Winter 1-14-2022

Female Librarians and Adoption of Open Source Software

Jitender Sharma
Jaipuria Institute of Management, Noida, India, jitender.sharma@jaipuria.ac.in

Salma Khan
IFTM University, Moradabad, salmafarhan2004@gmail.com

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Jitender Sharma
Sr. Librarian & Research Scholar
Jaipuria Institute of Management, Noida
A-32A, Sector – 62, Noida – 201309, India
Email: jitender.sharma@jaipuria.ac.in
Mobile: 9899695953

Dr. Salma Khan
Ex-Chief Librarian & HOD – Department of Library and Information Science, IFTM
University, Moradabad, Uttar Pradesh, India
E-mail: salmafarhan2004@gmail.com

ABSTRACT

Purpose: Open source software is used widely across different continents though its adoption in libraries depend upon varioius factors. Type of library, availability of staff, qualification and skill sets of the librarian and other staff, support of the management, library budget, time availability, independence to the librarian are just some of the factors that may determine adoption of open source software. This paper tries to understand if gender of the librarian also has any significant impact on adoption of open source software.

Design/Methodology/Approach: This study is conducted in India focusing on libraries of the private management education institutions in the Noida and Ghaziabad of the Uttar Pradesh, a state of India. Data is collected using Google Forms. After normalization of data, analyis of the data is conducted using SPSS 18 version after conducting reliability analysis on the major vaiables for reliability of the data. The sample is chosen due to very large number and different types of educational institutions providing management education in this geographical area.

Findings: This study confirms that more and more libraries are adopting open source software now however adoption rate of open source software among female libraries is lesser. It is evident from the study women are not lagging behind due to qualification or skill sets but their other responsibilities i.e. family responsibilities cause work-life imbalance and hence they do not take much risks and try to adjust in pre-defined boundaries. Survey results also indicate if employer provides risk free environment to female librarians then adoption of open source software may become faster.

Originality/Value: This study is entirely original work of the authors and is based upon data collected using google forms after distribution among various libraries. Results of this study may help in employers and government to take up women-friendly measures that ensure work-life balance and provide a women-friendly environment so that they can use their knowledge and skills for betterment of their libraries.

Keywords: Software, Open Source Software, OSS, Female Librarians, Librarian' Gender, Librarian Gender, Open Source Software Adoption

INTRODUCTION

Open source software (OSS) are also like proprietary software only but with a diffrence that their source code are accessible for anyone to study, amend, refine or enhance and redistribute with or without a cost. Open here denotes availability of soure code with software and it doesn't always mean free. OSS is a community based initiative i.e. a whole developers community contribute to its development and it is not specific to an individual organization or person.

Open source software was not developed keeping libraries at the core but gradually a number of open source software were developed exclusively for different functions of the library. Open source software for automation, digitization, web contents management and learning management systems are more in number and are regularly amended with upgraded versions by different developers of open source community. Though Indian libraries are more identified as users of the open source software but now a small number of Indian library professionals are contributing in their development also. Few library software like NewGenLib and eGranthalaya etc. were developed as open source software in India by Indian library professionals.

Use of open source software (OSS) has provided an opportunity to the library community to make changes in the software as per local or individual library needs due to availability of source code. Though detailed programming knowledge of the language in which a software is written is required for amending the same but librarians have a freedom at least from the harsh or complex licensing conditions of proprietary software. Moreover, being community driven initiative both support and software patches are available to help librarians in making amendments as per their needs.

Not all libraries in India are on equal footing in terms of resources, manpower, skills set of library staff, freedom to run library in their own way etc. hence adoption of open source software also vary among libraries from NIL to all areas.

Automation activities in Indian libraries started with release of software like CDS/ISIS towards the end of 20th century. Later, few good commercial software developed in India led by LibSys, which is still the market leader among commercial library automation software in India though few other software too exist in the market. Commercial software catered the market requirement well. However, their costs has always been an area of concern. Moreover, making any amendment to suit individual requirements is not possible due to non-availability of the source code and very high cost in case any library takes vendor help to do it.

