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Abstract

It is the responsibility of the libraries to keep update its users by incorporating different technologies or tricks among the services offered to users. The libraries are managing diversified collection in both electronic and physical formats including the theses and dissertations awarded by their respective parent institutes in physical form. The academic libraries are directed by the Indian government through a mandate to protect and preserve the theses and dissertation in electronic form and provide access to the public domain. Institutional Repositories (IRs) have the prospective to store any amount of information electronically. Therefore, many of the academic libraries are forced to develop their IRs. The present paper is an attempt to find out the answers to some of the burning questions related to creation and management of IRs by the libraries. The library managers are sometimes confused when they asked to install the IRs Software, design the IR policy, motivate faculty, prepare budget estimates for IRs, etc.

The current study covered various theoretic aspects related to the creation and maintenance of an IR in an academic institution. The study is based on the review of available literature and analysis focused various aspects of motivations, cost factors and software requirement and its global perspectives for the creation of Institutional Repositories. The paper also discusses the role of IRs in Scholarly Communication. Finally, it highlights the barriers for IRs in an academic environment appeared in the repository literature.

Keywords: Institutional Repository, Academic Library System, Open Source Software, Scholarly communication, Emergence, Planning and Strategies, Cost, Libraries-IRs, Global Perspectives, IRs-Barriers.

Introduction

The libraries in the academic institutions playing the role of the imparting knowledge to the academic fraternity since ages. However, nowadays it becomes difficult for the academic libraries due to the scarcity of space. The emergence of Institutional Repositories (IRs) is relatively a new phenomenon that provides an opportunity for an institution to share its intellectual wealth with the worldwide community of scholars (Prosser, 2003). According to Nolan and Costanza (2006), IRs currently shifting landscape without a clear consensus on their role in the academic environment. However, Jones and MacColl (2008) added that IRs can be seen as a vital integral part of every academic institution's infrastructure. The last couple of decade witnessed to a plenty of literature generated covering various aspects of IRs.

Keeping in view of the importance of literature on a topic, the present study is an attempt to solve few important queries related to the creation and maintenance of an IR.

1. What are the major motivations to create and maintenance of a repository?
2. How far the cost factor affect the creation of an IR in an academic setup?
3. What is the role of Open Source Software in the creation of an IR and which OSS is preferred and discussed in the repository literature?
4. What is the present scenario of IRs among the countries worldwide?
5. What are the major barriers before the libraries to create IRs?
6. What is the role of an IR in the scholarly communication?

A literature review is a conceptually organized combination of results that provide a context for the research. It helps to refine ideas, know specifications of research procedure, adds to the clarity and understanding of things to be done during research. On the basis of the literature review, several issues surrounded with emergence, motivations, cost –factors, software selection and its global perspectives have to try to identify and discussed in the present paper to get an understanding about the Institutional Repositories.

The literature for the present paper was searched and collected through the online databases namely Science Direct, Emerald, Project Muse and Google Scholars, etc. since these are accessible to the author. To find the research questions mentioned above, following objectives of the study have also kept in mind so that the study can remain focused.

Objectives of the Study

i. Track the growth and development of IRs in global perspectives in changing scenario.

ii. Discuss the motivations, cost factors and software requirement for the creation of Institutional Repositories.

iii. Discuss the major barriers for Institutional Repositories in scholarly communication.

iv. Analysis the role of Institutional Repositories in Scholarly communication among academicians.

