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# Assessment of Open-Access Institutional Repositories of China on Directory of Open Access Repositories (OpenDOAR)

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## Abstract

*Present-day institutional repositories play a vital role in promoting higher education systems and research and development. Individual organisations showcase their intellectual works using the Open access institutional repository platform. The present study focuses on the current status of Chinese Open Access Institutional Repositories. Data were collected from the global Directory of Open Access Institutional Repositories (DOAR) website. And collected data have been analysed and represented in graphical and tabular formats to clearly understand the study results. The Authors also assessed the Chinese' contribution to various parameters such as Year wise growth pattern, Nature of Institutional Repository, disciplines, Content, software and language used to build institutional repository.*

**Keywords:** DOAR, Dspace, Open Access, Institutional Repositories, Cspace, China

## Introduction

Present-day, institutional repositories play a vital role in promoting higher education systems and research and development. The term "Institutional repository (IR)" consists of a collection of digitally managed and managed digital content produced by teachers, staff and students in an institution (Velmurugan, 2010). Institutional repositories are emerging technologies for knowledge sharing and management in academic and research institutions (Doctor, 2008). An Institutional Repository (IR) is a Digital Library specialization (Adewumi & Ikhu-Omoregbe, 2010). Institutional repositories are "digital collections" of intellectual production that capture and preserve in single or multi-university communities (Crow, 2002; Hockx-Yu, 2006)". It has responsibility for the long-term preservation, organization and distribution, and access to digital materials produced by the institution (Lynch, 2003; Joo et al., 2019). Institutional repositories will help academic institutions and repository administrators to bring about improved investment decisions (Wirba Singeh, 2013). The

building of open institutional archives repositories is a new approach to disseminating research findings in many developed countries (Ezema, 2011).

The Directory of Open Access Repositories (Open DOAR) is maintained by SHERPA Services, based at the Centre for Research Communications at the University of Nottingham, UK (Vyas, 2013). It is a freely available repositories directory was launched in 2005. Open DOAR facilitates searching, finding, and retrieving country-based lists of repositories (Singh et al, 2020). DOAR is an attempt to build and maintain metadata harvesting service for all OAIR from the world (Vyas, 2013). Repositories enable the institutions to make their research and intellectual output more visible and accessible to any potential user (Loan, 2014). China is one of the most developing countries, which gives more focus on higher education and allotted very good amount of budget to its higher education (Das & Singh, 2017). An open access repository is a collection of full-text documents available online in an online database that can be accessed for free and directly. IR are maintained by research institutes to accommodate the work of their authors (Pinfield, 2005). Open access IR has been found to play an essential role in the preservation and dissemination of institutional research outputs (Ezema, 2011).

## **Literature Review**

Nayak et al (2021) examined the current status of open access institutional repositories of Shanghai Cooperation Organisation (SCO) Countries. The study's findings revealed that out of 214 repositories, the highest number of registration of repositories was took place in the year 2011 and 2019, i.e., 36 (16.82%) 34 (15.89%), respectively. It shows that majority used Dspace software 131(61.21%), followed by EPrints 35 (16.36%). Most of the repository preferred the English language 158 (52.15%) interface to develop institutional repositories, followed by Russian languages 56(18.48%). Kuri & Singh (2020) analyzed Open Access Institutional Repositories of India registered in DOAR. A total of 96 repositories were found on DOAR. The analysis presented in this study is based on selected criteria like content included, software used, languages, size of items, and policy used, etc. Singh et al. (2020) studied the Open Access Institutional Repositories of SAARC Countries the study's finding revealed that out of 128 institutional repositories, the highest number of (14.06%) institutional repositories are registered in 2013 and 2019 and belong to the institutional category. DSpace is the software used for creating the majority of the repositories (60.94%), followed by E-Prints (25%). Three-fourths of the repositories are represented in the English language having its contents in journal articles. Among the SAARC countries, India contributes the highest number of institutional repositories (72.66%). Singh (2017) examined the open-access IRs in Australia by selecting the database of DOAR. It is observed that majority, 42 (76.36%), of the IRs belong to universities, whereas 13 (23.64%) are from research institutions. English language was most preferred (i.e. 54 (98.18%)) language interface by Australian IRs. DSpace was a widely used (i.e. 15 (27.27%)) software by repositories. 39 (70.91%) repositories were from multidisciplinary subjects, and more archived form of scholarly communication in Australian open-access IRs was 44 articles (20.85%). Das & Singh (2017) conducted a study to discover the Chinese Open Access Institutional Repositories registered in open DOAR. The study determine the current status of

