Role of Institutional Repository to Promote the Open Access Policy: a study on central institutional repositories of CSIR, ICAR and DST-DBT

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Abstract

The purpose of the study is to discuss the role of institutional repository (IR) to promote the open access (OA) policy by analysing the OA policy of CSIR, ICAR and DST-DBT and their central IRs. For this study,chiefly thematic analysis with a combination of the inductive and latent approaches has been used.The evidence-based approach and content analysis have also been incorporated to fulfil the stated purpose of this study. It is found that maximum emphasis has been given to setting up of IRs by OA policies. CSIR, ICAR and DST-DBT have published their OApolicy where the role of IRs are playing a pivotal role to implement the OApolicy. This study presents the iconic relationship between OApolicy and IR. In this way, the value of IR has been highlighted to promote the OApolicy.

Keywords: CSIR, DST-DBT, ICAR, Institutional repository, Open access, Open access policy

1. Introduction

Institutional repositories play a significant role in the implementation of the OA mandate of the institution by collecting, preserving, and disseminating digital copies of the institution's intellectual output, particularly in research institutions. OA mandates are policies imposed by funders, institutions, or governments that require researchers to publish their research articles open access. It is common for OA knowledge repositories to serve a larger scientific community on a national scale. After that, it is no longer an institutional repository, but a national repository of knowledge. The OA knowledge repositories hosted by India have become one of the most important contributors to the field. According to Open DOAR (www.opendoar.org), India is ranked 16th in the global Directory of OA Repositories in 2023. There are 106 OA IRs registered in India. The majority of these owner institutions are universities, national institutions, laboratories and other research and development centres. Another directory of this kind, maintained by the Registry of Open Access Repositories (ROAR), can be found at http://roar.eprints.org, although its authentication and standardisation are not quite as good. India is ranked 11th in 2023 version of ROAR (Biswas & Das Biswas, 2022).

CSIR is one of the largest scientific research councils in India. Amandate for open access (http://www.csircentral.net/ mandate.pdf) was adopted by the CSIR in 2009 for its 42 laboratories and institutions, the first such mandate in India. In implementing this OA mandate, CSIR institutions will provide OAIRs and a central OAIR for publicly funded research literature.

ICAR has adopted a twelve-point open

access policy (2013) (https://icar.org.in/node/5542) which highlights the establishment of IR as well as other aspects of openly sharing the agricultural knowledge acquired by its institutes. ICAR is pioneering open access (OA) initiatives in India with the creation of KRISHI repository, a central institutional repository (IR).Through the sharing of scholarly content in OA mode, including grey literature, it serves as a knowledge hub in the Indian agricultural field.

DBT and DST launched an open access policy in 2014 (https://dst.gov.in/sites/default/files/APPROVED%20OPEN%20ACCESS%20POLICY-DBT&DST(12.12.2014)_1.pdf) to maximize the dissemination of knowledge and information generated by their funds. In order to ensure that research funds can be accessed, read, and built upon, providing free online access and the best way to preserve them is to deposit them in an institutional repository. A centralised IR hosting service is provided by Science Central for DST-DBT labs, and a harvester service is provided for all DST-DBT institutional repositories.

2. Literature review

The term open access (OA) refers to a publication that is freely available online without charge and with a few restrictions on repurposing. Research that is widely distributed benefits both authors and readers because it reaches more people and enables readers to stay up-to-date with the latest developments (Biswas, Brar, & Bhabal, 2022). Whereas a collection of digital content generated by faculty, staff and students at an institution that is organised and managed is referred to as an IR. A digital repository is designed to gather, manage, preserve, and disseminate intellectual output within and outside of an institution (Das Biswas, & Biswas, 2011; Kalbande, 2012). A number of research and development organisations, leading scientific research institutions (including the Indian Institute of Science, IITs, ISI, CSIR, ICAR, and the Indian Council of Medical Research) are establishing institutional and digital repositories as part of the open access movement to provide access to their research literature worldwide (Bist, & Mohanty, 2006). An important part of the promotion of OAhas been initiated through the Delhi Declaration of Open Access (2018) (Banerjee, & Jilani, 2022).The development of OA publishing in India has been boosted by this. INFLIBNET's Shodh Ganga project, a digital repository of Indian theses and dissertations, and e-print archives, such as Eprints@iisc of the Indian Institute of Science, the National Digital Library of India (NDLI), and the Traditional Knowledge Digital Library (TKDL), are among the initiatives. Using ROARMAP (Registry of Open Access Repository Mandates and Policies) data on Indian OA mandates can be useful for determining whether these mandates have been implemented (Rao, & Rao, 2018).Open access initiatives taken by ICAR are also noteworthy (G. Aneeja and Gutam Sridhar, 2009). In 2013, ICAR implemented an open access policy for maintaining its own open access repositories along with establishing a central repository to provide "one-stop access" to all the council's scientific areas (Biswas, 2023). Furthermore, based on statistical analysis, the sciencecentral.in repository of the DST-DBT is also a good central repository in India. (Srichandan, Piryani, Singh, & Bhattacharya, 2020).