The emergence of Institutional Repositories

The emergence of Institutional Repositories is not a new phenomenon for academic institutions as Xia and Opperman (2009) stated that IRs have existed for almost a decade. However large-sized academic libraries were the early adopters and their early development focused on the accumulation, preservation, and dissemination of faculty research output in an openly accessible way. During the past two decades, medium and small-sized institutions have also started planning and implementing repositories to support the scholarly communications process. In 2007 Xia provided a conceptual framework and a historical analysis of how IRs have grown and developed. Lynch (2003) stated a substantial number of leading institutions of United States are increasingly making commitments to implement Institutional Repositories. Although Palmer, Lauren and Newton (2008) opined that repositories development is still in the process of establishing guiding principles and best practices. Daly and Organ (2009) state that Institutional Repositories have evolved during their short lifespan to a point where they are now actively promoting as publishing platform with a wide variety of formats to provide self- publishing solutions in the academic environment. According to Bailey et al. (2006), *Association of Research Libraries* (ARL) has a strong commitment to Institutional Repositories. According to a survey, out of 87 ARL libraries which responded, 43% have operational Institutional Repositories, 35% are planning and 22% do not anticipate any Institutional Repository by 2007. Another survey of *Canadian Association of Research Libraries* by Shearer (2006), only out of 17 respondents in 2005, 9 had working repositories, while there were only 4 in 2004.

A paradigm has shifted from a storehouse of printed books to digitized assets to a showcase to institutional intellectual profiles. Now Institutional Repositories are working as a platform to publish original and peer-reviewed contents in emerging open access journal (Bankier, Gabriel and Perciali, 2008). Yu (2006) in his paper clearly states the Joint Information System Committee's (JISC) view on future plans for digital repositories, which has proved a value to the UK educational community. Jones (2007) characterized the coming generation of repositories in

what ways it might be used and even a little on how it is done. It also considers briefly on the future and the incredible things that might be achieved by working together.

The motivation of Institutional Repositories

According to Xia and Opperman (2009), the experiments of Institutional Repositories over the past years have helped accumulate necessary experience and provide appropriate platforms for libraries to function as open access publishers. Royster (2008) identified that Institutional Repositories have been developed and promoted primarily as a means to re-publish scholarly content previously published elsewhere. He discusses the use of repositories as the emerging publisher of materials not previously published elsewhere and assesses their potential for scholarly publication as an alternative to traditional commercial or university presses.

Repositories can form a part of the institution's web platform that enables senior management in research institutions to collate and assess research, to market their institution, to facilitate new forms of scholarship, and to enable the tools that will produce new knowledge (Swan and Carr, 2009). Laxminarsaiah and Rajgoli (2007) justify the need of Institutional Repositories in the present era of information explosion. Cohen and Deborah (2007) emphasized the partnership between institution and faculty to support the staffing needs necessary to create and sustain an Institutional Repository. According to Cohen (2001), IRs have capabilities to increase sales of institutional publications, but it is too early to tell if it can add exposure to the academic publication. According to Jones (2007), Institutional Repositories are being created to improve the visibility and dissemination of scholarly work.

Yu (2006) stated that Institutional Repositories are a new breed that exists within the educational landscape. Through free and unrestricted online availability, they make it easier for researchers to disseminate and share research outputs and then support the open access goals of scholarly communication. Yu (2006) further expressed that in addition to authors, who gain visibility and users, who find information easily, the potential importance of repositories extended to institutions, which increase their research profile and wider dissemination of research outputs. As noted by Scholarly Publishing and Academic Resource Coalition (SPARC), Institutional Repositories are becoming a major component of evolving structure of scholarly communication (Crow, 2002).

Cost Factors of Institutional Repositories

Although librarians' initiatives to develop institutional repositories to increase the potential for greater access to scholarly information. The planning issues involved with implementing and

managing IRs need to be considered by library administrators and planners. A number of considerations like the use of open source software or license a proprietary software, access for in campus or outside of campus, or just facilitating content access to all or limited, the will the cost of creating and managing IRs. Library managers may also like a better understanding of staffing needs and start-up and ongoing costs. Darby, Jones, Gilbert, & Lambert (2009) explored financial considerations of institutional repositories for academic libraries, they limit the discussion primarily to institutional repositories and cost revolved around it.

