

Growth and Development of Open Access Institutional Repositories in Africa

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Abstract

The present study attempts to highlight the growth and development of institutional repositories in Africa. The institutional repositories developed by African countries were identified by selecting the database of OpenDOAR (Directory of Open Access Repositories). The retrieved data were thoroughly analyzed for the necessary information. The study found a total of 219 open access repositories in Africa, out of which 161(73.51%) are Institutional repositories that contained theses and dissertations as one content type. The process of inclusion of institutional repositories at OpenDOAR in Africa started in the year 2005, while the maximum growth of repositories has been recorded during the year 2013 (21; 13%), 2015 (29; 18%), and 2019(46; 28%) respectively. The study also signifies that Kenya is the front runner contributing the highest institutional repositories, followed by South Africa and Nigeria. In terms of sub-region categorization (Eastern Africa, southern Africa, Northern Africa, Western Africa, and central Africa), it is observed that eastern Africa is the leading region having a maximum number of repositories while central Africa is lagging which do not have even a single repository registered with OpenDOAR. DSpace is the most preferred software used by the institutional repositories. The interface language assessment shows that English, the international language, was the most commonly preferred interface language by African institutional repositories.

Keywords: Open access, institutional repositories, theses and dissertations, scholarly communication, OpenDoar.

Introduction

Open access emerged in response to the restrictive access to knowledge in scholarly and scientific journals imposed by commercial publishing houses via subscription fees, license fees, or pay-per-view fees (Christian, 2008). Open access initiatives shape modes of scholarly communication in publishing, data sharing, and repositories (Borgman, 2007). Before the web, paper-based services for the dissemination of manuscript-stage publications had aroused in specific disciplines. In 1991 the first Internet-based subject repository, arXiv, emerged (Ginsparg, 2004). Such repositories allowed authors to embed their papers in a critical mass of other manuscripts on similar topics, attracting more promising readers. Now

the building of an institutional repository has been canvassed to disseminate research findings of scholars all over the globe. The landmark meeting for open archives initiatives (OAI) was held by the Open Society Institute in Budapest in 2001, resulting in the Budapest Open Access Initiative (BOAI).

The first open-access strategy was called self-archiving, and subsequently also referred to as institutional archives or institutional repositories, and proposed that copies of already published research articles should be archived in the author's institutional archive and made available freely (Chan, Kirsop & Arunachalam, 2005). Although publication in peer-reviewed journals remains a vital requirement to disseminate findings, achieve peer recognition, and career advancement, scholars now have additional channels enabling their publications to urge more research impact, more significant readership, and visibility. Open Access repositories are possibly one of the main interesting dissemination channels available to scholars today. The technological advances in the contemporary era make it possible to think about storing all the knowledge of humankind in digital form, and several organizations globally are experimenting with inexpensive ways to archive and disseminate scholarly information and in-house knowledge as Institutional Repositories (Ahmed & Al Reyaee, 2014). Institutional repositories (IRs) are a set of services that a university offers to its community members to manage and disseminate digital materials created by the institution for its community (Lynch, 2003). An institutional repository is the digital archive of the intellectual products created by the faculty, research staff, and students of an institution and made accessible to end-users within and outside the institution, with little or no barriers (Crow, 2004). The visibility and citation impact of an institution's scholarship is increased by an institutional repository (Hitchcock, 2004). Institutional repositories constitute a fundamental part of present-day digital libraries allowing global access to scholarly output and providing an opportunity for future research enrichment and long-term preservation of information (Ahmed, Alreyaee & Rahman 2014). Libraries have always served as key access points for information. Services have evolved from the period of closed stacks, through shelf browsing and card catalogs, punch cards, and online public access catalogs (OPACs), to the concept of open access and institutional repositories. These are activities that already correlate with the mission and goals of libraries (Cisse 2004 cited in Anunobi & Okoye, 2008). The current study tries to highlight the growth and development of open access repositories in Africa based on different facets (Year wise growth, Country-wise contributions, Region wise distribution, software used, and, Language interfaces used) with the hope to heighten awareness about the growth and development of institutional repositories in Africa and Some suggestions to improve the existing conditions and strengthen the growth rate of institutional repositories in Africa.