Female librarians too just like other female employees working in any organization face multiple barriers in their career including social, cultural, family and parenting barriers unlike their male counterparts and according to different studies and reports, they are judged all the time hence fear of failure remains always with them. This fear restricts or limits their risk taking capacity. That is the prime reason that there are lesser women employed in the IT

industry. Though library profession is not hostile to females but due to multiple constraints, there are still lesser percentage of females in higher positions in libraries.

OBJECTIVES

The present study tries to look into the current trends related to adoption of open source software (OSS) among private management education institutions and determines both advantages and barriers faced by using the open source software. It undertakes to study OSS adoption among males and female librarians and studies if there is any variation in adoption level of OSS by female librarians.

Outcome of this study will help not only in identifying both the benefits and problems associated with the usage of open source software but will also help in determining solutions to the problems faced in implementing such tools. Further, this study outcome may help policy makers in adopting measures so as to encourage female librarians to adopt open source software for their libraries

LITERATURE REVIEW

There is abundance of literature available both in print and electronic form on open source software and in about two and a half decades journey of OSS, extensive research conducted on open source software, which continues till date. Millions of search results occurs by searching open search software on any search engine.

However, in past very less or rather negligible work has been conducted in understanding if librarian's gender has any role to play in automation, digitization of the libraries using open source software. The scant literature available on this aspect is also highly generalized in the nature focusing on female participation in software industry in general and there is not even a single research study available exclusively on gender impact of librarians on OSS adoption.

Findings from the limited studies available on gender and open source software are listed below:

Powell, Whitney E and Hunsinger, D Scott (2010) have discussed gender bias issue in OSS field in their study. Lin, Yu-Wei and Besten, Matthijs den (2018) study describes how the software field is identified a male dominated industry citing male sociability as the main reason. This study advocates that a gender-balanced and female-friendly atmosphere will be a more conducive and productive workplace. Lie, Merete (ed) (2003) in her book has described in detail how females are still in minority when it comes to Information Technology domain. Mendez, Christopher et al (2018) study made use of a Gender Inclusiveness Magnifier tool to study different barriers in open source software field and particularly gender bias and this study too concludes that gender bias exists strongly in the open source software field.

Breanden Beneschott (n.d.) article mentions that women participation in tech industry is already very less and even if women are employed at big corporation like Facebook or Google

etc., technical roles are given to very few of them and this is more severe concern in open source projects. Another problem cited by this paper is double attrition rate of women than men in tech industry.

Studies by David & Shapiro (2008) and Robles, Reina, Serebrenik,Vasilescu & González (2014) identify that women representation in open source software domain is not even one-tenth of their total strength in computers field. Results of the FLOSS survey by Ghosh et al. (2002) are even more pessimistic finding hardly 1.1 per cent women participation in open source software development. According to Terrell et. al (2017) study on gender bias in open source, pull request for women with non-identifiable gender was more than identifiable women meaning by a strong gender bias exists in open source software development teams.

A study by Nafus, D., Leach, J. & Krieger, B. (2006) has looked into the reasons why open source software field is still not popular among females. Faulkner and Lie (2007) while acknowledging exclusion of women in IT domain have given strategic input for inclusion of more women in to the ICT profession and also how to curb their marginalization after inclusion. Ford, Harkins & Parnin (2017) paper related to the software developers' learning community 'Stack Overflow' discusses low representation of women in this developers' community and concludes that if more women are included in the community who interact with each other than they will be able to contribute more meaningfully. The earlier paper by Ford, Smith and Parnin (2016) has discussed what are the barriers for women in joining the software developers' community 'Stack Overflow'. Similarly, another paper by Ortu, M., Destefanis, G., Counsell, S. et al (2017) concludes that gender has a significant role to play in increasing productivity of a developers' community.

Balazs Vedres and Orsolya Vasarhelyi (2018) study on the other hand finds that disadvantage faced by women in open source software field is due to gendered behavior i.e. what work they do at workplace rather than a categorical disadvantage because of who they are.

A study by Devaraju S (2017) calls for enhancing digital skills sets by women librarian to meet the digital technology challenge to be successful in the digital era.