Unfortunately, little is known about the costs associated with implementing and managing IRs, but a number of studies have addressed the issues related to the cost. Lynch & Lippincott (2005) conducted a survey which focused on content type and the software used for IRs, and since decisions about software choice will have a financial impact, such studies aid in understanding a potential IR's maintenance needs. Sources of funding are also influence on what can be accomplished, what kind of services are need to be started. The factors depend on how much funding is available and where the funding is sourced and under what time constraint.

For example, Rieh, Markey, St. Jean, Yakel, & Kim (2007) gathered various descriptive data about IR development among academic libraries which included types of funding sources. The authors found that the primary source of starter funds is a library's special initiative, followed by costs absorbed by the library's operating budget and then costs entered as a line item in the budget. They refer to other considerations that affect expenses fixed costs, economies of scale, and whether consortia and multi-institutional repositories are part of an initiative. Lynch & Lippincott (2005) suggested that labor or personnel issues are also a factor. Rieh *et al.* (2007) asked whether academic librarians arbitrate submissions or allow self-archiving by content creators. In case of self-archiving initiatives, lots of cost of the labor can be saved.

Giesecke (2011) raised a question reflects different IR submission models, which may result in different operational costs, especially in terms of personnel. Additionally, IR costs may be complicated by the mandate status of an institution, whether additional services are provided, such as digitization and copyright management. Li & Banach, (2011) revealed that use and acceptance of the IR can be a cost-effective venture for the institutions. It is up to the librarians how they generate funds for implementing the IRs. Cullen & Chawner, (2009) supported that type of software can be the deciding factor for the creation of an IR. Giesecke (2011) emphasized over sustainability in staff and funding for long-term, collective strategic plans may take into consideration the potential impact on publishing models.

Edgar & Willinsky (2010) reported on the costs associated with digitizing dissertations for an IR and find that the cost to scan and digitize 320 documents totaled to $23,562 in labor, which includes 906 labor hours for both temporary help and librarians, and $0.27 per page. Bevan (2007) estimated that a mediated service, where librarians are responsible for depositing items in the IR, costs much more to operate than an institutional repository where content creators self-archive their work. Giesecke (2011) written that "Estimates for the cost to an institution for establishing a repository range from over $130,000 per year to over $248,000 per year at MIT. Factors that impact costs include the number and type of staff, the type of technology chosen for the repository, the services provided, and the cost of preservation of data" (section "Costs of Institutional Repositories", para. 1).

Kim (2011) further written that another set of costs for the institution to consider is the cost for self-archiving articles... In a study of alternative scholarly publishing models published by the Joint Information Systems Committee in 2009, the authors estimated that each article archived by a faculty member cost the institution approximately $14.90. Kim (2011) also estimated the ongoing costs per year for a repository averages $159,000. If an institution's faculty deposited 5,000 articles in a year, the institution would incur an additional $74,500 (para. 4). A research university may well have needs and costs that are substantially different from those of a granting institution.

Open Source Software for the Institutional Repositories

Laxminarsaiah and Rajgoli (2007) throw light on software selection process and various software such as *Eprints, DSpace, and Fedora,* etc., available for the purpose of creating *Institutional Repository.* Similarly, Doctor and Ramchandran (2008) also discussed Indian Open Source Software (OSS) that can be used for the same purpose. Sutradhar (2006) gives detail of the hardware and software requirement for repositories along with information about available open source software and their specifications. Krishnamurthy (2008) in his article mentioned various OSS such as *Eprint, DSpace* and *Greenstone,* etc., being used by the libraries. He emphasized upon open access i.e. free availability of literature on the Internet, permitting any users to read, download, copy, distribute, print, search, or link to the full text of articles, crawl them for indexing, pass them as data to software, or use them for any other lawful purpose.