Review of literature

Pinfield et al. (2014) reviewed the worldwide growth of open-access (OA) repositories from 2005 to 2012. Abrizah, Noorhidawati and Kiran (2010) highlighted the current state of open access repositories of Asian universities. They described their characteristics in terms of types, contents, disciplines, language, technical and operational issues, and policy. Bailey (2005) explained the institutional repositories (IRs) and open access, discussed their relationship, and examined the possible roles of reference librarians in IRs. Ezema (2011) explored the potential of open access institutional repositories (IR) in increasing Nigerian

scholarly publications' global visibility and impact. Shukla (2016) evaluated the growth and development of open access repositories of the world covered under the umbrella of OpenDOAR. He revealed that western countries lead with the highest number of operational open access institutional repositories. NwadiutoIgwe (2014) examined the role of institutional libraries in developing open access repositories and advocated for a national policy for the development and management of open access repositories in institutions. Ejikeme and Ezema (2019) examined the state of open access institutional repositories in Nigeria. Ahmed et al. (2014) traced out the growth and development of online e-theses repositories in Asia within the broader framework of open access. Park et al. (2007) conducted a survey of electronic theses and dissertations in university libraries in Korea and found the National Library leading the development of a system. Das and Singh (2017) highlighted the current status of open access institutional repositories in China and their contribution to a global knowledge base. Verma and Shukla (2015) evaluated the growth and development of open access repositories of the world covered under the umbrella of OpenDOAR. Ezema (2011) explored the potential of open access institutional repositories (IR) in enhancing Nigerian scholarly publications' global visibility and impact and acknowledges several problems that impede the building of open access IR.

Moreover, it highlighted some requirements for building IR with a road map for developing functional IR in Nigeria Maqbool and Mushtaq (2012) highlighted the growth and development of open access repositories in SAARC countries. Loan (2014) evaluated the repositories of Asian countries in the Directory of Open Access Repositories. Ali, Jan & Amin (2013); Bashir et al. (2019) evaluated the global status of *open access repositories*. Abrizah et al. (2010) throw light on the current state of OAR's of Asian universities in terms of types, contents, language, disciplines, technical and operational issues, and policy. Zhong (2009) examined the status of the open access movement in China and principally focused on institutional repositories in Chinese Universities. Further, the Factors that hinder the development of open access were also discussed, and some suggestions for constructing institutional repositories in Chinese Universities have been provided. Wani, Gul & Rah (2009) provided a detailed description of open access repositories registered with the OpenDOAR database in terms of country, subject, and continent-wise distribution. Loan and Sheikh (2016) analyzed the various characteristics like geographical distribution, collection size, content types, language diversity, operational status, interoperability, updating policy and software used for content management of open access (OA) repositories in the field of the health and medicine (H&M) available in the OpenDOAR. Bhat (2014) explored the various types of research materials deposited in Indian institutional repositories. He revealed that journal papers are the leading archived material, while preprints/working papers, teaching resources, and patents are the least archived material in Indian institutional repositories. Cho (2019) carried out an exploratory analysis to examine the basis for OA by evaluating the operational status of institutional repositories and their influence on the web in Asian countries by using the Directory of Open Access Repositories and the Ranking Web of World Repositories. Creaser et al. (2010) Investigated authors' awareness about open access repositories and the factors that motivate them to use the repositories. Mir and Sevukan (2021) analyzed the availability, visibility, impact, and trend of library and information science theses deposited in the Shodhganga repository.

Objectives of the study

The study is intended to evaluate the growth and development of institutional repositories of Africa. It tries to discover the composition of institutional repositories (IRs) based on the following key Parameters:

- (1) Year-wise growth. ,
- (2) Country-wise contributions. ,
- (3) Region-wise distribution. ,
- (4) Software used. ,
- (5) Language interfaces used. ,

Methodology

The methodology adopted for the completion of the study is quantitative. To collect the data regarding the above-stated objectives, the database of “OpenDOAR” was used, which is now utilized as an important source for data research on open access developments (Björk et al., 2013), open access advocacy (Morrison, 2012). OpenDOAR is the quality-assured directory of open access repositories around the globe. It enables easy categorization and analysis to help the more extensive use and exploitation of repositories or types of material held. It is maintained by SHERPA Services, based at the Centre for Research Communications at the University of Nottingham (OpenDoar, 2020). “OpenDOAR” was launched in December 2005 and available since then. The records are periodically reviewed, updated, and augmented in the database, and therefore the online service provides an up-to-date snapshot of the worldwide academic repository landscape. The data were collected from the directory (OpenDOAR) till 4 April 2020. The data was collected using the advanced search facility of OpenDOAR. The following search strategy was employed in the OpenDOAR to retrieve the data:

Repository type: institutional

Software name: the specific software name was searched one by one like Dspace, Content DM, Eprints, Drupal, etc.

