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INTERNATIONAL VISIBILITY OF THESIS AND DISSERTATIONS FROM ULISBOA THROUGH THE INSTITUTIONAL REPOSITORIES: GATEWAY FOR OPEN SCIENCE

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Abstract

Institutional repositories of universities are initiatives that integrate the concept of Open Science, enhancing the free circulation of academic and scientific production. The current University of Lisbon (ULisboa) results from the fusion of the former University of Lisbon and Technical University of Lisbon, in 2013. Currently, ULisboa comprises 18 schools. Since the fusion, University of Lisbon still has two independent institutional repositories based on DSpace – the Repositório.UL and the UTL Repository. Focused on the collection of theses and dissertations, the aim of the following study is to look at the scientific production of ULisboa and analyse the international visibility between 2010 and 2019. The final goal is to demonstrate how the use of institutional repositories contributes to enhancing science dissemination, research, and researchers' visibility and promotes access to knowledge, improving the quality of the information available on the web. The self-archive policies of the University of Lisbon express as the major goals, to gather and organize systematically the set of intellectual, academic and scientific production; to disseminate, provide access and more visibility to research developed; to improve monitoring, evaluation and management of research and teaching activities and to promote the enhancement and preservation of the intellectual and cultural heritage of this University.

Keywords

Repositories; Thesis and Dissertations; Academic production

Introduction

In the final report of the European Research Advisory Council, Koutras (2020) explains that the practice of open access has become part of the agenda of the European institutions since 2006. Thenceforth, Europe has been aligned with the free movement of scientific knowledge and the dissemination of research results, namely based on the Horizon 2020 program. This type of regulation illustrates the importance of open access policies for greater dissemination of scientific information, supporting scientific dialogue, the discussion of ideas, and the growth of knowledge. The Open Science movement and the implementation of public policies that support it, namely at the level of the European Higher Education Area, make the scientific knowledge acquired as a result of research projects gain a more notorious dimension.

Included in this scope are the repositories. Repositories are technological tools that enable the aggregation of data, information, and documents. This kind of content is kept and maintained in an organized way, usually in computer storage, accessible, and with the possibility to extract data. In the context of Open Science, repositories are recognized as initiatives that enhance the free circulation of academic and scientific production. Universities around the world have joined the use of repositories, assuming the creation and maintenance of institutional repositories (IR) where their scientific production is deposited. Institutional repositories are online digital archives that organize, preserves, and provides access to an institution's educational, academic and research output. Institutional repositories are maintained by librarians, and by gathering and making information available in open access, they respond to the citizen who seeks to learn, providing also advanced knowledge to professionals, supporting political decision-making, and enabling researchers to monitor cutting-edge scientific production through academic and scientific studies and works found there, ultimately contributing to a global movement for the internationalization of knowledge. This means that "the creation of a digital repository, that centralizes the materials produced in the institution, which organizes and allows their search and information retrieval and that enables the authors themselves to feed the database of the digital repository, is an asset in the academic and scientific context because it promotes, preserves and disseminates the scientific production of a university" (Lopes, Lopes, & Campos, 2010, p. 9). That is the main reason why repositories become a fundamental element for dissemination and communication in academia, and in the context of educational institutions, academic libraries started creating and maintaining these repositories for more than a decade, which have consolidated the understanding of their concept and application (Silva & Corujo, 2018). It is appropriate to mention that repositories have been seen as allies to promote and safeguard the scientific production developed by its faculty and students, being a requirement of funding agencies to give visibility to funded research (Coneglian, Vidotti, Martínez, da Costa, & Segundo, 2019). This also means affirming national public policies around open access (Weitzel, 2019).