Goh et al. (2006) developed a comprehensive checklist for evaluation of OSS, consisting of 12 categories of items suitable for creating an Institutional Repository. Using this list, *Greenstone* was found to be the best performer, followed by *CDSware*, *Fedora,* and *EPrints. Greenstone* was assessed as the only software package that consistently fulfilled the majority of the criteria of the

checklist. Daly and Organ (2009) discussed the experiences they gained while developing their Institutional Repository named Research Online using an OSS called *Bepress* to make published output available. *Bepress* includes editorial management, under which authors can discuss various issues like managing submissions, editorial functions and peer- review options, etc. Crow (2004) provided a summary of functions and features available in various OSS such as *ARNO*, *CERN Document Server Software (CDSware), DSpace, EPrints, Fedora, i-TOR* and *MyCoRe.* Similarly, Prudlo (2005) discussed LOCKSS, EPrints, and *DSpace* in terms of who uses them, their cost, underlying technology, the required know-how, and functionalities.
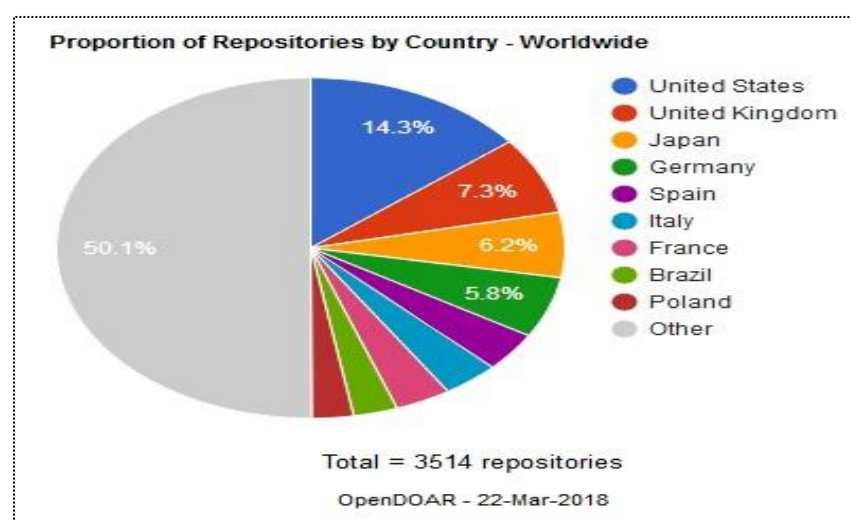
Marill and Luczak (2009) evaluated open sources such as *DAITSS*, *DSpace, EPrints, Fedora, Greenstone* and *Keystone DLS* and commercial sources such as *ArchivalWare, CONTENTdm, DigiTool* and *VITAL* to recommend for a digital repository at the *National Library of Medicine (NLM).* After completion of all testing, they recommended *Fedora* for the *NLM* digital repository. Jones, Day and Ball (2009) argued in favor and against of *Dspace* they also debated on Institutional Repository without OSS.

IRs as concepts are very much influenced by software. The two predominant and original IR software platforms are Eprints and DSpace. In 2000, Eprints was developed by Stephen Harnad and team at the University of Southampton (Tansley & Harnad, 2000) and in 2002, DSpace was launched by the Massachusetts Institute of Technology (MIT) with support from Hewlett-Packard. Chan (2004) noted that Eprints was designed to host traditional forms of scholarly publishing, including journal and conference articles, book chapters, and so forth, while DSpace was intended to host a much greater variety of material, such as the more formal instances of scholarly communication as well as various types of grey literature. In this respect, Eprints was developed specifically to allow researchers to make their work open access (Harnad, 2008) while DSpace was originally designed to address greater preservation of and access to the work of the intellectual output of an institution. (Moore, G. 2011).

Since the content held in a specific institutional repository reflects that repository's purpose, the quality of that content will likely affect the value of an IR if we deem such things to affect the reputation of the larger institution (Wacha & Wisner, 2011). As noted, the philosophical differences between EPrints and DSpace, at least in the early days of IRs at the beginning of the century, reflect two opposing viewpoints about their purposes.

