there is no such disparity regarding there area of research, even though females are dominated in publication their contribution toward the subject area is the same as men.

Table 5.19 Research Area Where Researcher Work

S. No.	Research Area	Articles	Male	Female	Total
1	Bibliometric/ Scientometric	201	297	98	395
2	User Studies	153	218	65	283
3	Digital Library	115	137	65	202
4	Others	52	75	34	109
5	Library Automation	50	72	15	87
6	Knowledge Organization	50	58	20	78
7	Library and Education	45	46	25	71
8	ICT/ Lib Consortia	41	59	22	81
9	Library Services	38	49	21	70
10	Information Literacy	36	42	20	62
11	Library Management	30	40	17	57
12	Knowledge Management	28	37	9	46
13	Academic Library	27	32	10	42
14	Public Library	20	24	5	29
15	Collection Development	16	18	6	24
16	Digital Preservation	10	11	5	16
17	Information Retrieval	9	9	8	17
18	Special Library	4	8	3	11
19	Research Methodology	1	1	0	1
	Total	926	1233	448	1681

4.14 MOST PROLIFIC FEMALE AUTHORS

Table 4.20 describes the most prolific female authors who have contributed the maximum number of papers to the SRELS Journal of Library and Information Management in their standing order as per their contributions made during the study period 1999-2018.

Table-4.20: Most Prolific Female Authors

Female author Name	Single authors	Two author	Three authors	More than three authors	Total Contribution	Rank
Khaiser Nikam	2	10	2	0	14 (3.68)	1
Amritpal Kaur	6	2	1	0	9 (2.36)	2
Lalitha Sami	0	7	1	0	8 (2.11)	3
P. Saraswathi	0	4	2	2	8 (2.11)	3
Thirumagal	1	7	0	0	8 (2.11)	3
Ritu Gupta	0	3	5	0	8 (2.11)	3
Swapna Banerjee	0	7	0	0	7 (1.84)	4
N. Parvathamma	0	6	1	0	7 (1.84)	4
S. Ally Sorman	0	4	2	0	6 (1.58)	5
B. A. Sharada	3	2	0	0	5 (1.32)	6
Ketki Bhatia	3	2	0	0	5 (1.32)	6
C. Gurushekhra	4	1	0	0	5 (1.32)	6
G. Thamarai Selvi	2	2	0	0	4 (1.05)	7
B. M. Meera	2	1	1	0	4 (1.05)	7
Neena Singh	1	3	0	0	4 (1.05)	7
Priti Mahajan	0	4	0	0	4 (1.05)	7
Three papers 11 authors	3	26	4	0	33 (8.68)	--
Two papers 34 authors	26	34	6	2	68 (17.89)	--
One paper 173 authors	55	91	24	3	173 (45.53)	--
Total	108	216	49	7	380 (100.00)	

