INSTITUTIONAL REPOSITORIES, VISIBILITY AND IMPACT OF SCIENTIFIC PRODUCTION

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Abstract: One quantitative analysis of the number of institutional repositories existing in the world was done. We made a statistical correlation between scientific production and scientometrics indicators from the Scopus database and the number of institutional repositories. The methodology was performed using Data Analyses from Excel. Results prove one strong correlation between variables considered.

Keywords: institutional repository, scientific production, scientometrics, SCOPUS, quantitative analyses

INTRODUCTION

The modern Open Access movement is tied to the changes in academic publishing. The radical transformation of scholarly publishing was set off by the introduction of computerized networks, although, John Willinsky notes that the "open access idea is not just a child of these new publishing technologies" (Willinsky, 2006), given that the endeavors to improve the open access have a pretty long history. He also argues that open access can be seen as the next step in supporting the democratic circulation of knowledge.

According to Magaly Báscones Domienguez, the Open Access movement consists of political, technological, legal and economic aspects (Dominguez, 2006). For the Open Access movement it is important to make peer-reviewed journal literature available to the public, through the internet.

DEFINITIONS OF OPEN ACCESS

There is a wide variety of Open Access definitions. The political actions taken to support open access have resulted in a number of declarations. According to Suber P. (2008) the Budapest (February 2002), Bethesda (June 2003), and Berlin (October 2003) Declaration definitions of open access are the most important for the Open Access circulation. These three definitions of Open Access are only slightly different, and since they are basically similar, a collective term is accepted - **the BBB statement.**

All three definitions confirm that open access eliminates both price and permission (authorization) barriers. However, it is not enough to have free online access and "fair use".

The three statements, components of the BBB definition, are not identical with respect to the permission barriers (authorization) that should be removed. BBB calls for the removal of obstacles to copy and redistribute publications. It does not require the removal of barriers to commercial re-use. Two of the three definitions, BBB components, provide for the removal of barriers in the distribution of derivative works.

BOAI (**B**udapest **O**pen **A**rchives **I**nitiatives) does not indicate how copyright owners shall operationalize the concept of open access. By contrast, the Bethesda

Declaration states that copyright holders will grant users certain rights under the licenses, and these rights must be "free, irrevocable, worldwide, and perpetual." Thus, according to the Bethesda Declaration, users have the right to create derivative works. For instance, a work could be translated into another language without asking permission from the author.

The Bethesda statement also introduces the requirement for open access documents to be deposited in the digital archives of "well-established organization", as opposed to the authors' personal web pages or digital archives whose perspectives of long-time information storage are questionable. The electronic archives of these organizations will ensure "long-term archiving". In other words, they will keep open-access digital documents. Despite this, some who advocate open access state that these two general requirements are not necessary (Harnad, 2003).

According to Suber P. "basically all supporters of open access agree on the BBB definition" (Suber, 2004). However, the author admits that the term is diluted and "real open access" is questionable. Among other reasons, Suber P. claims that the definition leaves room for variation. Stevan Harnad states that he accepts the definition in the Budapest Declaration that open access is offered free of charge on-line full text to peer review literature. At the same time, he notes that this definition lacks two important words - immediately and permanently (Harnad, 2006). Consequently, Harnad S. argues that the definition does not adequately specify **when** and **how long** access should be provided. Another questionable element is whether or not an open access publication should be reviewed.

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Peter Suber characterizes the basic concept of open access as follows: open access removes "price barriers" (e.g. subscription fees) and "permission barriers" (e.g. copyright and license grant restrictions) to "royalty-free" literature (for instance, scientific works created by authors for free open access), making them available with "minimum usage restrictions" (e.g. "author attribution" copyright) (Swan, 2005).

As pointed out by Moed H. the term, the concept of open access has different meanings when it comes to the practical implementation of the above definitions. (Moed, 2007). Thus, Moed H. argues that the term is used to indicate a particular business model of scientific publishing, in which essentially the authors of articles published in a journal pay the costs of the publication, and their full texts are freely accessible once they are published. The term "*Open Access*" is also used to indicate open or free accessibility of scientific documents in general, regardless of whether these are published in a journal running under an Open Access model, or published in a journal applying other business models but also deposited (usually after several months) in a freely accessible archive such as a personal website or an institutional repository, or in a freely accessible pre-print server.