As no work has been conducted related to librarian's gender impact on adoption of open source software among their libraries, thus, there exists a need to study in detail and determine if librarians' gender has any direct or indirect impact about choice made by them related to library software selection.
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METHOD, DATA COLLECTION AND ANALYSIS

This study is conducted among the private sector educational institutions offering management education in the Noida and Ghaziabad areas of Delhi-NCR region. Both these regions have a large number of private sector educational institutions offering management education. This sample constitutes standalone management program, larger institutions offering management education as one of their programs and private universities offering management education as one of their programs.

Due to widespread Covid-19 pandemic, authors made use of Google form to collect the data using Survey method. Authors conducted a test run on 10 institutions and once test results established reliability of questionnaire and data, then questionnaire link was sent to all institutions of the region. Authors received 81 responses. After data curing and normalization process, finally 69 responses met the research criteria. Among 69 responses, it turned out that 2 respondent libraries have not started automation process so far so their response was considered to only understand constraints faced by them so as to develop suggestions to overcome their constraints and finally 67 responses were used for data analysis.

During reliability analysis of the data, the Cronbach's alpha values of the constructs was calculated to above 0.7 thereby displaying high-internal consistency reliability meaning by suitable for further analysis.

Table 1 – Respondents Details

Academic Qualification		
Qualification	**Count**	**%Age**
Graduate	12	17.40
Post Graduate	36	52.17
M. Phil	9	13.04
Pursuing Ph.D.	2	2.89
Ph.D.	10	14.50
Total	69	100.00
Professional Qualification		
Qualification	**Count**	**%Age**
Graduate	1	1.45
Post Graduate	26	37.68
M. Phil	9	13.04
Pursuing Ph.D.	10	14.50
Ph.D.	23	33.33
Total	69	100.00
Gender		
Gender	**Count**	**%Age**
Male	51	73.91
Female	18	26.09
Total	69	100.00
Age		
Age Bracket	**Frequency**	**%Age**
20-30 Years	7	10.15
30-40 Years	23	33.33
40-50 Years	31	44.93
50-60 Years	7	10.14
Above 60 Years	1	1.45

Total	69	100.00
Work Experience		
Experience (Years)	**Frequency**	**%Age**
0 - 5 years	6	8.69
05-10 Years	6	8.69
10-15 Years	28	40.59
15-20 Years	17	24.64
Above 20 Years	12	17.39
Total	**69**	**100.00**

Going through Table 1, it turns out that about 52.2 percent librarians are postgraduates in their basic academic stream and over 37 percent are postgraduates in library science. 33.3 percent of the librarians have Ph.D. as their professional qualification. 14.5 percent of the respondent librarians possess Ph.D. degree as their academic qualification. Hence, majority of the librarians were well qualified.

Gender data shows that 73.9 percent of the respondent librarians were males and only 16.1 percent of the librarians were females. It confirms the initial assumption that females are still in very less proportion at highest level in the library science discipline too.

Further, going through age of the respondents, it turns out that almost 45 percent librarians were of 40-50 years' age group, 10 percent in 50-60 years' age group, 32 percent were in the 30-40 years' age group, 10 percent of 20-30 years' age group probably joined their first job and merely 1.4 percent were in 60 years' plus age group. Almost 83 percent librarians had at least ten years plus experience and only 17 percent librarians had less than 10 years' experience.

Table 2 - Details about using Open Source/Commercial/Both Software

Does Your Library Use Any Software for Library Functions (Yes - 1/No - 0)		
	Frequency	Percent
No	2	2.9
Yes	67	97.1
Total	69	100.0
Do You Use Commercial/Open Source Software/Both (1/2/3)		
	Frequency	Percent
Commercial	35	52.3
Open Source Software	9	13.4
Both	23	34.3
Total	67	100.0

Out of the 69 respondent libraries, only 2 libraries are not automated and hence 67 libraries responded to the question if they use commercial or open or both type of software. Table 2

suggests that highest number of libraries i.e. 52.3 percent were using commercial software alone, 13.4 percent only open source software and 34.3 percent were using both type of software. This shows that commercial software is still most preferred type of software. However, open source software use is picking up and currently 47.7 percent libraries were using open source software for at least some of their functions.