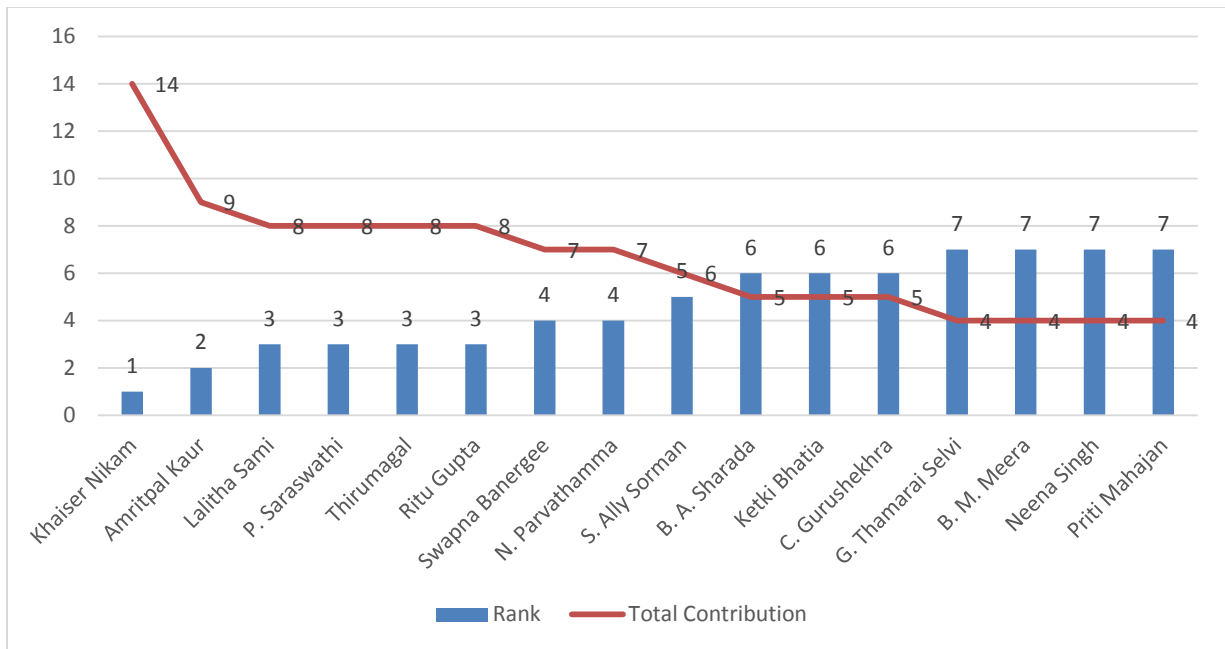


Figure 4.9 Most Prolific Female Authors

After analysis of the table, it resolved that Khaiser Nikam has contributed a maximum of 14 (3.82%) papers and listed as the most productive female author during the study period followed by Amritpal Kaur 9 (2.46%). In 3rd rank, there were 4 female authors (Lalitha Sami, P. Saraswathi, Thirumagal, and Ritu Gupta) who contributed 08 articles each. Besides these contributions, two female authors (Swapna Banerjee and N. Parvathamma) have contributed 07 papers each and occupied 4th rank and S. Ally Sorman with 06 contributions occupied 5th position in the ranking. Apart from these, there are four female authors have contributed 5 (1.32%) articles each and four female authors have made 4(1.05%) articles each. Four female authors have contributed 5 (1.32%) articles each and four female authors have made 4(1.05%) articles each.

The further analyses showed that there are 11 female authors, who had contributed 3 articles each, and 34 female authors had contributed 2 articles each, and similarly there are 173 female authors who had contributed one article each in this particular journal. In the above distribution, 108 female authors had contributed as a single author, 216 female authors as two-authors, and 49 female authors as three-authors and 7 female authors in more than three-author article.

4.15 TESTING OF HYPOTHESIS

In the present study, one Hypothesis was framed. Chi-square test was used to analyze the different variables and testing the Hypothesis, all tests were two-tailed with a statistical significance level of 0.05. the hypotheses are as follows:

H_1 =There is no difference between the professional category-wise distribution of males and females.

Table 4.21: Chi-Square Test of Professional Status of authors Gender-Wise

Professional Status	Count	Male	Female	Female	Total	Chi-square-test
LIS Teacher	Observed Expected	576 549	173 200	173 200	749	Chi-square value= 16.871
LIS Professionals	Observed Expected	293 323	147 117	147 117	440	df=3
Research Scholar	Observed Expected	172 164	52 60	52 60	224	
Others*	Observed Expected	192 197	76 71	76 71	268	
Total	1233	1233	448	448	1681	

df =degree of freedom

Chi-square tabulated value is $\chi_{0.05} = 7.81$

Chi-square calculated value is = 16.871

P value=0.0008

INFERENCE:

The Chi-square test is applied to test the hypothesis and it can be seen that the P-value = 0.0008 is less than the assumed value i.e. alpha (α) level = 0.05. It is also clear that the Chi-square calculated value is greater than to chi-square Tabulated value. Hence, the H_1 is not significant at 0.05 levels of significance. Therefore, the null hypothesis (H_1) is not accepted. It is confirmed that there is a difference between the professional category-wise distribution of males and females.

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CHAPTER 5

FINDINGS, CONCLUSION AND

SUGGESTIONS

The present study is based on data from the SRELS Journal of Information Management and compares the productivity and impact of women scientists with their male counterparts in the field of library science. The following are the salient findings of the study:

5.1 FINDINGS

1. A total of 926 articles from 1999-2018 are covered in the study. According to the study, the highest number of articles is 70 (7.56%) which is published in the year 2013 and the lowest is 23 (2.48%) in the year 2000. The highest numbers of contributors are 128 (7.61%) in the year 2013 and the lowest number of contributors is 37(2.2%) in the year 2000. There is no uniformity in the growth of the authors as well as articles.
2. The average article per year is 46.30 and an average author per year is 84.05 in the present study and it was found that there is no stability in the growth rate distribution of articles.
3. There are a total number of 1681 authors out of which 1233 (73.35%) are male authors and 448 (26.65%) are female authors during the study period 1999-2018. This difference shows the gender disparity and the majority of contributions are made by male authors.
4. In twenty years of period, two-authored publications are higher with 452 (48.81%) publications followed by one-authored with 344 (37.15%), 102 (11.02%) contributions were made by three-authors, and only 20 (2.16%) contributions by four-authors respectively. While only 8(0.9%) contributions were made by more than four authors or multiple authors. As compared to single authorship with 344 (37.15%) multiple- authorship is predominant.
5. The result of authorship pattern in the study found that most of the works are produced in a team comprising male-male authors 308 (33.26%), followed by works produced by male and female authors 231 (24.95%) and the works produced by the only male authors are 243 (26.24%), works produced by the only female are 98 (10.58%), and work produced by a female-female is 46 (4.96%). It can be

concluded that the contribution of female authors is less when they work at the individual level or in association with other female authors.

6. During the first decade of 1999-2008, the number of contributions with women authors was 131(14%), which increased to 249 (26.9%) during the period 2009-2018. This concludes that the number of papers by female authors increased almost double in the second decade. The similar, trend was also seen in the increase in the number of female authors from the first decade to the later decade of the study period.
7. The research productivity of the average male author per paper is 1.33 compared to the average female author per paper is 0.48, which is very less compared to male authors. It can be concluded that male productivity is three times higher than female productivity.
8. State-wise distribution of articles shows that the majority of publications is from Karnataka 324 (33.28%) followed by West Bengal with 103 (10.73%), followed by Tamil Nadu which is 8.35% of the total contribution and the lowest amounts of research articles are contributed by Bihar 0.1% followed by Tripura with 0.21%. A similar trend is seen for male and female authors who contributed to this journal. The reason behind Karnataka has got the highest number of contribution because of the place of publication of the SRELS journal of Information Management.
9. It is seen that the majority of publication is made from Indian authors with 856 (92.44%) compared to rest of the countries; this is because SRELS journal of Information Management is published in India followed by the USA with 19 (2.05%) stands second among the contributors.
10. Out of the total 926 articles, 860 (92.87 %) was produced in domestic collaboration and 55 (5.94 %) articles were produced in international collaboration and rest 11(1.88 %) is in both domestic and international collaboration. The number of papers written in domestic collaboration is more than fifteen times of paper published in international collaboration. It can be said that the share of international articles written by female authors is significantly lesser compared to male authors.