Open Science is a concept that emerged in a digital environment and aims to make available the data, results, and conclusions of the scientific activities set of assumptions summarised by FAIR principles (Wilkinson, et al., 2016): Findable, Accessible, Interoperable, and Reusable, developed in universities and research centres. These principles act as guidelines for all of those who work with scientific information and data, in their production, treatment and curation or dissemination. Open Access is free access to scientific information by peer-reviewed scientific journals, as well as other scholarly and scientific publications (conference communications, theses, and dissertations, technical reports, etc.) and research data available on the Internet. The main advantages of Open Access are (FCT, 2016): it supports and accelerates the progress of research and knowledge; increases the visibility, access, use and impact of research results; improves monitoring evaluation and management of scientific activity; facilitates innovation and maximizes the impact and socioeconomic return; and creates research results accessible to citizens and organisations. Institutional repositories of universities and academic social networks of access to scientific information are initiatives that are part of this design. Open Access, aligned with Open Science (Portugal, MCTES, 2016) provides free and public access for any user to read, download, copy, print, distribute, search or link to the full text of articles, respecting the legal rights of authorship, it can bring researchers from distant countries closer to international cooperation. This integration will certainly result in benefits for all nations. Regardless of the social and cultural

reality, most countries around the world suffer from the lack of visibility of the knowledge generated by their researchers (Melo, Sampaio, & Pires, 2008). At the same time “the credibility of institutions devoted to research is demonstrated by its publications and availability of its scientific production” (Lopes, Lopes, & Campos, 2010, p. 8). It is of fundamental importance that, through digital repositories, Higher Education Institutions gather and make available the set of scientific publications, contributing to the growing impact of the research developed in the institution, increasing its visibility and that of those who work there, and guaranteeing the preservation of Portuguese science heritage and memory (Carvalho, 2018).

Some studies support this idea reporting that the scientific outputs and visibility of scholarly research produced by the higher education institutions makes the research productivity of a particular institution more visible globally (Baro & Otiode, 2014; Malapela, Chisita, Hadebe, 2019; Stanton, & Liew, 2011). There are also perceived benefits of enhanced exposure and potential for sharing worldwide research (Ahmed, Alreyaee, & Rahman, 2014). Additionally, Novak & Day (2018) in their research about the conditions for repositories success, underlie that it is necessary to effectively position it within the context of the libraries’ collections, research support, and scholarly communication services. Serrano (2018) supports the idea that IR must be an important part of the formula for valuing the production and data of scientific and technical research, and for the evaluation of science in general, although it is important that we will be considered in broader methods of scientific production, beyond traditional metrics. Finally, Casella (2010), presenting an asset of items and criteria for IR evaluation, states that the variety, the richness and the completeness of the collections deposited in the repository and the number of value-added services developed for authors are strategic components of a successful repository.

Therefore, it is legitimate to state that repositories can be important tools to guarantee access and dissemination of scientific content, namely those produced within the scope of research projects, particularly those that are financed with public funds.

Objectives

This study aims to demonstrate how institutional repositories contribute to the internationalization of scientific knowledge. Focused on the contribution of theses and dissertations to the globalization of science, perceived by archived documents and their access types and the usage statistics of these collections, it seeks to answer the following questions:

1. How do institutional repositories contribute to increasing scientific dissemination?
2. What does society gain by having open access to theses and dissertations?
3. What effects do repositories have on the quality of information available on the web?

Methods

The collections of theses and dissertations archived in the two DSpace repositories of the University of Lisbon were identified. The number of theses and dissertations, from all communities (schools, institutes, and university rectorate) was collected for the period of 2010-2019. Usage statistics related to the number of views (made through repositories) and downloads (made through repositories and other platforms, e.g., search engines) and the home countries of these accesses were gathered. For a better characterization and perception of usage statistics, data on the types of access were also collected. Data collection took place on April 18, 2020. Access type data were collected, on June 18-22, 2021, based on data collected in 2020. A descriptive analysis was performed, concerning the schools listed in Table 1.

