Gender divergence in two Indian LIS Journals: A Bibliometric study

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ABSTRACT
The present study aims to explore the publication trends and the gender divergence in Indian LIS research. The prime objective of the study is to identify the nature of authorship pattern in LIS literature and examine the research productivity among male and female authors. Further attempts are also made to identify the relationship between the research productivity and professional engagement of authors. The articles are examined from the perspective of authors' gender and the Influence of gender has been assessed with respect to at individual and collaborative levels. Findings of the study showed that the two-authored papers are top in the list having 212 (48.73%) articles followed by single authored articles 142 (32.64%). The most of the articles are published by male authors (73.33%) and only 26.66% of articles are published by female authors. Further, it is found that the male authors are more productive even as LIS teachers (81.85%), LIS professionals (72.01%) and Research scholars (54.09%). From the findings of the study, it is found that there exists a gender divergence in Indian LIS research.

Keywords: Gender divergence; Library and Information Science; Research Productivity; India.

INTRODUCTION

Research in Library and Information Science (LIS) in India has been a sporadic activity for about three decades increasing slowly until around 1986. Developments in network technologies, scholarly communication, and Indian policy, National Knowledge Commission Report are challenging libraries and information science to find new ways to engage, interact with communities and enhance research output. Library and Information science faculty and librarians are responding with service innovations in areas such as bibliometrics and research data management. Surveys have investigated research productivity/output within India and other research services globally with small samples. Faculty members and librarians need a multifaceted understanding of the research environment. Research and development activities in science and technology and other fields of human endeavour have contributed significantly to a phenomenal growth in research themes. This has resulted in an information explosion and interdisciplinary approaches to research over the last seven decades. These developments have placed new demands on the services offered by libraries and

information centres and conducting research having direct or indirect bearing on these services (Mangi, 2014).

Gender bias is not localised to a particular part of the world but is prevalent in all societies of the world (Baro et al., 2009). Gender is also an obstacle, particularly for females in academic work, an area which has been dominated by men for a long time (Vanarensbergen et al., 2012). Over the years, the existence of gender parity in academic research has resulted in low contributions from females compared to males (Schroen et al., 2004; Ritchie, 2009; Kaw and Ahmad, 2013).

Women remain underrepresented in academic positions and that a lower percentage of women are published at each academic level. However, it is not always gender disparity that negatively impacts research productivity of researchers (Bentley, 2012; Hopkins et al. 2013). The issue of gender is not unique to a particular part of the world, but it is consciously or handled differently in various countries and spheres of the society. Women often claim that what their male counterpart can do, they can do better (Baro, 2009).

Despite continues scientific accomplishments of women in global movement toward the gender equality, women researchers are still underrepresented in professional scientific activities (Ebadi and Schiffauerova, 2016). Women's contribution to science is one of the social development indicators throughout the world (Sotudeh & Khoshian, 2014), but their scholarly activity is also reported to be characterised by low representation in science in general and in engineering, technology and mathematics in specific (Murphy, et al., 2007; Arruda, et al., 2009). Productivity of academic women seems to be lower than their male peers worldwide, even in the developed counties with high gender developed index where issues such as gender discrimination are less significant and women face fewer difficulties and barriers in their career compared to those in a developing country (Mozaffarian and Jamali, 2008)

However in India also many studies have absorbed gender disparities. (Kaw and Ahmad, 2013) the study reveals the effect of conflict on women in the scientific world. There are significant differences by gender in terms of research productivity. (Sampath Kumar, et al., 2018) investigate the gender disparities in LIS research productivity in India. The study reveals low participation of females in LIS research compared to males. As can be seen, while most studies have focussed on gender disparities in academia, some newer studies have investigated the role of gender in academic performance of researchers. Keeping in the view, the divergence of gender and authorship pattern in various disciplines the present research study has been undertaken to investigate the gender divergence Indian LIS research.

LITERATURE REVIEW

Numerous studies have been carried out by various researchers, professional and gender divergence in library and information science research.

Puuska (2009) has analyzed 1,367 scholars who worked at the University of Helsinki, Finland, during the period 2002–2004. Study has shown that male scholars are more productive than female scholars in all types of publications. It is observed that there is a remarkable distinction, men publishing on average 1.9 times more monographs, and 15–42 % more articles than women. In both fractionalized and non-fractionalized total output, the publishing productivity of male scholars is about 1.4 times higher. Only in the case of conference paper, there is no statistically significant difference between genders.