11. The study reveals that the Collaboration Index among the Male- Female publications is the highest with 2.35 followed by male publications with 1.71, and female publications with 1.34 and the average Collaboration Index is calculated to 1.81.
12. The degree of collaboration reveals that the Male- Female publications are the highest with 1.0 followed by male publications with 0.55, and female publications with 0.32.
13. It is analysed that the female author Collaboration Coefficient is high i.e. 0.55 when they collaborate with male authors and it is lowest i.e. 0.30 when they write individually. It is seen that female co-authorship decreasing significantly when it is more than two authors.
14. The modified Collaboration Coefficient is also highest among male-female collaboration with 0.55 followed by male authors 0.30 and female authors with 0.16.
15. The relative growth rate of articles has shown a decreasing trend from the year 2000 with 0.55 to 0.05 in 2018, whereas a doubling time for publication has shown an increasing trend from 0 to 13.86 from 1999 to 2018. The relative growth rate of articles of female authors has shown a decreasing trend from the year 2000 with 0.55 to 0.06 in 2018, whereas a doubling time for publication has shown an increasing trend from 0 to 11.55 from 1999 to 2018.
16. The annual growth rate (AGR) of total female contribution in the SRELS Journal of Information Management is fluctuating from positive to negative and negative to positive.
17. Women scholars produced 380 (41.03%) articles jointly as well as individuals and the remaining 546(58.96%) articles were authored by male researchers exclusively. There are 144(15.55%) articles that are exclusively written by female authors. Women researchers published 0.85 articles per author. Male authors produced 782 (41.03%) articles jointly as well as exclusively. Male researchers published 0.63 articles per author. Thus the study indicates that women scientists are more productive than their counterparts.

18. About the subject-wise distribution of paper in the SRELS journal of Information Management it seems that there is no such difference in the choice of a research area. The most preferred area of interest among the male author is Bibliometric/ Scientometric with 297 (24.09%) followed by user studies with 153 (16.52%) and digital literacy 115 (12.42%). The same kind of interest is seen among the female authors as there are no such biases.
19. In choosing their subject area. The highest contribution is in the area of Bibliometric / Scientometric with 98 (21.88%) followed by 'user study' with 65 (14.51%) female authors followed by digital literacy with 65 (14.51%). From the study, it may be concluded that there is no such disparity regarding there area of research, even though females are dominated in publication their contribution toward the subject area is the same as men.
20. It is been observed that the most productive female author is Khaiser Nikam who contributed 14 articles followed by Amritpal Kaur whose contribution is 9 articles. It also depicts that 98 female authors have contributed as a single author, 212 female authors as two-authors, 49 female authors as three-authors, and 7 as more than three-authors.

5.2 CONCLUSION

Women constitute about half of the total population and according to the AISHE report 2018-2019, women's participation in higher education constitutes 48.6% of total enrollment. It is evident that women are improving towards higher education but the rate at which they are growing is not enough to cover the gender discrepancy and lead the nation towards sustainable development. Women's participation in academic and research institutions are not adequate and this issue needs to be improved. Although women are improving their position in the academic and scholarly world still few steps are required for their better representation in the scholarly world. If they are not participating equally in attaining specialized skill, knowledge, and training, a large portion of human resources will get wasted and this will become an obstacle in the socio-economic development of the women and for the nation. It is, thus, recommended that women should attain higher degrees in education so that they will get involved in higher education and research institutions. The

reservation policy for women in academic positions can also be helpful to eradicate the problem.

Research and development are the key factors for the success of any nation. The number of researchers registering for doctoral research is increasing over the years. Though the publication output is increasing over the years, the productivity of individual universities is not very encouraging. There could be several factors in this situation. It is high time that the universities and research supervisors take stock of the current status of research and initiate corrective measures to improve the productivity of qualitative research. LIS research in India is gaining the attention of LIS researchers. In the era of the internet, the ICT supported and professional related subject areas call for the attention of LIS researchers, and research in those areas will contribute to the growth of knowledge and country

Bibliometrics is the most useful method for assessing macro research output. Research sustains innovation and innovation is one of the main driving forces behind economic growth. Therefore the ability to estimate research performance is vital for the Government to know the real worth of their research investments. Two different methods of evaluating research output are in practice by counting the number and share of publications and measuring citations of authors and their publications. These methods of measurement are widely implemented internationally also for the recognition of the contribution of authors even for the recommendation of Nobel Prizes.