The studied literature identifies that there is no such evidence-based study that shows the implication of IRs to promote the OA policy. This study attempts to fill up that gap.

3. Objectives

- To analyse the OA policy to identify the gravity given to IR

- To explore the role of IR to promote the OApolicy
- To present case study of central repositories to augment the point of promoting OA policy through setting up IR.

4. Methodology

A combination of inductive (deriving meaning from data without any preconceived notions) and latent (focusing on underlying meanings rather than examining reasons for semantic content) thematic analysis has been used to conduct this study. The evidence-based research approach has also been applied to appraise the role of IR to promote OA policy. For this study, content analysis has been applied as the primary methodology for analysing CSIR, ICAR and DST-DBT repository content. The data collection period was from 1st January 2023 to 28th February 2023.

5. Findings

Table 1: IRs hosted in CSIR Central and their statistics of content submission, download, full text and OA

Sl	IR	Items/ Deposits	Download	Full-Text %	OA %
1	IR@AMPRI > Advanced Materials and Processes Research Institute (AMPRI), Bhopal	763	2580	13	02
2	IR@CECRI >Central Electrochemical Research Institute (CECRI)	2644	219238	97	45
3	IR@CEERI > Central Electronics Engineering Research Institute[CEERI]	430	540	16	12
4	IR@CGCRI > Central Glass and Ceramic Research Institute (CGCRI)	4345	109558	82	06
5	IR@CIMFR > Central Institute of Mining and Fuel Research (CIMFR) Dhanbad	2332	80309	36	06
6	IR@CMERI > Central Mechanical Engineering Research Institute (CMERI)	731	944	14	08
7	IR@IHBT > Institute of Himalayan Bioresource Technology[IHBT]	977	15171	83	11
8	IR@IIIM > Indian Institute of Integrative Medicine (IIIM)	200	432	100	01
9	IR@NEIST > North East Institute of Science and Technology, formerly(RRL) , Jorhat	340	116841	100	100
10	IR@NEERI > CSIR-National Environmental Engineering Research Institute [NEERI]	779	3790	99	14
11	IR@NPL > National Physical Laboratory(NPL)	3816	300709	100	54
12	IR@CLRI > Central Leather Research Institute [CLRI]	05	2327	100	100
13	Indian Theses	506	615	00	00
	Total	**17868**	**853054**	**74**	**24**

(Source: http://csircentral.net/)

Table 1 shows that there are 13 IRs hosted in CSIR Central. Total 17868 items have been deposited of which 853054 times are downloaded, 74% of full text and 24% of OA.

Table 2: Submitted content types in CSIR Central

Sl	IR	Article	Book Chap	Book	Monograph	Conf. or Workshop	Thesis	Patent	Video	Other
1	IR@AMPRI > Advanced Materials and Processes Research Institute (AMPRI), Bhopal	763	00	00	00	00	00	00	00	00
2	IR@CECRI > Central Electro-chemical Research Institute (CECRI)	2252	00	00	09	05	46	332	00	00
3	IR@CEERI > Central Electronics Engineering Research Institute [CEERI]	00	00	00	00	430	00	00	00	00
4	IR@CGCRI > Central Glass and Ceramic Research Institute (CGCRI	3813	29	04	127	194	140	37	00	01
5	IR@CIMFR > Central Institute of Mining and Fuel Research (CIMFR) Dhanbad	2263	25	06	00	35	01	00	02	00
6	IR@CMERI > Central Mechanical Engineering Research Institute (CMERI)	731	00	00	00	00	00	00	00	00
7	IR@IHBT > Institute of Himalayan Bioresource Technology[IHB]	761	00	00	37	00	125	54	00	00