Content types: Theses and Dissertations

Countries and regions: Asia

The year of creation and Language interface of repositories were individually checked from each repository/record information and were recorded accordingly.

Scope & limitations

The study is limited only to those institutional repositories (IRs) archiving theses and dissertations as one core content type and registered with the directory of open access repositories (OpenDoar).

Results

The proportion of IRS repositories against total number repositories

A total of 219 open access repositories in Africa are registered at OpenDOAR, out of which 204 are institutional repositories (IRs). Out of these 204 IRs, 161 are IRs contained theses and dissertations as one core content type.

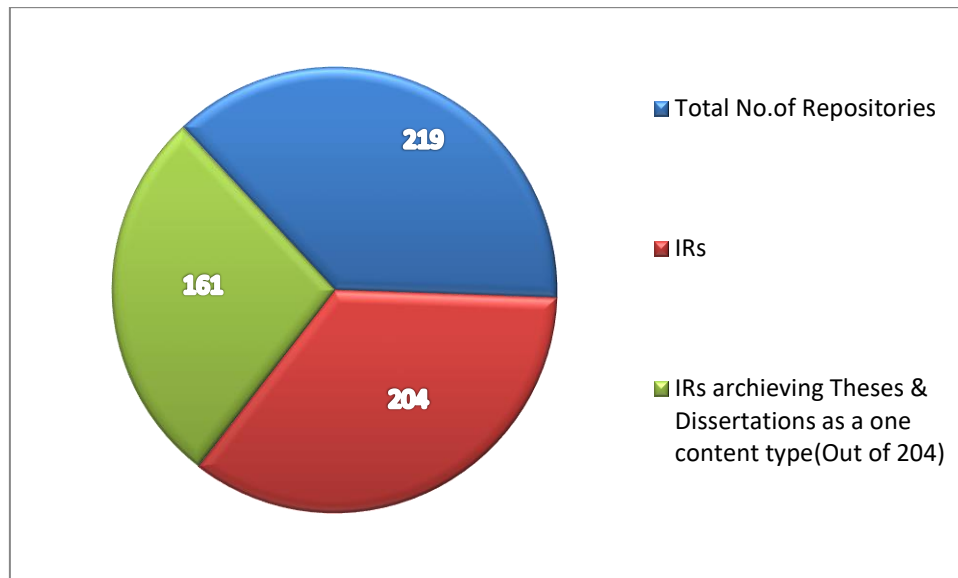


Figure 1: IRs against the total number of repositories in Africa

Year-wise growth of IRs in Africa

There are 161 institutional repositories (IR's) containing theses and dissertations as one content type in Africa related to various disciplines (as of April 4, 2020). The inclusion of IR's at OpenDoar in Africa started in the year 2005, in which three repositories have been included in the directory of open access repositories (OpenDoar). The maximum growth of IRs has been recorded in the year 2013(13%), 2015(18%), and 2019(28%) respectively, 59% of repositories has been registered during these three years with OpenDoar while the rest (39%) of IR's have been developed during the rest of thirteen years. However, the most recent IRs included in OpenDOAR are *the Institutional repository of the Houari Boumediene University of Science and Technology (USTHB)* and *the University of Ilorin repository* created on March 5, 2020, and February 10, 2020, respectively. The annual growth rate of IR's in Africa can be viewed below in table 1. Table 1 is supplemented by Fig 1 to demonstrate the data better.

Table 1

Depicts the year wise growth of IRs

Year	No. of repositories added	Annual growth rate (%)
2005	3	2
2006	3	2
2007	2	1
2008	4	2
2009	6	4
2010	8	5
2011	3	2
2012	5	3
2013	21	13
2014	8	5
2015	29	18
2016	11	7

Year	No. of repositories added	Annual growth rate (%)
2017	7	4
2018	3	2
2019	46	28
2020	2	1
TOTAL	161	99

(Note: percentage are rounded off to two decimal places)