The study reveals that within the 20 years study period women participated 41.04% of the contribution of the article in the SRELS Journal of Information Management. The total female contributors are only one forth in comparison to male contributors. There is a big gap in research productivity between males and females. The contribution by only female authors is seen less when they work solely or with other female authors. However, the number of female authors has increased during the 2nd decade of the study period during 2009-2018. Some positive changes have occurred in the contribution of the women authors in the journal. The number of articles authored by only female researchers is highest in the year 2011-2012. In other words, the younger female generation performance is much better than the older female generation, gender differences seem to change slowly over time. Different trends were observed in this particular journal. The female authors prefer to

collaborate more with partners from India compared to a partner from abroad. Women's research topics continue towards the areas that are more prestigious like those chosen by men authors. Among the female authors, Khaiser Nikam published the highest number of articles followed by Amritpal Kaur.

The study shows that within twenty years articles contribution in the SRELS journal of information management is increasing considerably. Collaboration pattern among authors in this study shows that the maximum number of authors who contributed in the SRELS journal of information management are single-authored i.e. 36.83% or two authored i.e. 49.26% which indicates that contributors have less tendency to work in collaboration. It reveals that collaborative research was preferred by authors and single-author paper is lower than co-author publication. The number of female-authored articles as well as female researchers had seen an increasing trend in the 2nd decade of the study which indicates that female researchers are more productive than male scholars but still it is below male research productivity. It is seen that contributions from Asian countries are more compared to the rest of the world. Geographical scattering of publication shows that the majority of articles are contributed from India followed by the USA respectively and within India, the most of contribution is from Karnataka state and it is in top followed by West Bengal. It is found that there is no gender disparity regarding the area of research, even though females are dominated by male authors in publication their contribution toward the subject area is the same as male authors. Regarding the professional status of both male and female authors, LIS teachers are found to be more productive as compared to others. The study reveals that there was a declining relative growth rate of articles and seen an increasing trend of doubling time of articles during the study period. This study has been established to be a valuable tool in the measurement of research productivity of faculty members and will be helpful for faculties, other academic faculty members, Research Scholars, Library professionals as well as interested students. It also motivates researchers towards hard work, fills the gaps of previous researches, and creates an opportunity for future research. Hence it is concluded from the study there is a difference in the terms of productivity between male and female authors in Library and Information Science research.

5.3 SUGGESTIONS AND RECOMMENDATIONS

1. Female faculties should concentrate more on research publications and the findings of our study showed that research in collaboration helps in quality publications therefore solo female authors should involve in more collaborative works.
2. Research productivity of institutions may improve if younger faculties produce more research publication output for the bright future of the institute.
3. The average productivity per author should be increased by promoting the authors whose research publications are less in number.
4. A healthy environment should be created to enable women academicians to carry out research and publish their findings.
5. Government, University management, and corporate bodies should encourage women researchers financially by way of providing them with a research grant, scholarships, etc.

5.4 AREAS FOR FURTHER STUDIES

1. Similar studies can be carried out for the other colleges as well as universities in the state and the national level institutions across the country.
2. A study of similar titles can be carried out by making a comparison of two or more reputed international and national journals.

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Zipf, G. K. (1993). Human Behaviour and the principle of least effort: An introduction to human ecology. Mass Addison- Wesley.

PARTICULARS OF THE CANDIDATE

NAME OF CANDIDATE : RAKHEE PATEL

DEGREE : M.Phil

DEPARTMENT : LIBRARY AND INFORMATION SCIENCE

TITLE OF DISSERTATION : Analysis of Library and Information Science
Research from Gender Perspective: A Case Study
of SRELS Journal of Information Management

DATE OF ADMISSION : 07/08/2018

COMMENCEMENT OF SECOND
SEM/DISSERTATION : 01/01/2019

APPROVAL OF RESEARCH PROPOSAL

1. DRC : 04/04/2019

2. BOS : 22/04/2019

3. SCHOOL BOARD : 07/05/2019

DATE OF SUBMISSION :

EXTENSION (IF ANY) : 31/07/2020

Head

Department of Library and Information Science

BRIEF BIO-DATA OF THE CANDIDATE

Name : Rakhee Patel
Date of Birth : 04/04/1987
Graduation : 2008, Mumbai University
Post Graduate : 2018, Mizoram University, Aizawl

PAPER PRESENTED:

- i. Presented a paper entitled “Bibliometric analysis of SRELS journal of Information Management, 2014-18” in Int. conf. on Sustainable Business Management and Information Technology organised by Dept. of Management, MZU, Mizoram.
- ii. Presented a paper entitled “Gender variation in LIS research productivity: A case study of SRELS journal of Information Management” in 2nd Int. conf. on Information System and Management Science organised by Dept. of Information Technology, Tripura University, Tripura on 6-7, 2019.
- iii. Presented a paper entitled “Use of Social Media by Academic Libraries in Library 2.0 Environment” in national seminar on Social Media and Librarianship: connecting the communities organised by Dept. of Lib. and Inf. Sc., MZU, Mizoram.
- iv. Presented a paper entitled “Research productivity of SRELS Journal of Information Management: A gender perspective” in Int. Conf. on Digital Information: A cognitive learning towards A.I. organised by RGNU of Law Punjab on 6-8 September 2019.