Table 1. Schools and Institutes – ULisboa

INITIALS	SCHOOLS/INSTITUTES
FA	Faculty of Architecture

FBA	Faculty of Fine Arts
FC	Faculty of Sciences
FD	Faculty of Law
FF	Faculty of Pharmacy
FL	Faculty of Arts
FM	Faculty of Medicine
FMD	Faculty of Dental Medicine
FMH	Faculty of Human Motricity
FMV	Faculty of Veterinary Medicine
FPCE	Formerly Faculty of Psychology and Education Sciences
FP	Faculty of Psychology
IE	Institute of Education
ICS	Institute of Social Sciences
IGOT	Institute of Geography and Spatial Planning
ISA	Higher Institute of Agronomy
ISCSP	Superior Institute of Social and Political Sciences
ISEG	Higher Institute of Economics and Management
REITORIA	Rectory

(Source: ULisboa - <https://www.ulisboa.pt/escolas>, 2020)

Results

A total of 30863 theses and dissertations were archived in ULisboa DSpace Repositories. Figure 1 shows the distribution of theses and dissertations by schools and institutes.

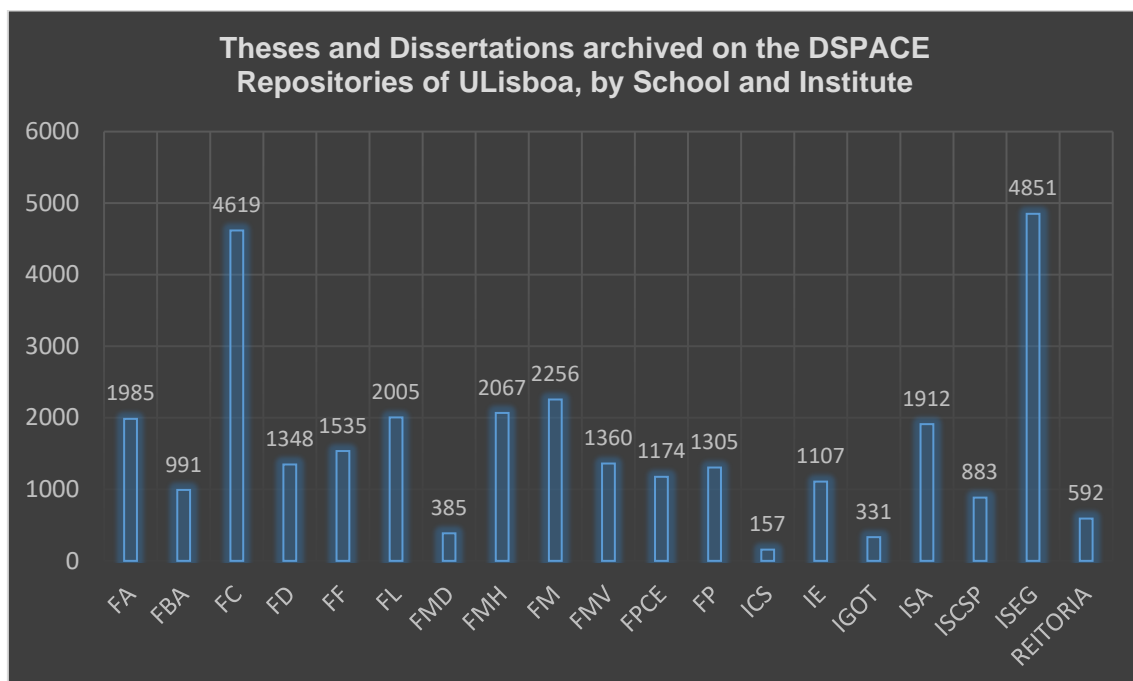


Figure 1. Number of Theses and Dissertations archived on the DSpace Repositories of ULisboa, by School and Institute (Source: Repositório.UL and UTL Repository, on April 18, 2020)

The different dimensions of schools and institutes, in the number of students and courses, have a direct relationship with the number of theses and dissertations defended and deposited. Indeed, 30335 of the existing theses in the repositories were deposited in the period 2010-2019 (Figure 2).