Borrego et al. (2010) identifed "differences in the amount of scientific output and the impact of publications, in terms of citations, according to gender". The study reveals that females have low research productivity. However, the articles by female researchers "were cited significantly more often, even when self-citations were excluded"

Mendlowicz, et al., (2012) investigated the gender gap in the authorship of psychiatric literature as a surrogate marker of gender imbalance within Brazil and Latin America. The study found that the proportion of overall female authorship grew significantly from 40% (in 2001–2002) to 49% (in 2007–2008). While the average annual increment for original articles was virtually null (.01%), for the non-original articles the corresponding figure was 3.7%. study also reveals that the chance of a woman being first author was about three times greater in original papers as compared to non-original (review) ones at the beginning of the study period. The chance of a woman being first author was about three times greater in original papers as compared to non-original ones at the beginning of the study period; this differential declined by 11% per year during this period.

Davarpanah and Moghadam (2012) reported that females accounted for 13 percent of the articles indexed in ISI databases during the study period. There is a gap of approximately 87% in research productivity between Iranian male and female academics in favour of men. An analysis of Indian scientists' publications also revealed that the gender imbalance in favour of men. The 81.83% of the Iranian female authored articles are indexed in the Science Citation Index database that represent technological-scientific disciplinary areas and the remaining (18.17%) are covered by Social Sciences Citation Index and Arts & Humanities Citation Index.

Barrios et al., (2012) identified possible gender inequalities in the scholarly output of researchers in the field of psychology in Spain. A sample of 522 papers and reviews published in 2007 were extracted from the Thomson ISI Web of Science. The data showed that women were the first authors of a lower proportion of papers than expected and signed as a corresponding author less frequently than men. The presence of women, the collaboration pattern and the impact of these scientific publications were analyzed. The results showed that the average number of female researchers per paper was 0.42 and that 42.3 % of the papers had a female researcher as the first author.

Eloy et al. (2013) found that, among academic otolaryngologists, men had significantly higher h indices than women. In addition, men had higher research productivity rates than women at points early in their career. Nonetheless, the productivity of women

equalled or even surpassed those of men as they moved up the career ladder. Although gender disparities seem to be diminishing in academia during the past 30 years or so, female attrition rates remain high.

Paul-Hus et al. (2014) study revealed the Russian research output, productivity, collaboration and scientific impact over the 1973–2012 period clearly shows that women in Russia were under-represented in terms of their contribution to research output and scientific impact in almost all disciplines, all disciplines taken together, women account for less than 30% of fractionalized authorship over the studied period with Mathematics and Physics having the largest gap. However, for Psychology, the contribution of women to published articles averages 45%, reaching more than 50% after 2000, making it the most gender-equal discipline of those in the analysis.

Eigenberg and Whalley (2015) analysed the 8 criminological journals spanning 2007 to 2013. This study found that women's participation in the publication process has increased from earlier rates but remained below that of their male contemporaries. Men were more likely than women to have single-author publications (Men 25.6% vs. Women 16.7%). women's rates of participation in journal publications increased, but this did not necessarily close the gap, because the rate of men's publishing also increased significantly over the 6-year period. This growth corresponded with general trends of increasing co-authorship, suggesting that the recent gains in women's representation do not indicate decreases in gender disparities.

While most studies have focussed on gender disparities in academia, few recent studies have investigated the role of gender in academic performance of researchers. The review of literature clearly shows that gender divergence exist in different fields. But there are very few studies conducted by Indian LIS researchers to identify the gender divergence. To fill this gap this study has been conducted to know the research productivity of male and female authors in LIS research.

OBJECTIVES OF THE STUDY

The study has been conducted with in the following research objectives:

- To identify the nature of authorship pattern in Indian LIS scholarly literature.
- To examine the relationship between the research productivity and professional engagement of authors.
- To know the research productivity of male and female authors in LIS research.
- To know the most productive university as well as state based on the number of research publications.