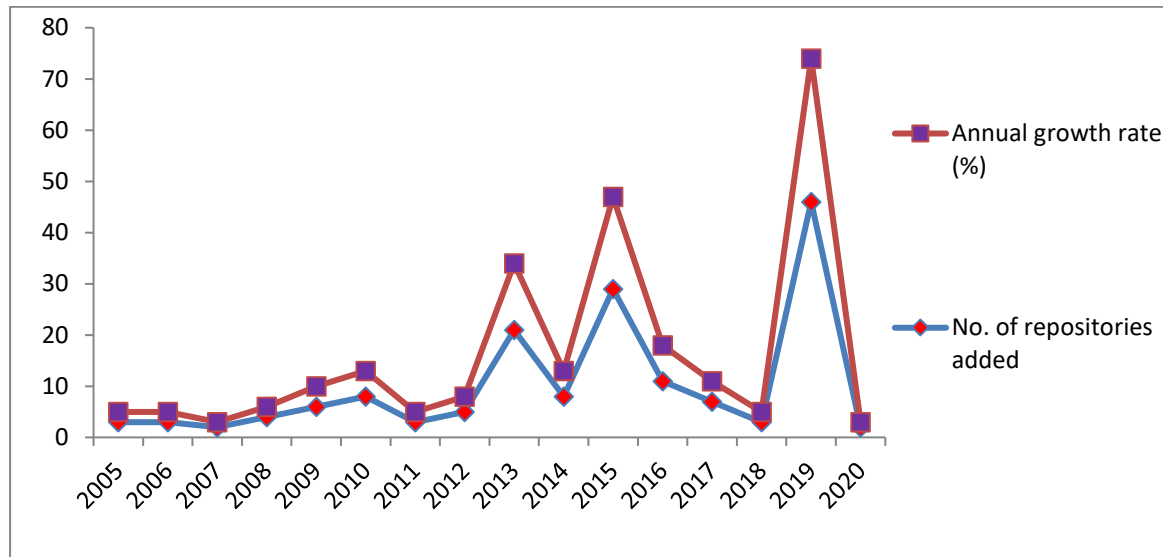


Figure 2: The year-wise growth of IRs

Country-wise distribution of Institutional repositories (IRs)

Of the total 161 IRs in Africa, Kenya is the front runner by contributing 34 (21.11%) theses and dissertation repositories, followed by South Africa with 33 (20.4%), Nigeria 19 (11.8%), Algeria 14 (8.6%), Tanzania, Uganda and Sudan 10 each (6.2% each) while Mozambique, Zambia, Morocco, Tunisia, Lesotho, Cabo Verde, and Senegal (1 each) have contributed a significantly less number of IRs. After analyzing the data thoroughly, it has been observed that the countries belonging to Eastern Africa contributed the highest number of Institutional repositories in the African continent while the countries belonging to middle Africa are lagging (Table 2).

Table 2

The country wise contribution of IRs

S.No.	Country	Theses & Dissertation Repositories	Percentage
1	Kenya	34	21.1
2	South Africa	33	20.4
3	Nigeria	19	11.8
4	Algeria	14	8.6
5	Tanzania	10	6.2
6	Uganda	10	6.2
7	Sudan	10	6.2
8	Zimbabwe	6	3.7
9	Egypt	4	2.4

S.No.	Country	Theses & Dissertation Repositories	Percentage
10	Ghana	4	2.4
11	Ethiopia	4	2.4
12	Rwanda	2	1.2
13	Libya	2	1.2
14	Namabia	2	1.2
15	Mozambique	1	0.6
16	Zambia	1	0.6
17	Morocco	1	0.6
18	Tunisia	1	0.6
19	Lesotho	1	0.6
20	Cabo verde	1	0.6
21	Senegal	1	0.6
	TOTAL	161	

Note: Those countries that do not have a single institutional repository are excluded from the study.