Table 3 - Choice of Software for Different Functional Areas

	Commercial		OSS		None		Total	
	Count	Row N %	Count	Row N %	Count	Row N %	Count	Row N %
For Operating System(Commercial - 1/OSS-2/None-3)	57	85%	7	10%	3	4%	67	100%
For Desktop Software (Commercial - 1/OSS-2/None - 3)	56	84%	6	9%	5	7%	67	100%
For Integrated Library System (Commercial - 1/OSSS-2/None - 3)	39	58%	23	34%	5	7%	67	100%
For Institutional Repository/Digital Library Software (Commercial - 1/OSS-2/None -3)	22	33%	19	28%	26	39%	67	100%
For Learning Management System (LMS)] (Commercial - 1/OSS-2/None-3)	37	55%	16	24%	14	21%	67	100%
For Web-Content Management Software (CMS) (Commercial-1/OSS-2/None-3)	29	43%	8	12%	30	45%	67	100%

As expected, Table 3 data shows that majority of the librarians use commercial software for operating system and desktop software as both Windows and Microsoft Office are most widely used software for the same. Only 3 percent libraries were using OSS for operating systems and 7 percent were using OSS for desktop applications. This data, however, shows that use of open source software is fast picking up for use as Integrated Library Systems (34 percent), Digital Libraries or Institutional Repositories (28 percent) and for Learning Management Systems (24 percent). OSS is used in 12 percent libraries now for Web Content Management Systems.

Table 4 – Reasons for Choosing Open Source Software

	No		Yes		Total	
	Count	Row N %	Count	Row N %	Count	Row N %
Due to Previous Exposure	11	34%	21	66%	32	100%
Due to No Organizational Support	25	78%	7	22%	32	100%
Due to Free Availability	8	25%	24	75%	32	100%
Due to Source Code Easy Availability	6	19%	26	81%	32	100%
Due to Freedom to Modify and Redistribute	13	41%	19	59%	32	100%
Due to Conducive Features	19	59%	13	41%	32	100%

Due to Flexibility in Choosing Paid or Free Support	17	53%	15	47%	32	100%
Due to Documentation Availability	23	72%	9	28%	32	100%
Due to Platform Independence	20	63%	12	38%	32	100%
Due to Dissatisfaction with CS conditions	27	84%	5	16%	32	100%
Due to Collaboration among Users Community	20	63%	12	38%	32	100%
Due to High Cost of CS	12	38%	20	63%	32	100%
Due to Save in Time and Efforts	17	53%	15	47%	32	100%
Due to fear of Shutter Down by CS Vendor	22	69%	10	31%	32	100%

Table 4 data shows 32 out of 67 respondents libraries were are using OSS for at least some functions in their libraries. Free availability of the source code (81 percent) and free availability of the software (75 percent) were two of the main reasons for choosing open source software. High cost of commercial software (63 percent) and previous exposure to open source software (66 percent) were also quite significant factors followed by flexibility in choosing paid or free support and save of time and efforts (47 percent each). Unlike widely accepted belief not very high percentage of the respondents attributed conditions imposed by commercial software as one of the highly significant reasons. It is because not many librarians read the terms and conditions carefully before signing an agreement or probably the software was already there before they joined. It is also observed that less than one-third (31 per cent) were apprehensive about shutting down of business by commercial software vendor.

Table 5 – Choice of Open Source Software for Different Functional Areas

For Operating System	Frequency	Percent
Unix	2	6%
Linux	5	16%
FreeBSD	1	3%
OpenBSD	1	3%
Ubuntu	10	31%
None	13	41%
Total	32	100%
For Desktop Software		
	Frequency	Percent
Apache Open Office	8	25.0
None	24	75.0
Total	32	100.0
For Integrated Library Systems (ILS)/Automation		
	Frequency	Percent
Koha	29	90.6
None	3	9.4
Total	32	100.0
For Digital Library/Institutional Repository		