SCOPE AND METHODOLOGY

The Scope of the study is confined to only two prominent LIS journals published in India during 2013 -17 viz., *i) Annals of Library and Information Studies and ii)DESIDOC Journal of Library and Information Technology.* The above promising journals have been

considered for the study since they have long traditional history of scholarly publications in Indian LIS discipline. Further these two journals are also included in the Scopus citations database. A total of 435 articles including research articles, review articles, case studies and technical papers were examined from the perspective of authors' gender and the influence of gender were assessed with respect to at individual and collaborative levels. Biographical notes provided at the end of each article and authors' details given in the first page were the chief source of information regarding the respective the author's gender, affiliation, university and country. The required details were extracted from the articles and saved in a separate file for further analysis. The details regarding number of articles, authorship pattern and author productivity are collected to fulfil the stated research objectives. Furthermore, the professional status of authors has been examined under four categories: LIS teachers, LIS professionals, Research scholar and Others (Technician, PG student, Mangers, Directors, and Scientist etc).

ANALYSIS AND INTERPRETATION OF DATA

Table 1: Research productivity by male and female authors

Year	Number of articles	Number of authors	Male authors	Female authors
2013	87	160	122 (76.25)	38 (23.75)
2014	94	185	134 (72.43)	51 (27.56)
2015	90	171	130 (76.02)	41 (23.97)
2016	80	160	112 (70)	48 (30)
2017	84	164	118 (71.95)	46 (28.04)
Total	**435**	**840**	**616 (73.33)**	**224 (26.66)**

Note: Number within the parenthesis indicates the percentage

Table 1 reveals the research productivity by male and female authors, during 2013 to 2017. A total of 435 articles are published in 2 prominent Indian LIS journals. It is clear from the table that a total of 840 Indian authors have contributed their research work in the Indian LIS journals. Of these, 616(73.33%) authors are males and 224 (26.66%) are females. It is also evident that every year, the involvement of male authors is higher compared to female authors. The finding is in line of Gul et al., (2016) where they reported that the male authors have published more than female authors.

Table 2: Year wise authorship pattern

Year	No. of. Articles	No. of authors	Solo author	Two authors	Three Authors	Four Authors	Five and above authors
2013	87	160	32 (36.78)	42 (48.27)	11 (12.64)	-	2 (2.29)
2014	94	185	29 (30.85)	46 (48.93)	12 (12.76)	7 (7.44)	-

2015	90	171	33 (36.66)	39 (43.33)	14 (15.55)	2 (2.22)	2 (2.22)
2016	80	160	25 (31.25)	39 (48.75)	10 (12.5)	3 (3.75)	3 (3.75)
2017	84	164	23 (27.38)	46 (54.76)	12 (14.28)	2 (2.38)	1 (1.19)
Total	**435**	**840**	**142 (32.64)**	**212 (48.73)**	**59 (13.56)**	**14 (3.21)**	**8 (1.83)**

Note: Number within the parenthesis indicates the percentage

Table 2 represents the authorship pattern in LIS journal articles. The data shows that two authored papers are top in the list with 212 articles (48.73 %) followed by the single authored papers (142- 32.64%), three authored papers (59- 13.56%) and four authored papers (14 - 3.21%). Hence it is revealed that collaborative research has dominated in the field of LIS research.

Table 3: Gender wise authorship pattern by year

Year	No. of Articles	Male	Female	Male & Male	Male & Female	Female & Female
2013	87	30 (34.48)	1 (1.14)	31 (35.63)	20 (22.98)	5 (5.74)
2014	94	20 (21.27)	9 (9.57)	34 (36.17)	26 (27.65)	5 (5.31)
2015	90	28 (31.11)	5 (5.55)	36 (40)	17 (18.88)	4 (4.44)
2016	80	21 (26.25)	4 (5)	27 (33.75)	21 (26.25)	7 (8.75)
2017	84	16 (19.04)	7 (8.33)	32 (38.09)	23 (27.38)	6 (7.14)
Total	**435**	**115 (26.43)**	**26 (5.97)**	**160 (36.78)**	**107 (24.59)**	**27 (6.20)**

Note: Number within the parenthesis indicates the percentage

Five different combinations of authorship patterns are made in the study. Two combinations involve an author's work at individual levels (male only or female only) and three represent the involvement of authors in groups (male-male; female-female; and male- female). It is evident from table 3 that most of the works are produced in a team comprised of male and male authors (36.78%), followed by the works male only (26.43%) and male and female authors (24.59%). Further, the contribution of female authors is lower regardless of whether they worked at an individual level (5.97%) or in association with other female authors (6.20%).