open access institutional repositories in China based on the four key constraints, i.e. number of IRs, types, subjects and contents and software used. The study highlights the current status of open access institutional repositories in China and its contribution to a global knowledge base. Singh & Verma (2017) examined the open access institutional repositories of Asian countries. The studies findings indicate that out of 613 open access repositories 317 (51.71%) were created eastern Asia alone. The study also revealed that China 5027585 (41.31%) was the major contributor in open access IRs among other Asian Countries. Vyas (2013) conducted a study to discover the Indian Open access institutional repositories registered in open DOAR. Total 2233 repositories were found on DOAR from all country on different subjects. Out of 2233, 54 repositories were from India. Analysis is presented on the basis of selected criteria like software used, size of items, content included, languages and policy used etc.

### **Scope and Limitations of the study**

This study focused on open access institutional repositories registered in the Directory of Open Access Repositories (DOAR). To know the research contributions of China, the authors have limited the study only to the institutional repositories registered by China. Those institutional repositories available in Open DOAR up to 3<sup>rd</sup> August 2020 has been considered for the study and analyzed.

### **Objectives:**

- To find out the year-wise distribution of Chinese institutional repositories;
- To assess the repositories type, subject and languages wise distributed in DOAR;
- To know the type of repositories and software used for Institutional Repositories;
- To know the China's Institutional Repositories enrollment in DOAR;

### **Methodology**

In this study, the researchers have explored the open access institutional repositories of China. Data were collected from the Directory of Open Access Institutional Repositories (DOAR) using website <https://v2.sherpa.ac.uk/opendoar> on 3<sup>rd</sup> August 2020. The collected data were categorized into repository types, year-wise growth, software used, content-wise language, and subject-wise repositories and country-wise registration of Institutional repositories in DOAR. Then collected data were tabulated using MS. Excel and data given were analyzed and interpreted in the form of tables and graphs.

### **Result and Discussion**

Based on the data collected, the authors have performed the analysis under different segments with required tables, figures, and graphical representations, which are as follows.

### **The Year-wise Growth Pattern:**

| Year | IRs | %      | Year         | IRs       | %              |
|------|-----|--------|--------------|-----------|----------------|
| 2005 | 2   | 3.51%  | 2014         | 1         | 1.75%          |
| 2006 | 0   | 0.00%  | 2015         | 3         | 5.26%          |
| 2007 | 2   | 3.51%  | 2016         | 0         | 0.00%          |
| 2008 | 1   | 1.75%  | 2017         | 1         | 1.75%          |
| 2009 | 2   | 3.51%  | 2018         | 0         | 0.00%          |
| 2010 | 2   | 3.51%  | 2019         | 5         | 8.77%          |
| 2011 | 21  | 36.84% | 2020         | 10        | 17.54%         |
| 2012 | 2   | 3.51%  | <b>Total</b> | <b>57</b> | <b>100.00%</b> |
| 2013 | 5   | 8.77%  |              |           |                |