Sl	IR	Article	Book Chap	Book	Monograph	Conf. or Workshop	Thesis	Patent	Video	Other
9	IR@NEIST > North East Institute of Science and Technology, formerly(RRL) , Jorhat	323	3	00	00	14	00	00	00	00
10	IR@NEERI > CSIR-National Environmental Engineering Research Institute [NEERI]	714	30	07	01	16	00	07	00	04
11	IR@NPL > National Physical Laboratory (NPL)	3694	12	04	01	105	00	00	00	00
12	IR@CLRI > Central Leather Research Institute [CLRI]	05	00	00	00	00	00	00	00	00
13	Indian Theses	02	00	00	00	00	504	00	00	00
		15520 (86.86%)	100 (0.56%)	21 (0.12%)	175 (0.98%)	799 (4.47%)	816 (4.57%)	430 (2.41%)	02 (0.01%)	05 (0.03%)
	Total 17868									

Table 2 reveals that CSIR Central is composed mostly of articles (86.86%). Other notable collections are thesis (5.57%) and conference or workshop proceedings (4.47%).

Table 3: Submitted content types in KRSHI according to subject matter division and number of contributors

Content Type	Subject Matter Divisions (SMD) (No. of ICAR Institutes)									
	Agricultural Education (04)	Agricultural Engineering (05)	Agricultural Extension (11)	Animal Science (19)	Crop Science (28)	Fisheries (08)	Horticultural Science (23)	Natural Resource Management (16)	Others (DKMA, ICAR-HQ ...) (02)	Total
Annual Report	123	141	213	221	310	172	217	211	36	1644
Article	570	271	173	1296	1321	8809	1505	1222	13	15180
Audio	01	--	02	26	--	--	23	--	01	53
Biographical	01	--	--	--	--	--	--	--	--	01
Book	52	26	101	128	237	139	187	582	56	1508
Book chapter	68	47	10	147	660	916	327	630		2805
Dataset	--	--	02		01	--	01	02	--	06
Dissertation/ Thesis	95	--	--	--	02	01	05	01	--	104
Editorial Material	04	01	--	03	02	--	--	01	--	11
Extension Leaflet	67	177	145	134	221	353	217	304	--	1618
Image	--	60	15	05	--	--	--	47	--	127
Journal	134	88	18	323	560	184	395	269	76	2047
Learning Object	01	--	--	--	03	01	06	01	--	12
Learning Object	---	---	01	--	---	--	--	--	--	01
Magazine	06	15	07	31	70	12	56	44	04	245
Map	--	--	--	--	--	03	--	27	--	30
Monograph	01	--	01	02	01	--	02	16	--	23
News Items	06	10	06	226	70	05	16	234	01	574
Newsletter	117	227	148	121	368	186	197	337	167	1868
Plan or Blueprint	--	--	02	--	05	--	01	--	--	08
Policy Paper	88	--	--	02	06	13	08	12	02	131
Preprint	01	--	--	--	01	--	--	03	--	05
Presentation	05	02	25	--	86	04	62	490	--	674

Content Type	Subject Matter Divisions (SMD) (No. of ICAR Institutes)									
	Agricultural Education (04)	**Agricultural Engineering (05)**	**Agricultural Extension (11)**	**Animal Science (19)**	**Crop Science (28)**	**Fisheries (08)**	**Horticultural Science (23)**	**Natural Resource Management (16)**	**Others (DKMA, ICAR-HQ ...) (02)**	**Total**
Proceedings	32	09	10	27	220	190	35	--	01	524
Project Report	61	03	06	05	41	01	03	775	--	895
Recording, acoustical	01	--	01	--	01	--	02	--	--	05
Research paper	1785	658	257	1846	4926	3955	3506	6228	44	23205
Review Paper	15	27	06	36	83	21	60	59	--	307
Software	01	--	--	02	01	--	--	02	02	08
Software Code or Macro	50	--	--	--	--	01	--	02	--	53
Success Story	01	14	15	07	21	01	21	32	01	113
Technical Bulletin	94	94	69	117	840	81	212	1948	33	3488
Technical Report	27	14	32	21	44	47	46	2930	17	3178
Training Manual	38	06	06	31	130	174	33	125	--	543
Video	12	05	29	26	08	10	43	49	--	182
Vision Document	08	11	03	09	18	05	23	17	03	97
Working Paper	07	--	--	--	04	--	01	07	--	19
Other	137	65	67	59	424	582	318	1116	104	2872
Total	**3609**	**1971**	**1370**	**4851**	**10685**	**15866**	**7528**	**17723**	**561**	**64164**