Table 4: Research productivity and professional engagements of male and female authors

Designation	Number of authors	Male	Female
LIS Teachers	226 (26.90)	185 (81.85)	41 (18.14)
LIS Professionals	293 (34.88)	211 (72.01)	82 (27.98)
Research Scholars	61 (7.26)	33 (54.09)	28 (45.90)
Others*	260 (30.95)	187 (71.92)	73 (28..07)
Total	**840**	**616 (73.33)**	**224 (26.66)**

* Technician, PG student, Mangers, Directors Etc.

Note: Number within the parenthesis indicates the percentage

The table 4 shows the research productivity and the professional engagements of male and female authors. It is evident from the table that the male authors dominated over female authors even as LIS teachers (81.85%) as well as LIS professionals (72.01%). In order to substantiate this data, the Chi-square test has been employed. The test clearly indicates that there is a significant association between the research productivity and also professional engagements of male & female authors (x2 =20.465, p=.000).

Table 5: Research productivity of male and female authors cross tabulated by states and Union Territories

State	Article	Authors	Male	Female
New Delhi	103 (24)	159	116 (72.95)	43 (27.04)
Karnataka	46 (10.72)	87	59 (67.81)	28 (32.18)
Maharashtra	41 (9.55)	70	53 (75.71)	17 (24.28)
West Bengal	30 (6.99)	47	44 (93.61)	3 (6.38)
Uttar Pradesh	22 (5.12)	36	22 (61.11)	14 (38.88)
Jammu & Kashmir	20 (4.66)	28	26 (92.85)	2 (7.14)
Kerala	20 (4.66)	47	28 (59.57)	19 (40.42)
Tamil Nadu	20 (4.66)	38	34 (89.47)	4 (10.52)
Andhra Pradesh	16 (3.72)	18	9 (50)	9 (50)
Punjab	16 (3.72)	18	15 (83.33)	3 (16.66)
Rajasthan	14 (3.26)	17	16 (94.11)	1 (5.88)
Telangana	14 (3.26)	19	14 (73.68)	5 (26.31)
Chandigarh	10 (2.33)	19	12 (63.15)	7 (36.84)
Chhattisgarh	8 (1.86)	14	13 (92.85)	1 (7.14)
Haryana	8 (1.86)	9	8 (88.88)	1 (11.11)
Himachal Pradesh	7 (1.63)	7	7 (100)	-
Jharkhand	6 (1.39)	8	8 (100)	-
Odisha	5 (1.16)	18	12 (66.66)	6 (33.33)
Uttarakhand	5 (1.16)	5	3 (60)	2 (40)
Gujarat	4 (0.93)	6	4 (66.66)	2 (33.33)
Madhya Pradesh	4 (0.93)	5	5 (100)	-
Mizoram	4 (0.93)	7	5 (71.42)	2 (28.57)
Assam	2 (0.46)	3	3 (100)	-
Bihar	1 (0.23)	2	2 (100)	-
Manipur	1 (0.23)	1	1 (100)	-
Sikkim	1 (0.23)	2	2 (100)	-
Tripura	1 (0.23)	1	1 (100)	-
Total	**429**	**691**	**522 (75.54)**	**169 (24.45)**

Note: Number within the parenthesis indicates the percentage

Table 5 table shows that the contribution of articles by male and female authors of different state and union territories. During the study period, author from New Delhi have published 103 articles and secured first place in the list. Karnataka stood in the second place by publishing 46 articles, followed by Maharashtra 41articles. Table also reveals that researchers from Bihar, Manipur, Sikkim and Tripura have published least

number of articles in the Indian LIS journals. It is observed that the male authors (75.54%) are dominated the female authors (24.45%) in most of the states in India.