	Frequency	Percent
DSpace	17	53.1
EPrints	1	3.1
None	14	43.8
Total	32	100.0
For Learning Management Systems		
	Frequency	Percent
Moodle	12	37.5
None	20	62.5
Total	32	100.0
For Web-Content Management Software (CMS)		
	Frequency	Percent
Zoomla	3	9.4
WordPress	5	15.6
OpenCMS	1	3.1
None	23	71.9
Total	32	100.0

Table 6 data reflects that Ubuntu (31 percent) was the preferred choice for Operating systems among respondents though 41 percent do not wish to use open source software for Operating System. Apache Open Office was chosen for desktop system by 25 percent and rest 75 percent didn't opt for any open source software. 90.6 percent of the respondents mentioned Koha as defacto choice for Integrated Library System (ILS). 53 percent respondents mentioned DSpace as preferred open source software for Institutional Repositories, EPrints by 3 percent though a significant percentage (43.8 percent) have not developed their institutional repositories. Moodle (37.5 percent) is preferred open source software for Learning Management System (LMS) while 62.5 percent do not have any LMS. Majority (71.9 percent) of the respondents have not used any software for Web-content management system but few respondents have used WordPress (15.6 percent), Zoomla (9.4 percent) and OpenCMS (3.1 percent) respectively. Thus, it turns out that open source software is most used for library automation and digitization purposes. Koha and DSpace were the leading open source software for these purposes.

Table 6 - Are You Satisfied with the Use of OSS in Your Library

Response	Frequency	Percent
No	4	12.5
Yes	28	87.5
Total	32	100.0

In response to the question if respondents using OSS were satisfied with the use of OSS, 87.5 percent expressed satisfaction and 12.5 percent were not satisfied thus majority of the respondents using open source software were satisfied with OSS. This indicates that once librarians start using open source software, they will feel satisfied with the same.

Table 7 – Females versus Males Librarians' Satisfaction with OSS Use in Their Libraries

			Are you satisfied with the use of OSS in your library in different areas (Yes/No)? (1/0)		
			No	Yes	Total
Gender of the Librarian	Female	Count	1	4	5
		% within Gender	20.0%	80.0%	100.0%
	Male	Count	3	24	27
		% within Gender	11.1%	88.9%	100.0%
Total		Count	4	28	32
		% within Gender	12.5%	87.5%	100.0%

Out of total 5 female respondents using OSS in their libraries 80 percent were satisfied with using OSS while among males' satisfaction level was a bit higher i.e. 87.5 percent. Overall, it turns that majority of the librarians using open source software were satisfied using the same. Dissatisfaction level was a bit higher among female librarians. Lesser percentage of women satisfied with OSS satisfy the assumption that women are risk averting by their grooming.

Table 8 – Relationship of Gender and Choice of Software

Statement/Count	Females	18				Male	51	Total	69	
	Yes	%	No	%	Total%	Yes	%	No	%	Total%
Do you feel your gender has any relation in choosing software for your library?	10	55.6	8	44.4	100	13	25.5	38	74.5	100

Data from Table 8 identifies that 55.6 percent of female respondents admitted that their gender had a role in their decision for choosing open or commercial software while 44.4 percent did not agree to the statement. Among male respondents, only 25.5 percent agreed for their gender playing a role in software selection while majority of 74.5 percent did not agree to the statement. This data support the hypothesis that female librarians face issues while making their choices for a particular type of software in comparison to their male counterparts.

Table 09 – Details of Issues Feared or Encountered due to Gender while Adopting OSS

Statement/Count	Females	18				Male	51	Total	69	
	No	%	Yes	%	Total%	No	%	Yes	%	Total%
Authorities don't Expect Much Innovation	11	61.1	7	38.9	100	30	58.8	21	41.2	100
Staff don't Listen	12	66.7	6	33.3	100	44	86.3	7	13.7	100
OSS Risky Option than CS	8	44.4	10	55.6	100	28	54.9	23	45.1	100
Coding Difficult	10	55.6	8	44.4	100	25	49.0	26	51.0	100

Other Responsibilities don't Allow Experimentation	7	38.9	11	61.1	100	32	62.7	19	37.3	100
Difficult to Approach OSS Community	11	61.1	7	38.9	100	37	72.5	14	27.5	100
Job or Reputation at Stake in case Anything goes Wrong	13	72.2	5	27.8	100	40	78.4	11	21.6	100
No Financial or Moral Support	12	66.7	6	33.3	100	36	70.6	15	29.4	100
OSS Just Looks Better Conceptually but Actually not in Comparison to CS	6	33.3	12	66.7	100	39	76.5	12	23.5	100

Going deeper into the issues faced it is evident from the data given in table 9 that majority of the female librarians mentioned their other responsibilities (61.1 percent) as a major reason while making their choices about software. This supports that argument that female librarians are pressed with their duties towards their homes and families hence have little time to experiment or try to take all things in their hands.