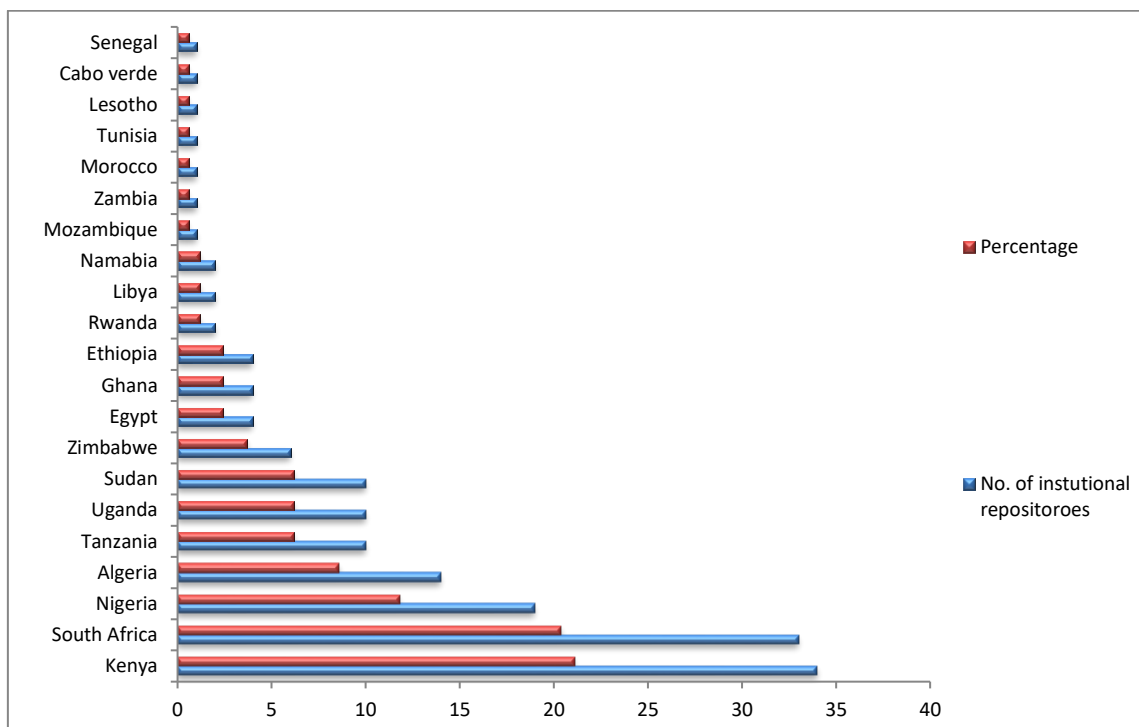


Figure 3: The country-wise picture of IRs.

Region-wise distribution of Institutional repositories in Africa

There are a total of 161 Institutional repositories in the whole African continent. At the same time, based on sub-regions categorization of Africa, Eastern Africa is the leading region with 68 IRs registered with Directory of Open Access Repositories (OpenDoar), followed by Southern Africa (36), Northern Africa (32), and Western Africa (25) respectively while central Africa is lagging which do not have even a single repository registered with OpenDoar so far (Fig 4).

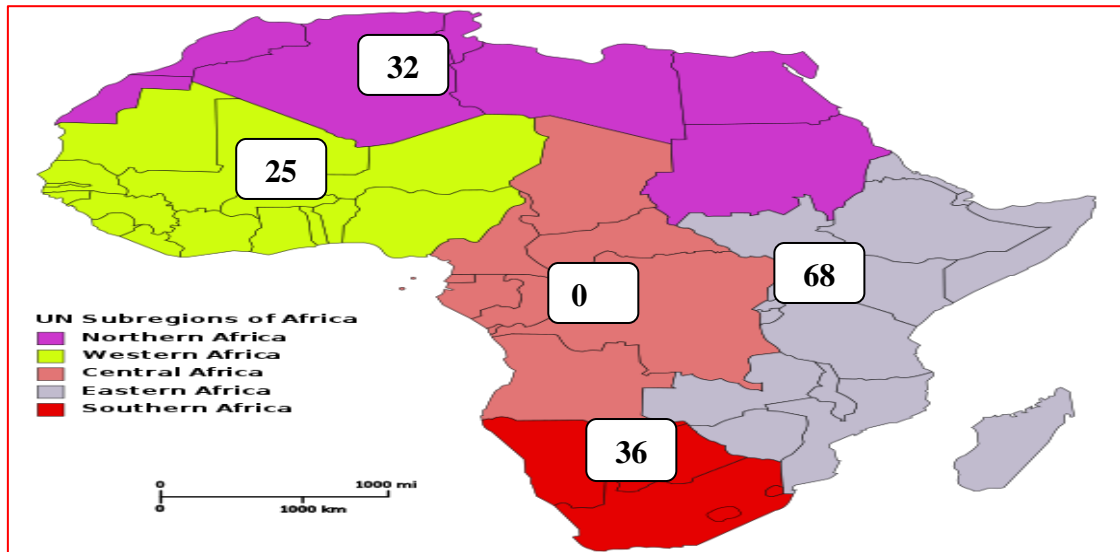


Figure 4: The clear picture of region wise contribution of IRs in Africa

The proportion of IRs contained theses and dissertations (T&D)