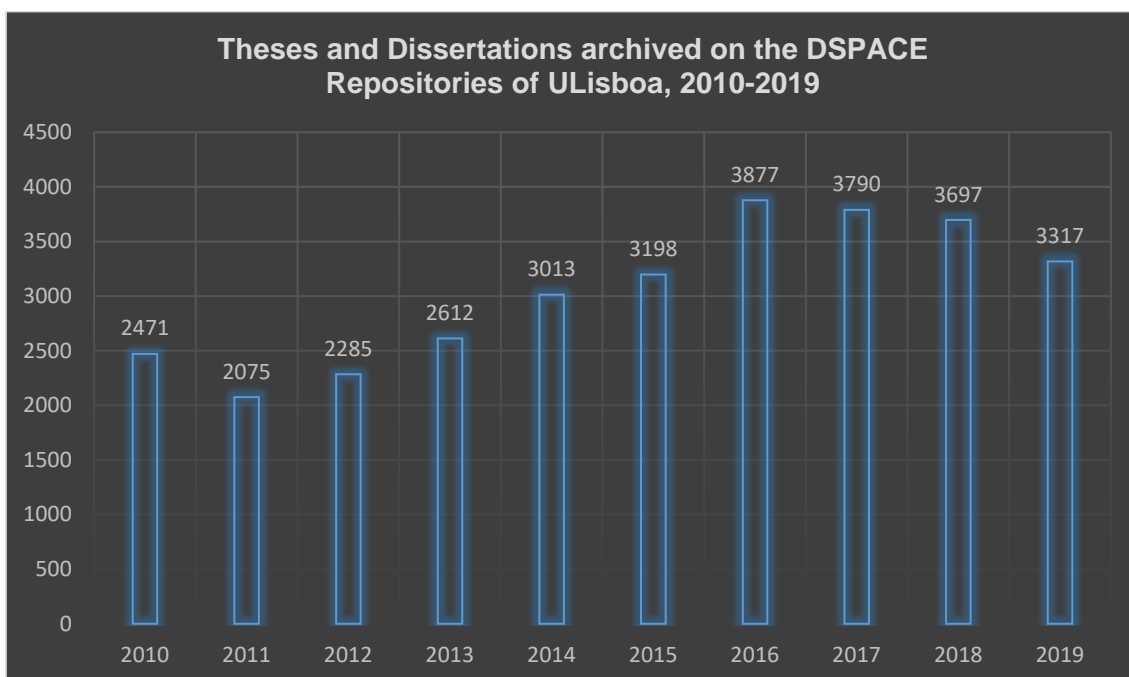


Figure 2. Number of Theses and Dissertations archived on the DSpace Repositories of ULisboa, 2010-2019 (Source: Repositório.UL and UTL Repository, on June 18-22, 2021)

In general, Figure 2 shows the increase of theses and dissertations archived on the DSpace repositories of ULisboa, in particular in 2016. Figure 3 shows that Open Access is the most frequent choice (79%) for Theses and Dissertations in the DSpace repositories of the University of Lisbon.