ABSTRACT

On

ANALYSIS OF LIBRARY AND INFORMATION SCIENCE RESEARCH FROM GENDER PERSPECTIVE: A CASE STUDY OF SRELS JOURNAL OF INFORMATION MANAGEMENT

**A Dissertation Submitted in Partial Fulfillment of the Requirements for the
Degree of Master of Philosophy**

RAKHEE PATEL

MZU Registration No. 1600776

M.Phil. Regn No. MZU/M.Phil./524 of 07.05.2019



**DEPARTMENT OF LIBRARY AND INFORMATION SCIENCE
SCHOOL OF ECONOMICS MANAGEMENT INFORMATION SCIENCE
MIZORAM UNIVERSITY, TANHRIL: AIZAWL
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1.1 INTRODUCTION

The progress of an academic field is mapped by their research publications and research output of a particular field. Publications and articles help to develop the discipline with new knowledge and ideas, which are helpful for the advancement of the profession. In the field of library and Information science, research plays a crucial part in identifying needs, problems, and helps in tackling the challenges in librarianship. The Association of African Universities (2017) states that "without research, universities will lose their capacity to offer first-class graduate studies, and to motivate and retain best brains and consequently lose the capacity to train the new generation of research fellows and scientists".

Library and information science (LIS) is a discipline which deals with the management of LIS centers in various ways to satisfy the information need of their users and this discipline has existed in India more than a century ago. Since the inception of this field, there are continuous growth and development have arisen due to various movements and involvement of eminent personalities and social reformers but real significant changes were observed after joining of Dr. S.R. Rangnathan to this profession. He did a lot of research on various facets of library and library services and derived a lot of basic theories, principles, and postulates which helped a lot in the growth and development of this profession. He has also started LIS education in various universities, initially as certificate and diploma courses and latter BLIS, MLIS, MPhil, and Ph.D. courses. Initially, the main areas of research in the LIS field are Classification, Bibliography, Documentation, Users Study, Information Seeking Behavior, Information Literacy Bibliometrics, etc. But last two decades the whole methodology of LIS research has changed due to ICT innovation and Impact. Many new research areas like, Matrices analysis (bibliometrics, Scientometrics, Webometrics, web content analysis), digital literacy, digitization, open-source software, multilingual information retrieval, semantic web MOOCs and many more are added in the LIS field which gave a lot of recognition to this profession.

The research productivity of the LIS subject is communicated in the form of journal articles, books, technical reports, and other types of publications. It is often used as an index of the department and institutes prestige. The new ideas and concepts generated through innovation and research are implemented in libraries are the most commonly used vehicles

through which these new scientific discoveries are known to the rest of the world. The reputation and credibility of a profession are based on the quality and quantity of new knowledge produced by it.

Universities and research institutions are considered an important center for scientific studies and create lots of new human knowledge and also contributing liberty to higher education and research which imparts for the development of the nation. The research output of any institutions or universities is reflected in the form of research articles, conference papers, or other forms of publications in peer-reviewed scholarly journals

Research and teaching are interconnected. Although research universities are trying to improve their excellence of research by emphasizing the importance of research more than teaching, the role of teaching still maintains a degree of importance in research universities. (Feldman, 1987; Thomas & Harris, 2000), Brew (2003, p.4) indicates that "the research universities see 'research-led teaching' by active researchers as part of their competitive advantage". Through these findings, we can see that when academics apply their updated knowledge from research to teaching, they can improve the teaching effectiveness that leads to enhanced learning outcomes for the student and they might bring teaching and research together to produce highly qualified human resources who are both knowledgeable in their field as a result of research-led teaching and able to conduct research independently.

1.2 GENDER PERSPECTIVE IN RESEARCH

The World Health Organization (WHO) defines gender as: "Gender refers to the socially constructed characteristics of women and men, such as norms, roles, and relationships of and between groups of women and men. It varies from society to society and can be changed."

Gender is an important influential factor in research productivity and many studies found that male researchers are more productive and progressive in the research fields compare to women. There are many types of research done whose results are of mixed opinions. Webber (2011) found that in recent years there is a change in women's contribution towards research, so it is not fair to say always that women are less productive than their male counterparts. He further states that females usually have lower numbers of non-refereed

journal articles, book reviews, and book chapters than males, but females have the same number of refereed journal articles, books, textbooks, and conference presentations as males (Webber, 2011). Women are one of the important components to know as an individual or for the development in any field of knowledge. Library and Information Science field has attracted both men and women as a practitioner and as an academician, and hence it is of interest to know whether the gender difference observed in other subjects are equally applicable in library information science field. Women are the most important component of our society and they are representing half of the population of society still, continue to fail to progress through the academic hierarchy in significant numbers and their contribution to research productivity is also not good enough. But in the last three decades, our government has taken a lot of measurement to improve their conditions through various schemes. Although they are moving towards equal representation still they are underrepresented in leading positions or institutes of higher education in teaching and research. The present decade is a turning point for women in academics and their conditions will improve very soon. Several studies have been tried to analyze the women's contribution to the research output of subjects, institutes, and countries based on research output or analysis of journal publication trends. Numerous studies and data exist from all over the world in scientific fields analyzing the male and female publication output and provide the insights of research productivity based on gender analysis.

1.3 SRELS (Sarada Ranganathan Endowment for Library Science) JOURNAL OF INFORMATION MANAGEMENT

The SRELS Journal of Information Management was founded by Dr. S. R. Rangnathan in 1964 and was known as 'Library Science with a slant to Documentation'. The title of the journal was changed to Library Science with a Slant to Documentation and Information Studies from Vol.25 in 1988 and then to 'SRELS Journal of Information Management' from Vol.37 in 2000. This journal is one of the leading peer-reviewed bio monthly periodicals completely dedicated to the field of Library and Information Science serving the preferential community by publishing papers in the field of Scientometrics, Webometrics, Library and Information Science, Information management, Informatics, and Information technology in

India. The finding reveals various aspects of the characteristics and pattern of the contribution of this journal (Source: <http://www.srels.org/>).