Institutional Repositories in Global Perspective

Development of Institutional Repositories is becoming a universal phenomenon to facilitate global visibility of scholarly communication. Wani, Gul and Rah (2009) revealed that all the continents are maintaining Open Access Repositories, but major shareholders are in *Europe*, which contributes to 47.92% of total (599) repositories, followed by *North America* with 29.28% of (366) repositories. *Asia* emerges as the third largest contributor with 11.04% of (138) repositories. While *Australia* and *South America* are contributing 5.84% of (73) and 4.40% of (55) repositories respectively. The smallest number of repositories belong to *Africa* with only 1.52% of (19) repositories. Deployment of Institutional Repositories in the academic sector is an international phenomenon (Van Westrienen and Lynch, 2005).

Source: OpenDOAR

Figure 1: Worldwide Share of IRs

The USA

Xia and Opperman (2009) discussed the current practices being followed by the libraries in the USA. Rieh et al. (2008) and Zuber (2008) discussed the national trends of Institutional Repositories in the *USA*. Zuber also suggested about the subject wise distribution of various academic disciplines in Institutional Repository. Lynch and Lippincott (2005) pointed to deploy other resources such as faculty publications, research and project reports, and institutional publications like annual reports in addition to doctoral theses in the collection of the IRs in the United States. Further, they found that majority of the IRs have a strong commitment among the non-research institutions to upload the locally created material for teaching and learning in the institutes. According to Shearer (2006), Institutional Repositories are still evolving in Canada, however, slowly and gradually the repositories are building a strong base in the academic environment. While mentioning the distribution by country, Wani, Gul and Rah (2009) found that

the USA maintains the highest percentage i. e. 25.36% of (317) number of repositories maintained by the academic libraries in their higher education system. Chan, (2004) discussed the Open Access for the IRs as an additional venue to access the scholarly publication in an academic environment which is known as Open Access Archiving. The figure 1 shows that the USA covered 14.3% share of the total IRs registered on OpenDOAR as on 22nd March 2018. This also shows that dominance of the United States over other countries for the creation and management of the IRs.

The United Kingdom

According to Yu (2006) Institutional Repositories has added a value to the educational society in the UK through the Joint Information System Committees that works to support open access movement and respond to the need of the academic community in the UK. Wani, Gul and Rah (2009) in their country wise distribution ranked the UK the second leading country with 10.88% of (136) repositories. However, as per the current status, the UK shares 7.3% of total repositories registered on OpenDOAR.

India

In an editorial Venkadesan (2009) has given views on the status of scholarly research publications using Institutional Repositories in India. Doctor and Ramchandran (2008) also discussed the current status and future scope of IRs in the Indian scenario.

Ghosh and Das (2007) discussed Open Access Movement with its usefulness and features in Indian academic scenario. OAM in India has grown with the beginning of the 21st century, however, still, it reached its developing stage. Further, they throw some lights on the future of this movement in India. Although, some initiative like the building of consortium has been taken yet there is a lack of governmental policies in the regards. The growth of the Open Access movement in India depends upon the academic fraternity and they have to play a significant role in the adoption of open initiatives to support the IRs. To disseminate the research output, few academic institutions like IIS, Bengaluru, ISI Bengaluru, IIM Kozikhode, IIT Delhi, INFLIBNET Ahmedabad, etc. have set up their open access repositories. Rajsekhar, (2003) suggested to the research community and repository managers to submit their research output.

In the recent years many of the IRs have built up in India as per the OpenDOAR, an open-access authoritative directory of IRs so far there are 79 IRs have registered by the Indian educational

institutions that covered only 2.24% of the total IRs registered on OpenDOAR worldwide. It is, however, a slow and steady growth of IRs over last decade (OpenDOAR website, 2018).