(Source: https://krishi.icar.gov.in/jspui/)

Table 4: Availability of full text and OA content in KRISHI repository

Sl	KRISHI Content	Deposits	Full- text %	OA%
1	Research paper	23205	04	02
2	Article	15180	12	11
3	Journal	2047	10	10
4	Book chapter	2805	03	02
5	Book	1508	05	03
6	All other contents	19419	94	91
Total		**64164**	**33**	**31**

Table 3 and table 4 bring forth the coverage of resources of KRISHI repository. It is found from research papers to different kinds of grey literature have been deposited in the repository. 33% is full-text and 31% is OA of total 64164 contents.

Table 5: IRs hosted in Science Central of DST-DBT and their statistics of content submission, download, full text and OA

Sl	IR	Items/ Deposits	Download	Full-Text %	OA %
1	IR@DBT > Department of Biotechnology (DBT)	00	00	00	00
2	IR@CDFD > Centre for DNA Fingerprinting and Diagnostics (CDFD)	984	9331	99	37
3	IR@CIAB > Center of Innovative and Applied Bioprocessing (CIAB) Mohali	02	00	100	00
4	IR@NBRC > National Brain Research Centre	742	2285	82	29
5	IR@NIBMG > National Institute of Biomedical Genomics (NIBMG)	10	00	00	00
6	IR@THSTI > Translational Health Science and Technology Institute (THSTI)	09	00	00	00
7	IR@BIRAC > Biotechnology Industry Research Assistance Council (BIRAC)	00	00	00	00
8	IR@DST > Department of Science and Technology	21	2481	57	57
9	IR@ILS > Institute of Life Sciences (ILS)	10	00	00	00
10	IR@NCCS> National Centre for Cell Science (NCCS)	1895	1970	29	19
11	IR@RCB > Regional Centre for Biotechnology (RCB)	631	692	59	41
12	IR@WELLCOMEDBT >Wellcome Trust/DBT	00	00	00	00
13	IR@BIBCOL > Bharat Immunologicals and Biologicals Corporation Limited (BIBCOL)	00	00	00	00

Sl	IR	Items/ Deposits	Download	Full-Text %	OA %
14	IR@IBSD > Institute of Bioresources and Sustainable Development	10	00	00	00
15	IR@NABI > National Agri-Food Bitechnology Institute(NABI)	2001	2099	80	72
16	IR@NIAB > National Institute of Animal Biotechnology (NIAB)	1756	2006	80	85
17	IR@RGCB >Rajib Gandhi Centre for Biotechnology (RGCB)	945	84	99	04
		9016	**20948**	**72**	**82**

(Source: http://sciencecentral.in/)

Table 5 shows that there are 17 IRs hosted in Science Central. Total of 9016 items have been deposited of which 20948 times are downloaded, 72% of full text and 82% of OA.

Table 6: Submitted content types in Science Central of DST-DBT

Sl	IR	Article	Book Chap	Book	Monograph	Conf. or Workshop	Thesis	Patent	Video	Other	Total
1	IR@DBT > Department of Biotechnology (DBT)	0	0	0	0	0	0	0	0	0	0
2	IR@CDFD > Centre for DNA Fingerprinting and Diagnostics (CDFD)	975	05	0	0	04	0	0	0	0	984
3	IR@CIAB > Center of Innovative and Applied Bioprocessing (CIAB) Mohali	02	0	0	0	0	0	0	0	0	02
4	IR@NBRC > National Brain Research Centre	718	20	02	0	01	0	0	0	01	742
5	IR@NIBMG > National Institute of Biomedical Genomics (NIBMG)	10	0	0	0	0	0	0	0	0	10
6	IR@THSTI > Translational Health Science and Technology Institute (THSTI)	09	0	0	0	0	0	0	0	0	09
7	IR@BIRAC > Biotechnology Industry Research Assistance Council (BIRAC)	0	0	0	0	0	0	0	0	0	0