With the advent of e-publishing, keeping with the trend, an online version is also available. In the beginning, the papers mainly focused on the research conducted at DRTC in particular, Library Classification and Library Cataloguing, Documentation, and gradually extended its coverage to new areas of interest e.g. Computer Applications, Library Management, and Information Systems. During the 1970s, when CSIR/NISSAN was launched, special issues devoted to Information Systems - planning and organization, were brought out. Now the periodical is fully multidisciplinary, covering all facets of Library and Information Science (LIS). This study attempts to map the subjects of the papers of this periodical which has spanned the last fifty years. The analysis would serve as a checklist for the areas of current and traditional subject interests in the field of LIS. The study highlights the important contributions of this periodical and made for the progress and development of LIS during the last fifty years.

1.4 SIGNIFICANCE AND SCOPE OF THE STUDY

1.4.1 Significance of the Study

Scholarly publishing is a central point for academic success because the quantity and quality of publications determine performance, evaluations, funding decisions, promotions and increments, and reputation in the academic field. It is relatively harder for Indian women to become a researcher but inside research, there are fewer differences in the topics that they choose to investigate. Numerous studies are looking at the various aspect of gender research productivity in academia. These can be broadly categorized into several key issues: women's participation in academia, impediments that hamper academic women research productivity, and evaluations of women's research productivity overall. Gender differences in terms of scientific productivity need to be monitored in the twenty-first century when the whole world is talking about women empowerment and emancipation. In the present study, the disparity in research productivity between male and female authors will find out and highlighted. Females are improving their position in the academic and scholarly world; their contribution needs to be studied at regular intervals to pinpoint the change. The study is a step forward in this regard. There are many parameters in which the research productivity

will be examined in this study like- the number of publications, gender-wise authorship patterns, the geographical distribution of articles, collaboration pattern, a different research area in LIS where male and female work, and finally gender diversity in LIS academics, etc. Thus the present study helped to find out the gender aspect in research productivity in LIS research and gender inequality if any. The goal of this investigation is to help further characterize the processes producing gender differentials in publication rates and to better understand the productivity gap.

1.4.2 Scope of the Study

The scope of the present study was to analyze the gender perspective (male and female) research productivity of library and information science research based on published papers in SRELS Journal of Information Management, a peer-reviewed journal started to publication since 1964. This journal was started by Dr. S.R. Ranganathan, the father of library and information science, and continued in print as well as online mode. This journal is also an index in the Indian citation index and under the top five LIS journals of India (Patra and Chandel, 2004). To know the publication pattern and trends of any journals, two-decade is sufficient time. Thus the period of the present study is limited to 20 years i.e. from 1999-2018. In this study, we try to analyze the productivity gap and observed whether gender differences are persistent or they change over time.

RESEARCH GAP

On the analysis of the above literature review, it has been observed that there is a sufficient number of researches conducted on research productivity and gender perspective at various levels. But no detailed study has been carried out in the proposed area of the study and hence, this study is an attempt to full fill this research gap by providing fresh insight and investigate the productivity of LIS academics by a gender perspective.

1.5 RESEARCH DESIGN

1.5.1 Statement of Problem

Since journals have been a very popular means of spreading of innovative thoughts and research communications. This work plans to inspect gender-based research productivity in the LIS field based on the publication of the SRELS Journal of Information Management. Research work is universally accepted as an influential tool for the progress of society. In recent years there has been a constant focus on women's participation in academic and research works. Though the government is encouraging female participation and contribution to research works by making women-centric policies, offering grants and support still there is a gap between man and women productivity. To know the trends and present situation of gender disparity in research productivity and issues that hamper the academic women's research productivity in the LIS field, it is necessary to conduct a detailed study on it. Therefore was very interesting and challenging to conduct a study on gender perspective in research productivity of the LIS field.

1.5.2 OBJECTIVES OF THE STUDY

The objectives of the present study are:

1. To analyse the publication trends in the SRELS Journal of Information Management during 1999-2018.
2. To identify the nature of the authorship pattern and gender-wise authorship pattern in the selected journal.
3. To study the gender distribution in the collaboration pattern.
4. To analyse the geographical distribution of articles based on gender in the selected Journal.
5. To analyse different research areas of authors in the SRELS Journal of Information Management.

1.5.3 Hypothesis

The Study proceeds with the following hypothesis.

H₁: There is no difference between the professional category-wise distribution of males and females.

1.5.4 Research Methodology

The present study is to analyze the research productivity in terms of publication of SRELS journal from a gender perspective for 20 years (from 1999 to 2018). The SRELS journal of Information Management started its publication since 1964 and till now 55 volumes published since December 2018. Research data has been collected from the journal website (<http://www.srles.com>). The observation method has been used for collecting the personal information of the author to know their gender and profession. The study includes only journal articles. The detailed curriculum vitae (CVs) of the individual authors regarding their information are collected from the updated bio-data from SRELS official website. The relevant data were analyzed using R-software. The gender of the author was identified from the first name of the authors. The downloaded data included name along with their affiliation and their performing sector to which institution belonged. To identify the gender/sex of the authors of the particular article, we directly contact the authors through affiliation if there is no affiliation or doubt, other sources of information such as institutional websites, social networking sites such as Facebook, research gate, LinkedIn and google scholar has been used to know the missing information of authors. Publication productivity of individual faculties was cross-checked with the help of internet tools like- Google Scholar, Research Gate, Academia, etc.