Other Countries

According to Van Westrienen and Lynch (2005) in Germany, Norway and Netherlands IRs have become a common entity and an integral part of their academic institutions. However, in Finland, the IRs have just started to take place, there is a long way to go. A survey by Wani, Gul and Rah (2009) Germany find the third rank with 10.32% of (129) repositories. As regards to other Asian countries, Japan leads the continent with 5.52% of (69) repositories. Further, in the same survey, Australia claimed the fifth position with a 5.44% of (68) repositories. However, the Canada and Italy also making a significant contribution to establishing IRs.

The figure 1 reveals that Japan gets third rank (6.2%) as far as the registration of the IRs is concerns followed by Germany by registering 5.8% of the repositories. The figure 1 also shows that Italy, France, Brazil, and Poland also registered significant contribution towards IRs.

Barriers in the Ways to IRs and Scholarly Publishing

During the interview by Hutchns (2010), Suzane Bell shared various challenges regarding the development of Institutional Repositories. She expressed why faculty members on campus are so uninterested in submitting their articles to the repository? She also discussed technical aspect of repositories to handle different file formats and traditional publishing texts. Venkadesan (2009) observed that limited access to scholarly publications as a problem and he believed that the number of papers in the repositories should grow so that it can attract the users. Krishnamurthy (2008) identified that fund, legal framework and technical concerns are the major barriers those are associated with the IRs, for example, the lack of source code for OSS used in IRs is a key challenge to the IRs.

Cohen (2001) identified that collection development, content organization and online access to the printed output of researchers as challenges to the repositories. Cohen and Deborah (2007) addressed the problems such as platform selection, a partnership with stockholders and staffing requirements for creating Institutional Repositories including some technical issues. Lynch (2003) mentioned that the budget crunches is another major barrier for the IRs.

After two decades of repository development, there is a big shift in its role has noticed, nowadays high level of contents, services, and value for scholarly communities have established. IRs have proved the most useful for the academic fraternities through dedicated user services supporting the

production of knowledge. **Armbruster** and Romary, (2010) identified three major challenges for the repository development first identification and deposition of content, second access and use of services and thirdly the preservation of content and sustainability. These challenges are varied and depend on the different regions and setups.

Discussion: The Role of Institution Repositories for Scholarly Communication

Libraries have a long tradition of delivering information to all who need it, even the libraries feel pride itself on providing all its users with the latest and relevant information for research and studies. Presently, there is a wealth of scholarly research output that is hidden from access to users. Somehow, the users remain deprived of this grey literature. It is observed that the universities are the major producer of research output in the form of theses, research papers, research posters, etc. comprised of a variety of formats and topics. The libraries are making efforts together such valuable information at a single place to preserve and distribute the intellectual output of the universities. Institutional Repositories are just part of the discussion on the changing aspect of scholarly communication nowadays. The high cost of journal subscription and publisher's restriction on self-archiving, the libraries are encouraged to create their own online platform to access research output freely. Jones, Day and Ball (2009) mentioned that in 2008, a report of Association of Research Libraries (ARL) encouraged universities to prompt and expand the growth of IRs to broadcast and access to their research works.

According to Research Council UK (2005), it has been recognized by funding bodies worldwide that there is an international trend to acquire publication of research results through repositories to maximize the usage and impact of research. Bankier, Gabriel and Perciali (2008) observed that the universities are playing important role in making Institutional Repositories active by encountering many problems to give access to the research output. Today, universities have wider opportunity to reinvent the model of the repositories for scholarly publishing. According to Cohen (2001) online access to publications available in IRs can enhance the visibility, use and research output of a university.