Table 1: Year-wise Growth pattern of Institutional Repository

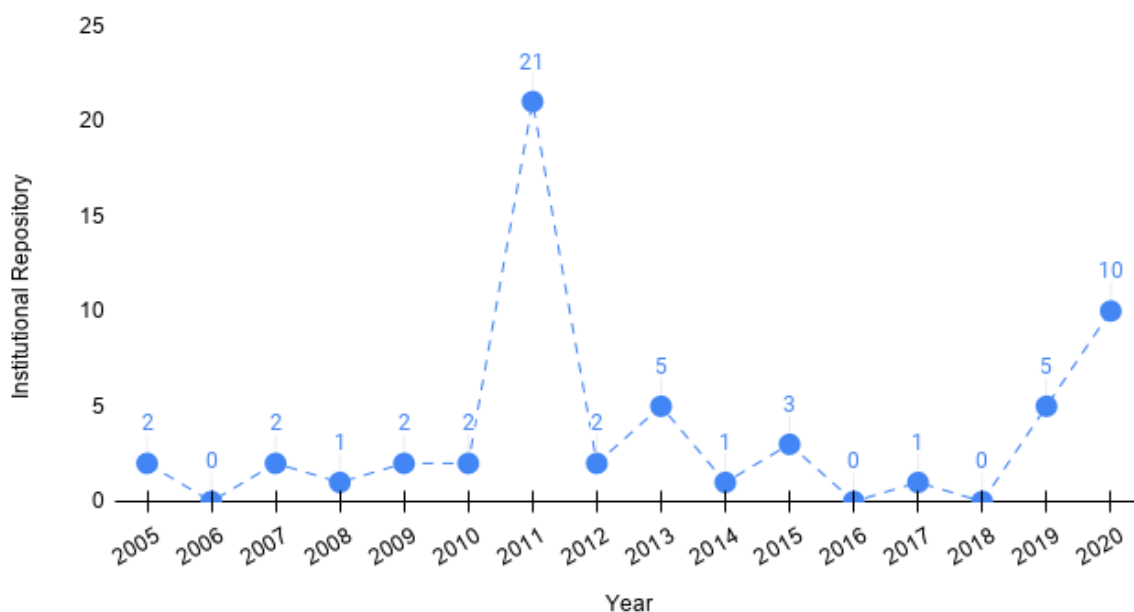


Figure1: Year-wise Growth pattern of Institutional Repository

Table: 1/ Fig 1 depicts the year-wise growth registration of institutional repositories in the DOAR with its cumulative percentage. It is represented that out of 57 institutional repositories highest, i.e., 21 (36.84%) institutional repositories were registered in the years of 2011, followed by 10 (17.54%) repositories in 2020 & followed by 5 (8.77%) repositories in 2013 & 2019 each, and no repositories registered in 2006, 2016 and 2018. It is evident from the analysis that non-constant growth is found in the registration of Institutional repositories with DOAR.

### Nature of Institutional Repository

| Types of IRs  | Number    | %              | Records        |
|---------------|-----------|----------------|----------------|
| Aggregating   | 2         | 3.51%          | 4236970        |
| Disciplinary  | 1         | 1.75%          | 326            |
| Governmental  | 1         | 1.75%          | 0              |
| Institutional | 53        | 92.98%         | 1497732        |
| <b>Total</b>  | <b>57</b> | <b>100.00%</b> | <b>5735028</b> |

Table 2: Types of Institutional Repository

Institutional repositories (IRs) are categories under four significant heads: Aggregating, Disciplinary, Governmental and Institutional. Table: 2. shows the maximum number of repositories are Institutional (53) followed by Aggregating (2), Disciplinary and Governmental (1) each. It is observed from the analysis that academic institutions' institutional repositories were found more in number than other types of IR's.

### Software Usage of Repositories

| Software     | Number    | %              |
|--------------|-----------|----------------|
| Cspace       | 12        | 21.05%         |
| Dspace       | 37        | 64.91%         |
| VuFind       | 1         | 1.75%          |
| Undefined    | 7         | 12.28%         |
| <b>Total</b> | <b>57</b> | <b>100.00%</b> |