Sl	IR	Article	Book Chap	Book	Monograph	Conf. or Workshop	Thesis	Patent	Video	Other	Total
8	IR@DST > Department of Science and Technology	20	0	0	01	0	0	0	0	0	21
9	IR@ILS > Institute of Life Sciences (ILS)	10	0	0	0	0	0	0	0	0	10
10	IR@NCCS> National Centre for Cell Science (NCCS)	1792	102	0	0	0	0	0	0	01	1895
11	IR@RCB > Regional Centre for Biotechnology (RCB)	624	5	0	1	0	0	0	0	1	631
12	IR@WELLCOMEDBT >Wellcome Trust/DBT	0	0	0	0	0	0	0	0	0	0
13	IR@BIBCOL > Bharat Immunologicals and Biologicals Corporation Limited (BIBCOL)	0	0	0	0	0	0	0	0	0	0
14	IR@IBSD > Institute of Bioresources and Sustainable Development	10	0	0	0	0	0	0	0	0	10
15	IR@NABI > National Agri-Food Bitechnology Institute (NABI)	2001	0	0	0	0	0	0	0	0	2001
16	IR@NIAB > National Institute of Animal Biotechnology (NIAB)	1753	03	0	0	0	0	0	0	0	1756
17	IR@RGCB >Rajib Gandhi Centre for Biotechnology (RGCB)	945	0	0	0	0	0	0	00	0	945
		8869 (98.37%)	**135 (1.50%)**	**02**	**02**	**05**	**00**	**00**	**00**	**03**	**9016**

Table 6 reveals that Science Central is also composed mostly of articles (98.37%). Another notable collection is book chapter (1.50%).

Table 7: Comparison of CSIR Central, KRISHI and Science Central

Sl.	Repository	Items	Downloads	Full text (%)	OA (%)
1	CSIR Central	16564	850955	74	24
2	ICAR KRISHI	64164	4159923	33	31
3	DST-DBT Science Central	9016	20948	72	82

Table 7 presents a comparison among CSIR Central, KRISHI and Science Central. It is found that because of the large content submission, number of downloads from KRISHI repository is in a good place. On the other hand, despite of 72% full-text and 82% OA, the number of downloads from Science Central is not very good. One of the reasons is only 9016 items have been deposited.

6. Discussion

6.1 CSIR Central

The OA policy of CSIR composed of seven points emphasises on the setting up of IR. The first, second, and fourth points focus exclusively on the setting up of their own IRs along with a central repository for research papers, electronic theses, and dissertations that helps harvest the full-text and metadata of these documents.

There are 13 IRs (vide table no. 1) hosted in CSIR Central. Other twenty CSIR institutes have their IRs also. In CSIR Central, article (15520), book chap (100), book (21), monograph (175), conference or workshop (799), thesis (816), patent (430), video 02) and other contents (05) have been deposited. A total of 17868 documents have been deposited in CSIR Central. 74% of them are full-text and 24% of them are OA. The downloading statistics is 853054.

6.2 ICAR KRISHI

The very first point of ICAR's OApolicy emphasises the establishment of IR for each of its institutes. It has been observed that out of 65 ICAR research institutes; 15 ICAR-national research centres; 3 central agricultural universities and 4 deemed universities, 4 ICAR research institutes, viz., Central Marine Fisheries Research Institute, Kochi; ICAR-Central Plantation Crops Research Institute, Kasargod; ICAR-Central Potato Research Institute, Shimla; Indian Institute of Rice Research, Hyderabad and one national research centre, viz., National Research Centre on Meat, Hyderabad have opened individual OAIR so far.

Whereas the second point buckles down to the need for central repository. In order to make its knowledge resources available to all stakeholders at one point, ICAR has developed a central OAIR called KRISHI - Knowledge Based Resources Information Systems Hub for Innovations in Agriculture.

ICAR's fourth point focuses on making all publications open access. The publications of five ICAR institutes are submitted through their respective institutional repositories, and the publications of others are submitted directly to the KRISHI repository. According to table 3, ICAR institutes have deposited research papers to the grey literature in KRISHI. First and second place respectively go to research papers and articles.

It is also recommended that unpublished ICAR documents be deposited in an OA

repository in the fifth point. In addition, the institutions have begun sharing unpublished reports in their institutional repositories or directly in KRISHI repository which is shown in table 3. The said table also shows that 05 pre-print have been submitted so far which has been highlighted in point number six.