Lynch (2003) assumes IRs as an instrument for restructuring the current economics of scholarly publishing rather than as vehicles to advance support and legitimize a much broader spectrum of new scholarly communication. It can structure and make effective otherwise diffused efforts to capture and disseminate learning and teaching materials, symposia and performances and related documentation of the intellectual life of universities. Lynch further stated that repositories could facilitate greatly enhanced access to traditional scholarly content by empowering faculty to

effectively use the new dissemination capabilities. Lynch and Lippincott (2005) found that repositories have a strong commitment to locally created materials for teaching, learning, and research. Doctor and Ramachandran (2008) evaluate the usage of e-resources needed for a repository of academic institutions, management, and handling, etc. Davis and Matthew (2007) reported on a three-part evaluative study of Institutional Repositories in which they described the contents and participation of academic fraternity**. McKay** (2007) summarized the usability of Institutional Repositories and its users into three main groups i.e. authors, information seekers, and data creators/maintainers while authors are reasonably well understood, the latter groups are particularly taken under study for their contribution to the IRs. Bankier, Gabriel and Perciali (2008) in their article expressed about the author's attitude towards open access publishing in Institutional Repositories and suggested better ways meet faculty needs.

Crow (2002) identified internally (the institutional users i.e. the faculty, research scholars, library staff, and students, etc.) and external (other than institutional users) users of Institutional Repositories. Jacso (2006) believed that IRs are beneficial for all the stakeholders, including publishers, editors, and authors as they can contribute to substantially increase their impact and the impact factor of the source journals. Davis and Matthew (2007) reported through the in-depth interviews with eleven faculty members in the field of sciences, social sciences, and humanities to explore their attitude, motivation, and behavior for non-participation in the repositories and suggested to support the repository initiatives. Foster and Gibbons (2005) focused on how faculty members do their research and writing, using IRs and understanding faculty to deposit their article in repositories. They developed a list for evaluation of individual needs centered mainly on authoring and co-authoring, archiving and disseminating their own work, and finding for reading by other authors.

Conclusion

The repository literature shows that IRs are playing a crucial role in the academic institutions of higher education of imparting knowledge and visibility of intellectual work. However, the growth of IRs during last two decades is slow and steady as far as numbers of IRs and its popularity are concerned. The total numbers of 3514 IRs are registered on the OpenDOAR so far as on the beginning of 2018. The current status of IRs country wise have discussed in the repository researchers, the USA and UK are the leading countries as regards to creation and maintenance of IRs. During the review of the literature, it is also observed that the evolution of the IRs has started

from the beginning of the new millennium with the emergence of digitization software like DSpace. The first decade witnessed the increase in the popularity and awareness of the IRs in the academic environment. In many countries the importance of IRs have recognized in the early stage of its evolution, therefore, a tremendous growth in the literature has noticed over a period of time. A number of repositories have created and emerged to showcase the research output and enhance the visibility of the intuitional publications. It is observed during the review that IRs provide an alternate platform over the monopoly of publishers, who charged publication fees and restrict the free access to faculty publications.

At the planning stage several issues like need assessment, software selection, services and content types, etc. are needed to be considered by the libraries administrators and planners. The financial aspect is another important parameter that also taken care by the planners, however, the literature reveals that the fund requirement for the creation of the repository is not at higher as the repository managers expect. The cost involves in the creation of a repository is varies from the region to region and the content size. In Indian scenario, the repository maintenance cost ranges from Rs. 2 to 4 lakhs in the current environment for the collection of a 30 thousand collection. The main factor that involved a large expense for the repository is the hardware and the labor that entered data of the individual repository. The literature shows that for the creation of the repository, many open source software are available in the public domain which is preferred by the repository managers. The literature reveals that several discussion has been taking place on the selection of open source versus commercial software but the majority of the repository is created through the open source software. As far as open source software are concerns, there are many options which are easily available for the creation of repository. The DSpace and Eprints are the most preferred digitization software, those are used by the majority of IRs as shown on the OpenDOAR. The IRs help to free access to faculty publications of an institution and enhance the chances to be cited their works. Thus it motivates scholarship and scholarly communication. The IRs in the recent years have proved to be a vital means to support open access goals of scholarly communication.

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