1.6 FINDINGS

1. A total of 926 articles from 1999-2018 are covered in the study. According to the study, the highest number of articles is 70 (7.56%) which is published in the year 2013 and the lowest is 23 (2.48%) in the year 2000. The highest numbers of contributors are 128 (7.61%) in the year 2013 and the lowest number of

contributors is 37(2.2%) in the year 2000. There is no uniformity in the growth of the authors as well as articles.

2. The average article per year is 46.30 and an average author per year is 84.05 in the present study and it was found that there is no stability in the growth rate distribution of articles.
3. There are a total number of 1681 authors out of which 1233 (73.35%) are male authors and 448 (26.65%) are female authors during the study period 1999-2018. This difference shows the gender disparity and the majority of contributions are made by male authors.
4. In twenty years of period, two-authored publications are higher with 452 (48.81%) publications followed by one-authored with 344 (37.15%), 102 (11.02%) contributions were made by three-authors, and only 20 (2.16%) contributions by four-authors respectively. While only 8(0.9%) contributions were made by more than four authors or multiple authors. As compared to single authorship with 344 (37.15%) multiple- authorship is predominant.
5. The result of authorship pattern in the study found that most of the works are produced in a team comprising male-male authors 308 (33.26%), followed by works produced by male and female authors 231 (24.95%) and the works produced by the only male authors are 243 (26.24%), works produced by the only female are 98 (10.58%), and work produced by a female-female is 46 (4.96%). It can be concluded that the contribution of female authors is less when they work at the individual level or in association with other female authors.
6. During the first decade of 1999-2008, the number of contributions with women authors was 131(14%), which increased to 249 (26.9%) during the period 2009-2018. This concludes that the number of papers by female authors increased almost double in the second decade. The similar, trend was also seen in the increase in the number of female authors from the first decade to the later decade of the study period.
7. The research productivity of the average male author per paper is 1.33 compared to the average female author per paper is 0.48, which is very less compared to male

authors. It can be concluded that male productivity is three times higher than female productivity.

8. State-wise distribution of articles shows that the majority of publications is from Karnataka 324 (33.28%) followed by West Bengal with 103 (10.73%), followed by Tamil Nadu which is 8.35% of the total contribution and the lowest amounts of research articles are contributed by Bihar 0.1% followed by Tripura with 0.21%. A similar trend is seen for male and female authors who contributed to this journal. The reason behind Karnataka has got the highest number of contribution because of the place of publication of the SRELS journal of Information Management.
9. It is seen that the majority of publication is made from Indian authors with 856 (92.44%) compared to rest of the countries; this is because SRELS journal of Information Management is published in India followed by the USA with 19 (2.05%) stands second among the contributors.
10. Out of the total 926 articles, 860 (92.87 %) was produced in domestic collaboration and 55 (5.94 %) articles were produced in international collaboration and rest 11(1.88 %) is in both domestic and international collaboration. The number of papers written in domestic collaboration is more than fifteen times of paper published in international collaboration. It can be said that the share of international articles written by female authors is significantly lesser compared to male authors.
11. The study reveals that the Collaboration Index among the Male- Female publications is the highest with 2.35 followed by male publications with 1.71, and female publications with 1.34 and the average Collaboration Index is calculated to 1.81.
12. The degree of collaboration reveals that the Male- Female publications are the highest with 1.0 followed by male publications with 0.55, and female publications with 0.32.
13. It is analysed that the female author Collaboration Coefficient is high i.e. 0.55 when they collaborate with male authors and it is lowest i.e. 0.30 when they write individually. It is seen that female co-authorship decreasing significantly when it is more than two authors.

14. The modified Collaboration Coefficient is also highest among male-female collaboration with 0.55 followed by male authors 0.30 and female authors with 0.16.
15. The relative growth rate of articles has shown a decreasing trend from the year 2000 with 0.55 to 0.05 in 2018, whereas a doubling time for publication has shown an increasing trend from 0 to 13.86 from 1999 to 2018. The relative growth rate of articles of female authors has shown a decreasing trend from the year 2000 with 0.55 to 0.06 in 2018, whereas a doubling time for publication has shown an increasing trend from 0 to 11.55 from 1999 to 2018.
16. The annual growth rate (AGR) of total female contribution in the SRELS Journal of Information Management is fluctuating from positive to negative and negative to positive.
17. Women scholars produced 380 (41.03%) articles jointly as well as individuals and the remaining 546(58.96%) articles were authored by male researchers exclusively. There are 144(15.55%) articles that are exclusively written by female authors. Women researchers published 0.85 articles per author. Male authors produced 782 (41.03%) articles jointly as well as exclusively. Male researchers published 0.63 articles per author. Thus the study indicates that women scientists are more productive than their counterparts.
18. About the subject-wise distribution of paper in the SRELS journal of Information Management it seems that there is no such difference in the choice of a research area. The most preferred area of interest among the male author is Bibliometric/ Scientometric with 297 (24.09%) followed by user studies with 153 (16.52%) and digital literacy 115 (12.42%). The same kind of interest is seen among the female authors as there are no such biases.
19. In choosing their subject area. The highest contribution is in the area of Bibliometric / Scientometric with 98 (21.88%) followed by 'user study' with 65 (14.51%) female authors followed by digital literacy with 65 (14.51%). From the study, it may be concluded that there is no such disparity regarding their area of research, even though females are dominated in publication their contribution toward the subject area is the same as men.