Also, about 66.7 percent of female librarians believe that open source software is inferior to commercial software. On the contrary, these concerns do not seem so significant among male librarians. 55.6 percent of female librarians consider open source software as a risky option again signifying and supporting the assumption of risk averting nature of females in general.

Majority of the female respondents (61.1 percent) do not think that there is hesitation in reaching out to community for support indicating that working females do not have any issues dealing with opposite gender in contrary to assumption that women are not comfortable in dealing with opposite gender people. This reflects rising confidence level among female librarians.

Contrary to the assumption that females are avert to coding, the results show that larger percentage of female librarians (55.6 percent) do not think this as a concern comparing to their male counterparts (49 percent) which is again a positive development.

Similarly, only a smaller percentage of female librarians feel that their job or reputation will be at stake if anything goes wrong by adopting open source software. This data also shows that authorities or financial support is also not a very big concern anymore for majority of the librarians though some of the librarians still find it them as relevant issues. Majority of both female and male librarians do not agree that getting staff support is a significant issue.

Thus, from the analysis of the data in turns out that other responsibilities and considering open source as inferior to commercial software are two most significant factors for female librarians in taking a decision about open source software.

CONCLUSION

Unlike previous studies related to use of open source software among libraries, results of the current study indicate that acceptance of open source software is getting wider among libraries and specially among private sector management institutions libraries of Noida and Ghaziabad region which are two big hubs of educational institutions. From 67 respondent libraries using software for library work, 35 were using commercial and 32 were using open software for at least one area, which again confirms that open source is getting acceptance in more and more libraries.

Free availability of the source code and open source software, high cost of commercial software, previous exposure to open source software and flexibility in support services choice are the main reasons cited for choosing open source software.

Koha software is having numero uno status among libraries opting for open source software for automation as an Integrated Library System while DSpace software has that status now as an institutional repository software. Ubuntu and Apache OpenOffice were preferred open source software for Operating System and Desktop application though adoption level of open source software is much less in these areas. Librarians are also adopting open source software for Learning Management Systems as Moodle is the most preferred choice whereas for Web Content Management System WordPress is most preferred among those who are using an open source software for this purpose.

Results of this study clearly proves that adoption level of open source software is still much lesser among female librarians. Though the data proves that female librarians are equally qualified, skilled, experienced, and software-coding issue is not a big concern anymore but societal setup and family compulsions are still the biggest barriers for female librarians in taking a decision to adopt open source software. Majority of the female librarians still consider open source software as inferior to the long established and time-tested commercial software, which is again due to the risk averting and less experimentation nature of females.

Majority of the female librarians do not find organizational support, financial support or staff support as the reasons for open source adoption   male domination in software domain, non-friendly working environment.

From among 69 respondents, only 18 were female librarians, which confirms the assumption that women leave career midway and hence do not reach to highest positions. Family priorities and constraints are still hinder women career largely.

Finally, this study concludes with suggestion that though gender has definitely an impact upon adoption of open source software among library community but this issue can be handled if females are made free from societal or family burdens and provided equal opportunities like their male counterparts.

RECOMMENDATIONS

Females do not require any clutches but require equal opportunities to prove their mettle. Open source acceptance is rising among libraries and will increase further in time to come. It is necessary that our policy makers, institutions authorities create an environment where librarians in general and female librarians in particular can innovate and experiment with latest technologies and software. Outcome of this study may be further generalized and a new study may be undertaken that encompass all types of libraries including public and private sector universities and institutions, public libraries and different level of libraries.

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