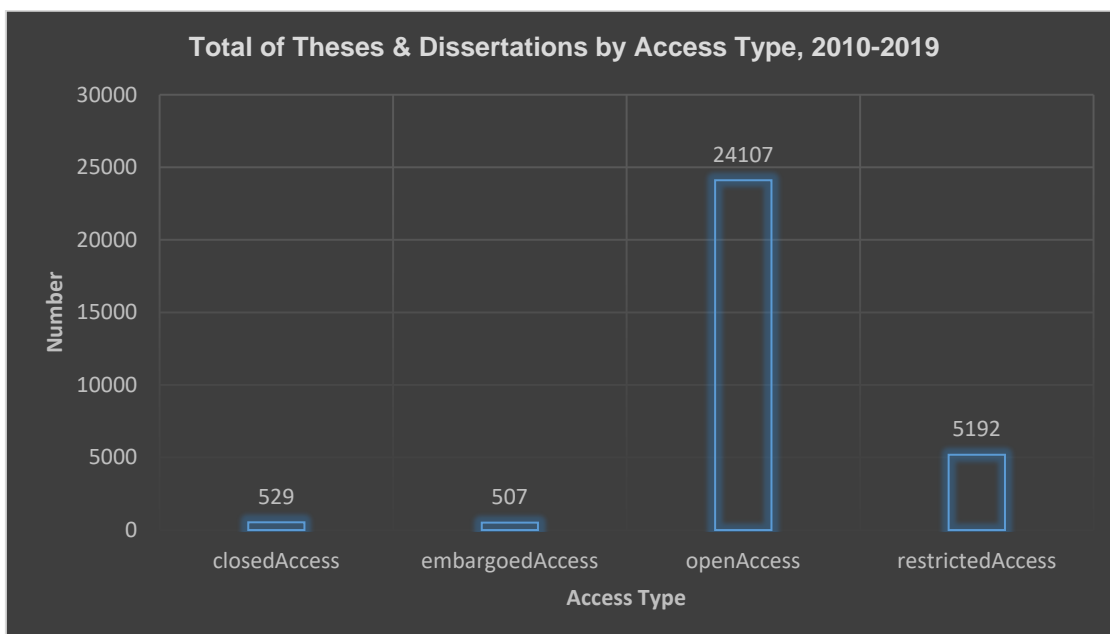


Figure 3. Total of Theses and Dissertations archived on the DSpace Repositories of ULisboa in 2010-2019, by Access Type (Source: Repositório.UL and UTL Repository, on June 18-22, 2021)

Figure 4 shows that Open Access is the most frequently chosen access type for theses and dissertations in DSpace Repositories of ULisboa. With some variations over the years, the lowest values occurred between 2016 and 2017 (71% and 70%, respectively), due to the significant increase in theses and dissertations with restricted or closed access.

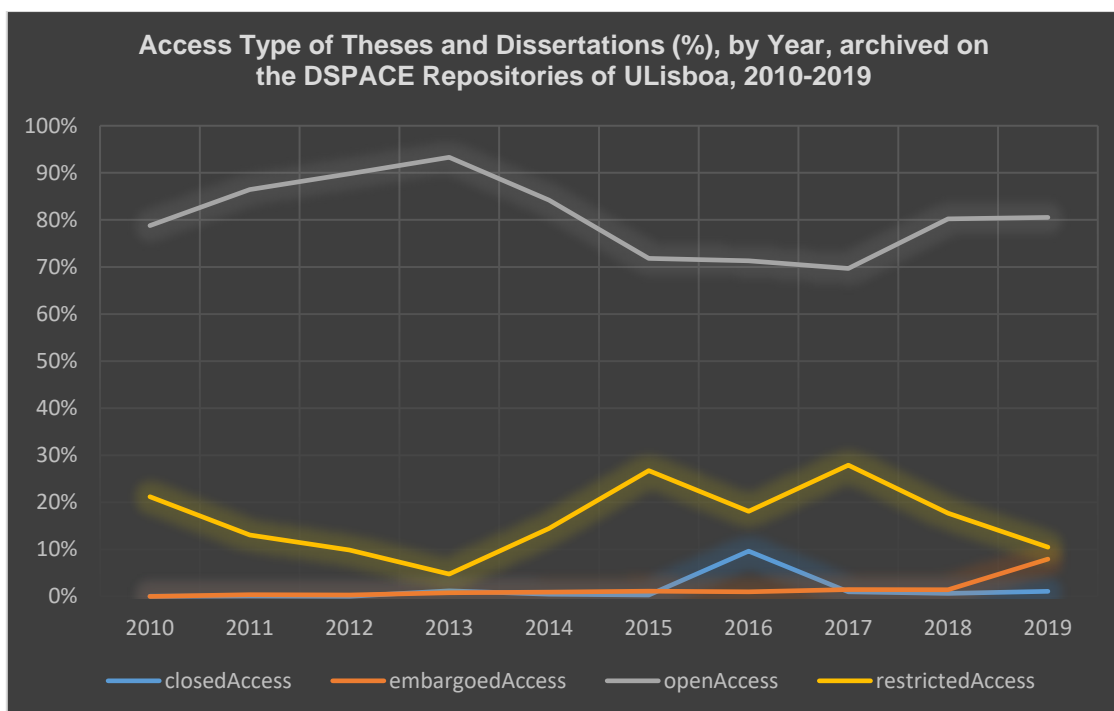


Figure 4. Access Type of Theses and Dissertations (%), by Year, archived on the DSpace Repositories of ULisboa, 2010-2019 (Source: Repositório.UL and UTL Repository, on June 18-22, 2021)