Table 3: Software-wise distribution of IRs

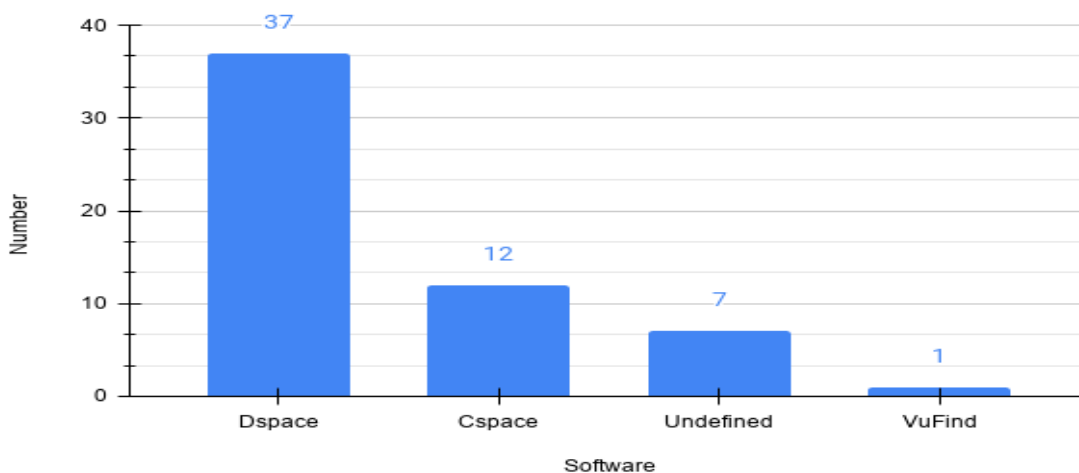


Figure: 2 Software-wise distribution of IRs

Table: 3/fig2 shows the distribution of the software used for the deployment of Institutional repositories in China. The most widely used software is the open-source application DSpace 37 (64.91%), followed by Cspace with 12 (21.05%), Undefined with 7 (12.28%), and the least number of repositories use VuFind with 1 (1.75). It is evident that more than 65% of IRs registered with DOAR were using open source software.

### Language-wise Distribution of IR

| Language     | Number    | %              |
|--------------|-----------|----------------|
| Chinese      | 53        | 54.64%         |
| English      | 44        | 45.36%         |
| <b>Total</b> | <b>97</b> | <b>100.00%</b> |

Table 4: Language-wise distributions

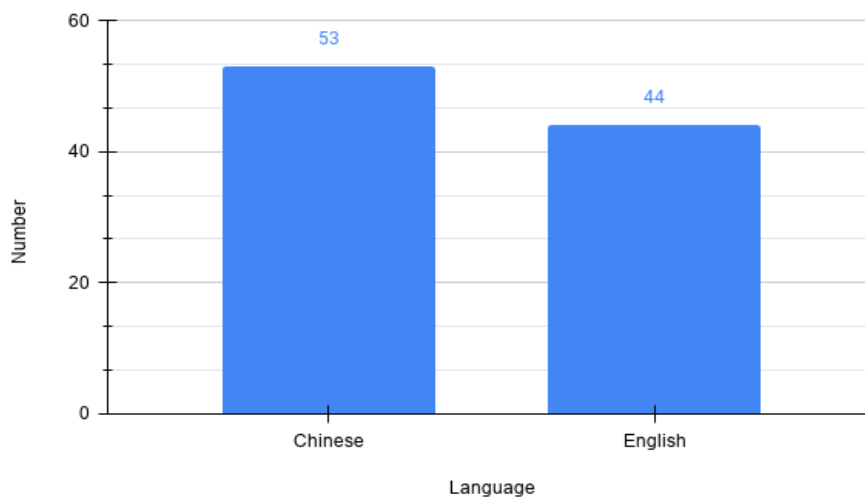


Figure: 3: Language-wise distributions

Language is a medium for interaction, exchanging ideas, understand feelings of others, and for the development of the human race existing on this planet. Languages allow humankind to access information and data contents, to draw inferences to set and accomplish goals (Kuri & Singh, 2020). China reflects a dual-language repository. It is observed from the table: 4/fig3 that most of repositories use both Chinese and English languages as an interface. 53 (54.64%) repositories have used Chinese, followed by English with 44 (45.36%) repositories. The data reveals that most of the repositories use Chinese as a medium of language and English is the only internationally accepted language.

### Core Content Types

| Content Type                   | Number | %      |
|--------------------------------|--------|--------|
| Bibliographic References       | 14     | 5.88%  |
| Books, Chapters and Sections   | 26     | 10.92% |
| Conference and Workshop Papers | 32     | 13.45% |

|                            |            |                |
|----------------------------|------------|----------------|
| Datasets                   | 5          | 2.10%          |
| Journal Articles           | 52         | 21.85%         |
| Learning Objects           | 3          | 1.26%          |
| Other Special Item Types   | 14         | 5.88%          |
| Patents                    | 27         | 11.34%         |
| Reports and Working Papers | 23         | 9.66%          |
| Software                   | 2          | 0.84%          |
| Theses and Dissertations   | 40         | 16.81%         |
| <b>Total</b>               | <b>238</b> | <b>100.00%</b> |