There are 204 institutional repositories in Africa, out of which 161 (78.92%) are institutional repositories containing theses and dissertations as one core content type. The data analysis shows that the representation of IRs contained theses and dissertations against the total number of Institutional repositories contributed by a country varies significantly. Of the total 204 IRs contributed by African countries, most repositories, 161 (78.92 percent) are IRs containing theses and dissertations. Kenya has topped the list with 34 IRs archiving theses and dissertations of the 40 IRs contributed so far, followed by South Africa with 33 of 41, Nigeria 19 of 30, Algeria 14 of 16, Tanzania 10 of 12 and Uganda, Sudan, 10 of 10 each (Table 3).

Table 3

The number IRs archiving theses and dissertations (T&Ds) and total number of IRs by country

S.No.	Country	Total number of IRS	IRs archiving T&Ds	Percentage
1	South Africa	41	33	80.48
2	Kenya	40	34	85
3	Nigeria	30	19	63.33
4	Algeria	16	14	87.5
5	Tanzania	12	10	83.33
6	Zimbabwe	11	6	54.54
7	Uganda	10	10	100
9	Sudan	10	10	100
9	Egypt	6	4	66.66
10	Ghana	5	4	80
11	Ethiopia	4	4	100
12	Libya	3	2	66.66
13	Rwanda	2	2	100
14	Morocco	2	1	50
15	Botswana	2	-	-

S.No.	Country	Total number of IRS	IRs archiving T&Ds	Percentage
16	Namabia	2	2	100
17	Senegal	2	1	50
18	Malawi	1	-	-
19	Mozambique	1	1	100
20	Zambia	1	1	100
21	Tunisia	1	1	100
22	Lesotho	1	1	100
23	Cabo verde	1	1	100
	TOTAL	204	161	78.92

Distribution of IRs by software

Among the seven commonly used software for creating open access repositories by African countries, Dspace is the leading software used by 140 repositories, followed by E-prints, which is used by seven repositories. The study reveals that other software like Digitool, Drupal, Greenstone, and Invenio is not so popular in African countries, and each is used by only 1(0.62 %) repositories. The study also found that eight repositories used the software that is not recognized by OpenDOAR and hence is grouped under *other categories* (Figure 5).

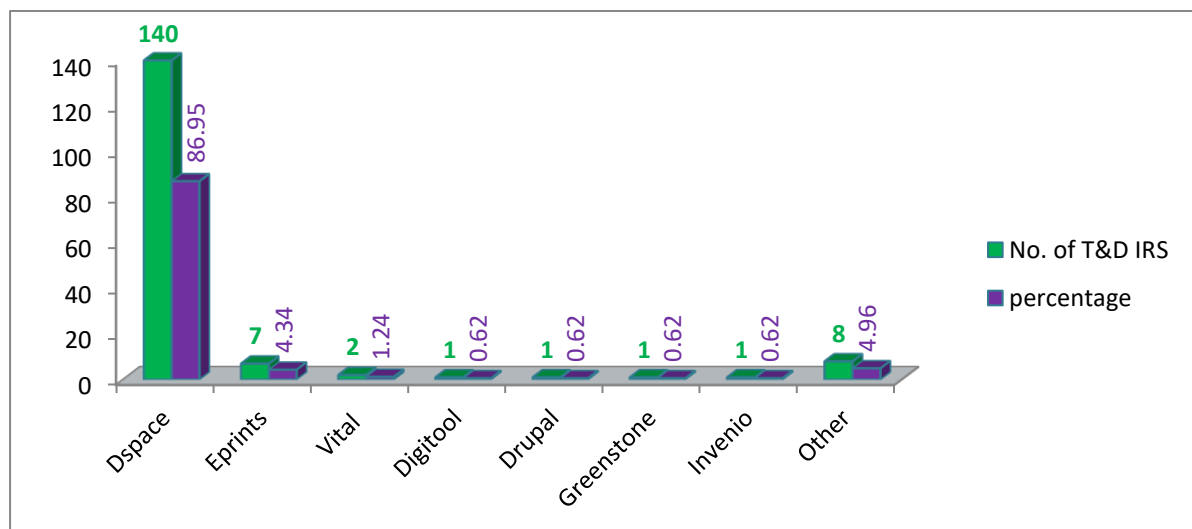


Figure 5: The software-wise contribution of IRs

Interface diversity of institutional repositories

It is observed that there are four commonly used interface languages by African repositories. Among these four languages, English is the leading language that is used by the majority of repositories (139), followed by French (7) and Portuguese (2). However, some repositories use more than one language as an interface, like Arabic & English is used by seven repositories, and five repositories, respectively, use French & English.