Published in 2015, the legislation P. 285/2015 forced the retrospective deposit of all Theses and Dissertations defended since August 2013 and until 2016. Due to the difficulty in obtaining authorization from the authors, Schools and Institutes of ULisboa complied with the legislation by depositing theses in restricted or closed access. However, it is important to understand these numbers and their global impact, as a whole which is substantiated by the total number of views and downloads. Regarding usage statistics, in 10 years, downloads reached 19.975.293 and views reached 9.006.808 (Table 2). The major number of downloads (comparing with views) is justified by the diversity of available platforms that allow users to search and download without going through repositories.

Table 2. Total of downloads and views

ULISBOA		
Year	Downloads	Views
2010	367328	200171
2011	1027561	461329
2012	1669261	691573
2013	2459786	1082665
2014	3847076	1838277
2015	3213723	1749775
2016	1467390	666651
2017	1456393	704566

2018	2194029	791996
2019	2272745	819805
	19.975.293	9.006.808

(Source: Repositório.UL and UTL Repository, on April 18, 2020)

For better visualization of these results, Figure 5 is presented, which shows the total of downloads and views for theses and dissertations in the period 2010-2019.

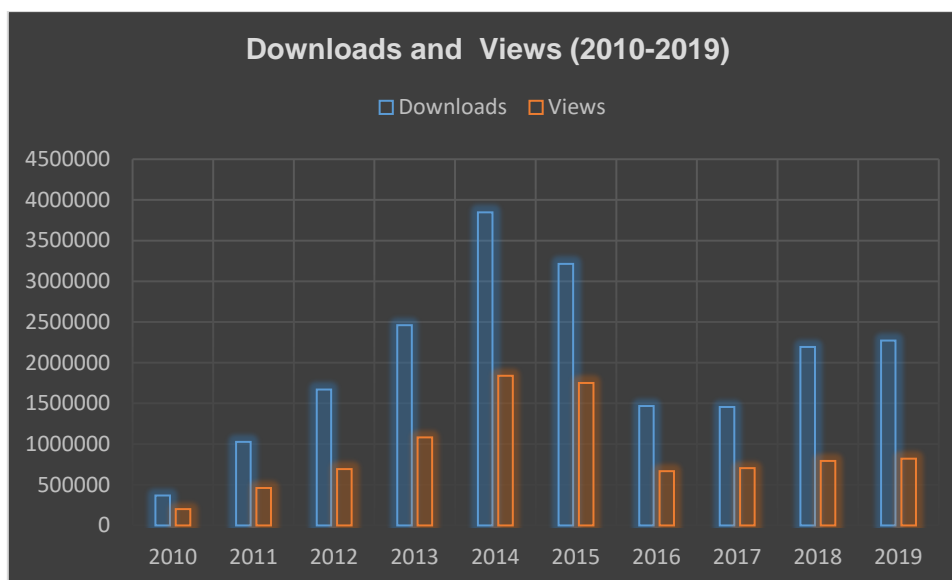


Figure 5. Total of downloads and views for theses and dissertations in the period 2010-2019 (Source: Repositório.UL and UTL Repository, on April 18, 2020)

The total of downloads and views for theses and dissertations in the period 2010-2019 demonstrates a consistent increase until 2014. However, in 2015 there was a slight drop. This does not exactly reflect the decrease of interest in consulting these documents, but rather the irrecoverable loss of statistical data due to a system update.

Later, in 2016, there was also a sharp drop, which this time is justified by the implementation of robotic access control that made the usage data more reliable. Thus, the data from the most recent years appear to be more consistent, revealing regular access and a new gradual and solid increase in views and downloads of theses and dissertations.