In the seventh point, ICAR scientists and researchers are encouraged to publish with publishers who offer self-archiving via OAIR. According to data taken from the ICAR - National Agricultural Science Fund (NASF) website (https://www.icar.gov.in/nasf/index.html), 110 articles related to 15 ICAR funded projects have been published in 80 journals under Call I phase. It has been reported that 57 of those 80 journals publish their articles in open access mode which also allows self-archiving. A total of 09 of them are ICAR published journals offering Open Access, while another 02 are ICAR published journals offering hybrid access and they are connected to KRISHI repository.

In connection with point number 7, point number 8 also emphasises that ICAR funded researchers' final manuscripts have to be submitted in OAIR. It is found that more than 50% of publications have been published as open access. Among them, 11% of OA article is available through KRISHI repository (vide Call Iphase).

Table 3 also connects point number ten which focuses on the submission of dissertation/Ph.D. thesis by presenting 104 M.Sc. and Ph.D. thesis/dissertations (full content) in KRISHI. Among them, Agricultural Education stands in the first position with 95 thesis/dissertations.

In accordance with the last or 12th point of ICAR's OAP, documents with patent able or commercially viable materials are not allowed to be submitted in OAIR. Researchers and staff at ICAR can however negotiate with publishers to share commercial books via institutional repositories after a reasonable embargo period. As of today, ICAR holds 654 patents in the field of agriculture (https://krishi.icar.gov.in/icaripdb/patent-list/168).

6.3 DST-DBT Science Central

Two third portion of DST-DBT OA policy has focussed on setting up of IR. A central harvester (www.sciencecentral.in) has been established by the Ministry of Science and Technology to harvest full texts and metadata of OA publications. It is recommended that all other institutions have an IR. Publications from institutions without IRs can be deposited into the central repositories maintained by DBT and DST. Sciencecentral.in is the main domain under which each laboratory's IR is created. Asingle console for searching and viewing R&D literature from different DST-DBT institutes is provided as a value-added service for the research community. Science Central hosts 17 institutional repositories, while 42 other repositories are regularly harvested. In Science Central, article (8869), book chapter (135), book (02) , monograph (02) , conference or workshop (05), thesis (00), patent (00), video(00) and other contents (03) have been deposited. A total of 9016 documents have been deposited in CSIR Central. 72% of them are full-text and 82% of them are OA. The downloading statistics are 20948.

6.4 Comparison

A comparison of three central repositories shows that ICAR's KRISHI has large scope and coverage regarding items and downloads. On the other hand, CSIR Centralis providing a good number of full text (74%). But both ICAR and CSIR Central are

providing open access content below 35%. Whereas the availability of OA content in DST-DBT Science Central is in a good position with 82%. But the content of Science Central only includes 9016 items. Therefore, the overall comparison of the three central repositories explores that ICAR's KRISHI is in a good position.

6.5 Epitomisation

The overall analysis of the OA policy of CSIR, ICAR and DST-DBT shows that maximum emphasis has been given to setting up IR to accomplish the OApolicy. While the creation of central repositories is an effective initiative to harness the motto of OA policy. The case studies of central repositories of CSIR, ICAR and DST-DBT have explored in this study how they are playinga pivotal role as the main instrument to implement the OA policy. The central repositories have functioned as one-stop access to the full-text, abstract and metadata of scholarly content. Even the repositories have provided good facilities to share the unpublished or grey literature of the institutions to all. It not only enhances the OA movement but also enriches the knowledge domain. Moreover, the usage of this literature is maximised because of availability in OA mode through IR. It is very much noticeable in the KRISHI repository. The self-archiving policy which is another crucial part of OA policy also gets instrumental through IR. The fact has also been identified in the said three central repositories.

7. Conclusion

To accelerate the OA movement, OA policy plays a crucial role by framing the proper guideline. But OApolicy should not be a mere guideline. Constructive steps have also to be taken to implement the OA policy properly. Setting up IRs is one of the important steps to do that. The central repositories of CSIR, ICAR and DST-DBT have already shown the crucial role IR is playing to promote the OA policy. The role of IR needs to be made more vital by making more content available in full-text and OA modes. Finally, it can be concluded that IR is the main pillar for the successful implementation of OApolicy.

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