20. It is been observed that the most productive female author is Khaiser Nikam who contributed 14 articles followed by Amritpal Kaur whose contribution is 9 articles. It also depicts that 98 female authors have contributed as a single author, 212 female authors as two-authors, 49 female authors as three-authors, and 7 as more than three-authors.

1.7 CONCLUSION

Women constitute about half of the total population and according to the AISHE report 2018-2019, women's participation in higher education constitutes 48.6% of total enrollment. It is evident that women are improving towards higher education but the rate at which they are growing is not enough to cover the gender discrepancy and lead the nation towards sustainable development. Women's participation in academic and research institutions are not adequate and this issue needs to be improved. Although women are improving their position in the academic and scholarly world still few steps are required for their better representation in the scholarly world. If they are not participating equally in attaining specialized skill, knowledge, and training, a large portion of human resources will get wasted and this will become an obstacle in the socio-economic development of the women and for the nation. It is, thus, recommended that women should attain higher degrees in education so that they will get involved in higher education and research institutions. The reservation policy for women in academic positions can also be helpful to eradicate the problem.

Research and development are the key factors for the success of any nation. The number of researchers registering for doctoral research is increasing over the years. Though the publication output is increasing over the years, the productivity of individual universities is not very encouraging. There could be several factors in this situation. It is high time that the universities and research supervisors take stock of the current status of research and initiate corrective measures to improve the productivity of qualitative research. LIS research in India is gaining the attention of LIS researchers. In the era of the internet, the ICT supported and professional related subject areas call for the attention of LIS researchers, and research in those areas will contribute to the growth of knowledge and country

Bibliometrics is the most useful method for assessing macro research output. Research sustains innovation and innovation is one of the main driving forces behind economic growth. Therefore the ability to estimate research performance is vital for the Government to know the real worth of their research investments. Two different methods of evaluating research output are in practice by counting the number and share of publications and measuring citations of authors and their publications. These methods of measurement are widely implemented internationally also for the recognition of the contribution of authors even for the recommendation of Nobel Prizes.

The study reveals that within the 20 years study period women participated 41.04% of the contribution of the article in the SRELS Journal of Information Management. The total female contributors are only one forth in comparison to male contributors. There is a big gap in research productivity between males and females. The contribution by only female authors is seen less when they work solely or with other female authors. However, the number of female authors has increased during the 2nd decade of the study period during 2009-2018. Some positive changes have occurred in the contribution of the women authors in the journal. The number of articles authored by only female researchers is highest in the year 2011-2012. In other words, the younger female generation performance is much better than the older female generation, gender differences seem to change slowly over time. Different trends were observed in this particular journal. The female authors prefer to collaborate more with partners from India compared to a partner from abroad. Women's research topics continue towards the areas that are more prestigious like those chosen by men authors. Among the female authors, Khaiser Nikam published the highest number of articles followed by Amritpal Kaur.

The study shows that within twenty years articles contribution in the SRELS journal of information management is increasing considerably. Collaboration pattern among authors in this study shows that the maximum number of authors who contributed in the SRELS journal of information management are single-authored i.e. 36.83% or two authored i.e. 49.26% which indicates that contributors have less tendency to work in collaboration. It reveals that collaborative research was preferred by authors and single-author paper is lower than co-author publication. The number of female-authored articles as well as female

researchers had seen an increasing trend in the 2nd decade of the study which indicates that female researchers are more productive than male scholars but still it is below male research productivity. It is seen that contributions from Asian countries are more compared to the rest of the world. Geographical scattering of publication shows that the majority of articles are contributed from India followed by the USA respectively and within India, the most of contribution is from Karnataka state and it is in top followed by West Bengal. It is found that there is no gender disparity regarding the area of research, even though females are dominated by male authors in publication their contribution toward the subject area is the same as male authors. Regarding the professional status of both male and female authors, LIS teachers are found to be more productive as compared to others. The study reveals that there was a declining relative growth rate of articles and seen an increasing trend of doubling time of articles during the study period. This study has been established to be a valuable tool in the measurement of research productivity of faculty members and will be helpful for faculties, other academic faculty members, Research Scholars, Library professionals as well as interested students. It also motivates researchers towards hard work, fills the gaps of previous researches, and creates an opportunity for future research. Hence it is concluded from the study there is a difference in the terms of productivity between male and female authors in Library and Information Science research.

1.8 SUGGESTIONS AND RECOMMENDATIONS

1. Female faculties should concentrate more on research publications and the findings of our study showed that research in collaboration helps in quality publications therefore solo female authors should involve in more collaborative works.
2. Research productivity of institutions may improve if younger faculties produce more research publication output for the bright future of the institute.
3. The average productivity per author should be increased by promoting the authors whose research publications are less in number.
4. A healthy environment should be created to enable women academicians to carry out research and publish their findings.

5. Government, University management, and corporate bodies should encourage women researchers financially by way of providing them with a research grant, scholarships, etc.

1.9 AREAS FOR FURTHER STUDIES

1. Similar studies can be carried out for the other colleges as well as universities in the state and the national level institutions across the country.
2. A study of similar titles can be carried out by making a comparison of two or more reputed international and national journals.