It is also important to consider the countries of origin of the searches, to understand the scope and reach out of the dissemination of this information. In the results, analyses were identified 228 countries or regions as the origin of downloads and views.

The top15 countries represents 92,6% and 94,5% of total downloads and views, respectively (Table 3 and 4). Portugal, Brazil, and United States, with a total of 79% of downloads and 78% of views, are in the Top 3 of downloads and views ranking, followed by China.

Table 3. Top 15 - Downloads by Country

TOP 15		
DOWNLOADS		
Countries	Nr.	(%)
Portugal	7370935	35,72
Brazil	5561921	26,95
United States	3381053	16,38
China	648509	3,14
Angola	425121	2,06

Mozambique	392252	1,90
Germany	285078	1,38
Mexico	275056	1,33
Russian Federation	263010	1,27
United Kingdom	128489	0,62
France	108995	0,53
Spain	91456	0,44
Cape Verde	79903	0,39
Turkey	57290	0,28
India	51610,9	0,25
N/A	587238	2,85

(Source: Repositório.UL and UTL Repository, on April 18, 2020)

Note that Angola, Mozambique and Cape Verde, Portuguese-speaking African countries, appear in the Top 15 both in terms of downloads and views.

Finally, N/A corresponds to home countries not identified (data not available, satellite providers and anonymous proxy).

Table 4. Top 10 - Views by Country (2010-2020)

TOP 15 Countries	VIEWS	
	Nr.	(%)
Portugal	3619142	37,59
Brazil	2057495	21,37
United States	1860612	19,32
China	332201	3,45
Poland	322802	3,35
Russian Federation	229403	2,38
France	131808	1,37
Germany	116221	1,21
Angola	109797	1,14
Mozambique	87734	0,91
United Kingdom	73273	0,76
Netherlands	53026	0,55
Spain	43982	0,46
Cape Verde	32439	0,34
Turkey	30657	0,32
N/A	214494	2,23

(Source: Repositório.UL and UTL Repository, on April 18, 2020)

These results are consistent with the literature review, where a correlation was shown, demonstrating the influence of the language of the documents deposited with their access, represented here by the Portuguese language and by countries that speak the same language. It should also be noted that the existence of theses and dissertations in English seems to favour views and downloads by non-Portuguese-speaking countries all over the world.

Discussion and Conclusions

The evaluation of the use of institutional repositories is a useful process to verify the visibility that the scientific production created by higher education institutions and their research centres is developing. In this environment, statistical data on the use of the two repositories of the University of Lisbon (consisting of 18 schools) were collected and analysed in the period from 2010 to 2019. During ten years, 19,975,293 downloads and 9,006,808 searches were performed. Most of the information downloaded was from Portugal (36%), Brazil (27%) and the United States (16%), representing around 79%.

We point out that, in line with what happens in other countries, the language in which the information is found has an important influence on the amount of information consulted.

Approaches favourable to the development of institutional repositories should include the following aspects: maintaining a strategic vision and assessing the impact of development and scientific knowledge; creating an institutional policy and/or image for the repository developing strategies to encourage the production, dissemination and implementation of institutional repositories; ensuring coordination, unity, vision and technical commitment; providing communication channels between the various stakeholders; implementing understandable and intuitive information systems and responsive search interfaces; encouraging content updating; applying marketing and dissemination strategies for the Repository and its contents and ensuring application and knowledge of government policies and national and international directives.

The final objective of this study was to demonstrate how the use of institutional repositories contributes to increasing scientific dissemination, research, and the visibility of researchers and promotes access to knowledge, improving the quality of information available on the web. And that was achieved. It will also be necessary to improve the attention given to auto-archiving, encouraging researchers to participate more actively in the Open Science movement. Based on such an illustrative example like this (of thesis and dissertations international visibility), it became evident that scientific knowledge production gains worldwide visibility, reaching a much wider audience through institutional repositories.

Studies like this are important to improve the global perception of the open science movement and its impact on all stakeholders, particularly authors, whose scientific production undoubtedly gains exponential visibility by being available in an institutional repository.

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