Table 6: Research productivity of male and female authors cross tabulated by various countries

Country	Article	Authors	Male	Female
India	429 (85.28)	691	522 (75.54)	169 (24.45)
Nigeria	22 (4.37)	66	37 (56.06)	29 (43.93)
Sri Lanka	8 (1.59)	12	4 (33.33)	8 (66.66)
Bangladesh	6 (1.19)	15	12 (80)	3 (20)
Kingdom of Saudi Arabia	5 (0.99)	5	5 (100)	-
USA	5 (0.99)	7	2 (28.57)	5 (71.42)
Fiji	4 (0.79)	4	3 (75)	1 (25)
Iran	4 (0.79)	11	10 (90.90)	1 (9.09)
Sudan	3 (0.59)	3	3 (100)	-
Canada	2 (0.39)	2	2 (100)	-
Tanzania	2 (0.39)	3	2 (66.66)	1 (33.33)
Argentina	1 (0.19)	2	-	2 (100)
Austin	1 (0.19)	2	-	2 (100)
Botswana	1 (0.19)	2	1 (50)	1 (50)
Brazil	1 (0.19)	1	1 (100)	-
Malaysia	1 (0.19)	1	1 (100)	-
Singapore	1 (0.19)	2	1 (50)	1 (50)
Slovenia	1 (0.19)	1	1 (100)	-
Sloan	1 (0.19)	2	2 (100)	-
South Africa	1 (0.19)	2	2 (100)	-
Spain	1 (0.19)	2	1 (50)	1 (50)
Sultanate of Oman	1 (0.19)	2	2 (100)	-
Swaziland	1 (0.19)	1	1 (100)	-
Thailand	1 (0.19)	1	1 (100)	-
Total	**503**	**840**	**616**	**224**

Note: Number within the parenthesis indicates the percentage

Table 6 shows that the authors from 24 countries have contributed a total 503 articles in Indian LIS journals. Among these countries India produced 85.28% of articles and occupied the first place, followed by Nigeria (4.37%), Sri Lanka (1.59%) and Bangladesh (1.19%). Table also reveals that the male authors are predominated over the female authors in most of the countries.

Table 7: Research productivity of Male and Female authors cross tabulated by various Universities in India (Top 5)

Universities	Article	Authors	Male	Female	Rank
University of Delhi	23	29	19	10	1
Banaras Hindu University	13	15	6	9	2
University of Kerala	13	16	13	3	2
Indira Gandhi National Open University	12	13	7	6	3
University of Kashmir	12	16	15	1	3
Shri Venkateswar University	11	11	1	10	4
Panjab University	11	18	11	7	4
Jawaharlal Nehru University	10	12	10	2	5

Table 7 represents the list of prolific universities (Top-5) having contributed a maximum number of articles to the selected Indian LIS journals during the period 2013 to 2017. Out of the 435 contributions, highest numbers of articles have been contributed by the male and female authors of University of Delhi (23), followed by Banaras Hindu University (13) and University of Kerala (13). Further Jawaharlal Nehru University has occupied the 5th rank by contributing (10) articles. The distribution of articles by male and female authors is also presented in the table. It is very clear from the table that the most of the male authors have contributed more number of articles to the Indian LIS journals in all top 5 universities in India.

CONCLUSION AND SUGGESTIONS

Findings of the study

- The study reveals that the majority of articles (67.35%) are contributed from multi authors.
- The study found that the librarians have produced more number of articles (34.88%). The male authors dominated over female authors even as LIS teachers (81.85%) as well as LIS professionals (72.01%).
- The male authors are produced more articles (73.33%) compare to female authors (26.33%) in Indian LIS journals.
- The contribution of female authors is lower regardless of whether they worked at an individual level (5.97%) or in association with other female authors (6.20%).
- The study also found that the majority of authors contributed to Indian journals are from New Delhi (103) Karnataka (46) and Maharashtra (41) regions of India.
- The study shows that the most of the articles (23) contributed to the Indian journals from University of Delhi.

Suggestions

Based on the findings of the study, the following suggestions are hereby made:

- LIS Faculty members and Librarians need to work hard to publish articles in highly reputed journals.
- Enabling and conducive environments may be created to support female authors to carry out research and publish their research works.
- The study reveals an imbalance in terms of research productivity between male and female researchers in the field of LIS. In spite of global policies that try to heighten the position of women, the proportion of female researchers is not promising and no distinct change has been observed over time.
- In this context the Indian government and university authorities may encourage to provide research grants to support research among female authors.

Limitations and suggestions for future research

The findings of the study are based on the contribution of male and female authors in only two India LIS journals. The future researchers may expand the study by including more number of Library and Information Science journals publishing from India.

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