Table: 5 Content wise distributions

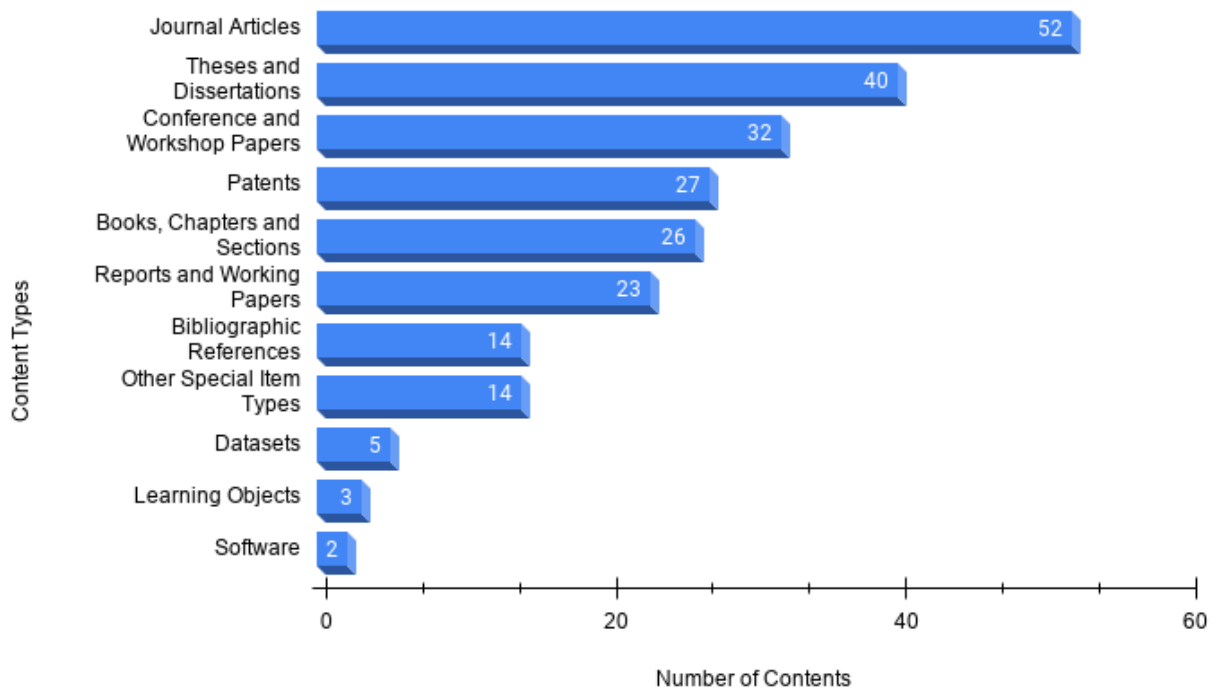


Figure: 4 Content Types v/s Number of Contents

Table: 5/fig4 shows the range of sources content types of institutional repositories registered by China with DOAR. The nature of contents being added to the repository distributions is recorded under its numbers with a cumulative percentage. The leading types of contents found in the repositories of open DOAR journal articles 52 (21.85%) followed by theses & dissertations 40 (16.81%), Conference & workshop papers 32 (13.45%), Patents 27 (11.34%), Books, Chapters and Sections 26 (10.92%), Reports and Working Paper 23 (9.66%), Bibliographic References and Other Special Item Types 14 (5.88%), Datasets 5 (2.10%), Learning Objects 3 (1.26%), Software constitute a minimal amount of content with 2 (0.84%). From the analysis, most of the authors were more curious and involved in contributing journal articles than any other content, as indicated in the table.



### Discipline wise Distribution of IR

| Subjects                              | No. | %     | Subjects                             | No.        | %              |
|---------------------------------------|-----|-------|--------------------------------------|------------|----------------|
| Agriculture, Food and Veterinary      | 4   | 2.84% | Law and Politics                     | 2          | 1.42%          |
| Arts and Humanities General           | 7   | 4.96% | Library and Information Science      | 2          | 1.42%          |
| Biology and Biochemistry              | 6   | 4.26% | Management and Planning              | 3          | 2.13%          |
| Business and Economics                | 1   | 0.71% | Mathematics and Statistics           | 1          | 0.71%          |
| Chemistry and Chemical Technology     | 7   | 4.96% | Mechanical Engineering and Materials | 4          | 2.84%          |
| Computers and IT                      | 3   | 2.13% | Multidisciplinary                    | 21         | 14.89%         |
| Earth and Planetary Sciences          | 1   | 0.71% | Physics and Astronomy                | 9          | 6.38%          |
| Ecology and Environment               | 8   | 5.67% | Psychology                           | 1          | 0.71%          |
| Education                             | 1   | 0.71% | Science General                      | 26         | 18.44%         |
| Electrical and Electronic Engineering | 1   | 0.71% | Social Sciences General              | 8          | 5.67%          |
| Geography and Regional Studies        | 5   | 3.55% | Technology General                   | 18         | 12.77%         |
| Health and Medicine                   | 1   | 0.71% | <b>Total</b>                         | <b>141</b> | <b>100.00%</b> |
| Language and Literature               | 1   | 0.71% |                                      |            |                |