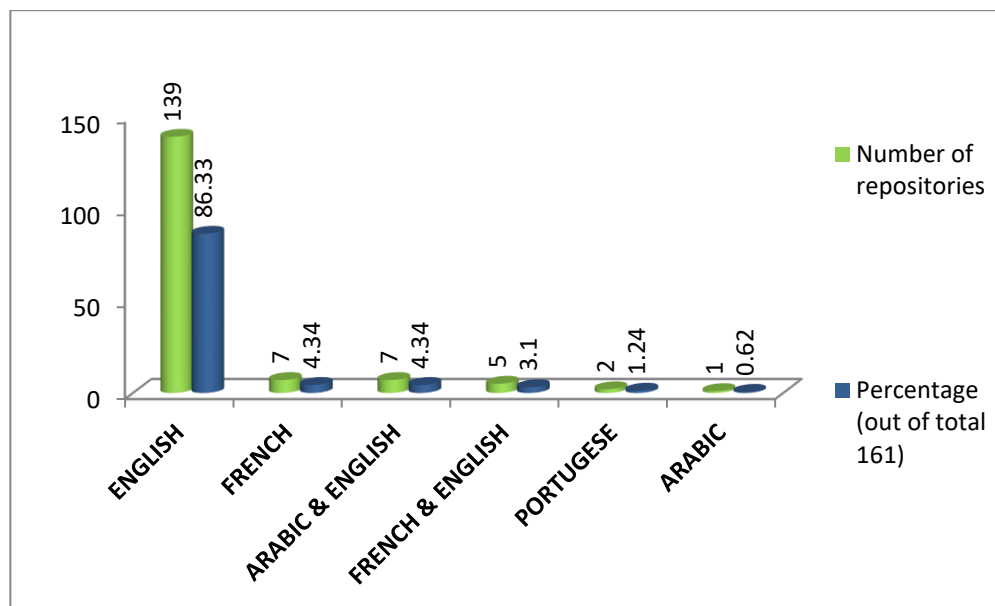


Figure 6: The number and percentage of the language of the interface of the open access institutional repositories

Discussion

The study found a total of 219 open access repositories in Africa, out of which 161 (73.51%) are Institutional repositories that contained theses and dissertations as one content type. The process of inclusion of institutional repositories at OpenDOAR in Africa started in the year 2005, while the maximum growth of repositories has been recorded during the years 2013 (13%), 2015 (18%), and 2019 (28%), respectively. It has been observed that Kenya, South Africa, and Nigeria are the major contributors to IRs in Africa. In contrast, other countries, notably Rwanda, Libya, Namibia, Mozambique, Zambia, Morocco, Tunisia, Lesotho, Cabo Verde, and Senegal, have experienced a minimal contribution. In terms of sub-region categorization, eastern Africa is the leading region with the maximum number of repositories. At the same time, central Africa lags which do not even have a single repository registered with OpenDOAR. The Dspace is the most preferred software used to create the institutional repositories by African countries, which is also evident from the earlier studies (Roy, Biswas & Mukhopadhyay, 2013; Wani *et al.*, 2009). The interface language assessment shows that English is the most commonly preferred language used by African countries.

Institutional Repositories are the centralized information systems that organize, archive, and make accessible, all research output of an institution (Lynch, 2003). With the emergence of the internet and allied technologies, access to scholarly literature is evolving unprecedentedly. The scholarly output is becoming increasingly accessible for researchers across the globe. Research organizations and universities utilize this opportunity and make their research available on the web (Henderson, 2013).

Conclusion

The need is to emphasize the common awareness about the concept and benefits of open access and institutional repositories to promote the culture of open access so that the research output of an institution can be accessed online at a single-window by creating the institutional

repositories which enhance the visibility and impact of institutional knowledge and helps to elevate the impact and ranking of the institution. Theses and dissertations are one of the essential types of grey literature, so by archiving these in open access intuitional repositories, these can be exposed to the global audience by which the visibility, accessibility, and impact will be enhanced that can be highly beneficial for the authors as well as intuitions.

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