Table: 6 Subject-wise distributions

Table: 6 depict the discipline-wise distribution of institutional repositories in DOAR. The majority, i.e., 26 (18.44%) of Institutional Repositories consist of Science in General, followed by 21 (14.89%) multidisciplinary, 18 (12.77%) technology in General, 9 (6.38%) Physics and Astronomy, 8 (5.67%) Ecology & Environment and Social Sciences General, 7 (4.96%) Arts & Humanities General and Chemistry & Chemical Technology, 6 (4.26%) Biology and Biochemistry, 5 (3.55%) Geography and Regional Studies, a very few IR's consist of other subjects, as shown in the above Table.

### Ten oldest Institutional Repositories with the date of establishing year and Time

| Repositories Name  | Date                           |
|--|--------------------------------|
| Hong Kong University of Science and Technology Institutional Repository (HKUST Repository) | 21 December 2005 12:22:20 UTC  |
| HKU Theses Online  | 21 December 2005 12:44:08 UTC  |
| HKU Scholars Hub   | 7 June 2007 11:11:31 UTC       |
| CityU Institutional Repository   | 24 September 2007 14:14:01 UTC |
| Xiamen University Institutional Repository (XMU IR)  | 6 March 2008 16:16:06 UTC      |

|   |                              |
|---|------------------------------|
| PolyU Institutional Repository  | 5 February 2009 11:11:23 UTC |
| Knowledge Repository of National Science Library, CAS (NSL-IR)                      | 19 August 2009 11:11:27 UTC  |
| University of Macau Institutional Repository (UMIR)                                 | 30 June 2010 09:09:27 UTC    |
| Library and Information Science Institutional Repository                            | 6 October 2010 11:11:01 UTC  |
| Institutional Repository of South China Sea Institute of Oceanology, CAS (scsio-IR) | 10 October 2011 11:11:39 UTC |

Table: 7 Ten oldest Institutional Repositories

Table: 7 reveals the top 10 oldest institutional repositories registered with the Directory of Open Access Institutional Repositories. It is observed that the Hong Kong University of Science and Technology Institutional Repository (HKUST Repository) is found in the oldest institutional repository, which is registered with DOAR on 21 December 2005 12:22:20 UTC. Followed by HKU Theses Online 21 December 2005 12:44:08 UTC and HKU Scholars Hub on 7 June 2007 11:11:31 UTC. It is apparent that among the top ten oldest institutional repositories top 2 oldest repositories registered in the same date with different time.

### Major findings

1. It is found that highest, i.e., 36.84% institutional repositories were registered in 2011. Furthermore, none of the Institutional repositories enrolled with DOAR in 2006, 2016 and 2018.
2. The analysis indicates that maximum, i.e., 92.98% number of repositories is Institutional.
3. It was observed from the study that Dspace 64.91% is found most widely used IR software.
4. The analysis found that a massive, i.e., 54.64% of repository contents are in the Chinese language.
5. It was found from the study that the journal articles, i.e., 21.85% are the leading type of contents found in the DOAR.
6. From the analysis it is observed that the highest, i.e., 18.44% of Institutional Repositories, consists of Science in General contents.
7. It is noticed from the analysis that "Hong Kong University of Science and Technology Institutional Repository (HKUST Repository)" is the oldest and earliest (21-Dec-2005) institutional repository, which was indexed in DOAR.

### Conclusion

The present study reviewed current status of Chinese open access institutional repositories. The analysis of open access IRs shows that there is a need for creating awareness within the community for extensive contribution of content to the IRs. Zhong (2009) suggested that in developing countries like China, first universities should initiate green drive OA deposit by constructing IRs. DOAR is an open international platform for every world nation to showcase their scientists' intellectual works by creating an Institutional Repository. Nayak et al (2021).

The author also emphasises upon creating common awareness of the concept and advantages of OA and IR is significant that there is still a lot of work to be done to promote OA and IR in China. The analysis evident from the study that China like most populous country have raise awareness among the community and encourage them to contribute content to the DOAR. Of course China has a long way to go and lot to do to strengthen the open access movement in the Country.

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