There have been numerous additional declarations on open access, as well as declarations from different groups that contribute to understanding open access, including: UK University Declarations on Access to Research Publications; Australian

Declaration; IFLA Declaration on Open Access to Scientific Literature and Research Documentation; Declaration of Principles and Action Plan approved at the World Summit on the Information Society, etc. Thus, the above-mentioned documents and other statements promote the idea of open access, but the approaches are different.

John Willinsky argues that open access is a part of a broader term called the access principle which he defines as: "a commitment to the value and quality of research with it a responsibility to extend the circulation of such work as far as possible and ideally to all who are interested in it and all who might benefit from it." (Willinsky, 2006).

Willinsky J. also mentions that open access is not free access and that the open access movement "is not operating in denial of economic realities" (Willinsky, 2006). He further argues that the movement is concerned with increasing access and concerned with a long, withstanding scholarly tradition of extending the circulation of knowledge.

For open access definitions related to the open access principle, it is common that they focus on the beneficiaries of open access and less on how access is funded.

Currently, the term Open Access is widely used in at least two ways. For some, open access is digital, online and free literature. This interpretation removes price barriers, but not permission barriers. For others, open access is digital, online, free and royalty-free literature, as well as licensing restrictions. This interpretation removes both price barriers and permission barriers. Most commonly, open access is addressed in the first acceptation, while the BBB definition describes open access from the perspective of the second acceptation.

Scientists have agreed to use the open access term in two ways: "Weak Open Access" is used to eliminate price barriers, and the term "Strong Open Access" is used to eliminate both price barriers and barriers permission. The use of new terms contributes to a clear improvement of the previous ambiguity. *Weak open access* is a necessary, but not sufficient, condition for strong open access. *Weak open access* is often used when *strong open access* is not possible, and open access should not be postponed until *strong open access* can be reached.

Thus, open access is free access to research literature, online copies of peer review articles, conference papers, technical reports, working thesis and documents (Repanovici, 2009). In most cases, there are no restrictions on the licensing of their use by readers. They can be freely used for research, training and other purposes. In order to prepare young researchers to adhere to the principles of Open Access, they should be trained through Information Culture courses. (Repanovici, 2008)

METHODS TO ACHIEVE OPEN ACCESS

Referring to the three *Open Access* channels for information dissemination - open access electronic journals, thematic repositories and institutional repositories - the barriers to open access publishing and obstacles that restrict open access are specified. Thus, Angela Repanovici (2010) argues that a wide range of electronic journals offered by large publishers will force small publishers to leave the business for the following reasons:

(a) the lack of a correlation market would allow large companies to take advantage of the earnings from the publication of scientific journals;
(b) increased supplier and procurement prices and elimination of competition;
(c) Legal and judicial issues.

Bo-C. Björk (2004) also mentions several barriers to open access publishing (Table 2.1). The author classifies barriers and means in six different categories: legal framework, information technology infrastructure, business models, indexing and standardization services, academic reward system, marketing. The number of asterisks (from zero to three) in the table denotes the importance of a certain point in preventing a quick transition process. Thus, in the opinion of Bo-C Björk, legal barriers to the proliferation of open access journals do not exist or are minimal, but this is a central issue in the case of institutional archives, and there must be a prominent position within the academic communication system. (Table 1)

Table 1: Classification and relative importance of different types of barriers to increasing *open access* editing. (Bo-C.Bjork, 2004)

Categories	Open access journals	Thematic repositories	Institutional Repositories
Legal framework	-	*	**
IT infrastructure	**	*	**
Business models	***	**	*
Indexing and standardization services	**	-	***
Academic reward system	***	*	*
Marketing	***	**	***

STATISTICS ON INSTITUTIONAL DIGITAL REPOSITORIES
The main project that generated significant statistics on the number of digital institutional repositories in the world is OPEN DOAR - Directory of Open Access Repository (V2.sherpa.ac.uk., 2018). The figure shows countries with the most institutional digital repositories (Figure 1)

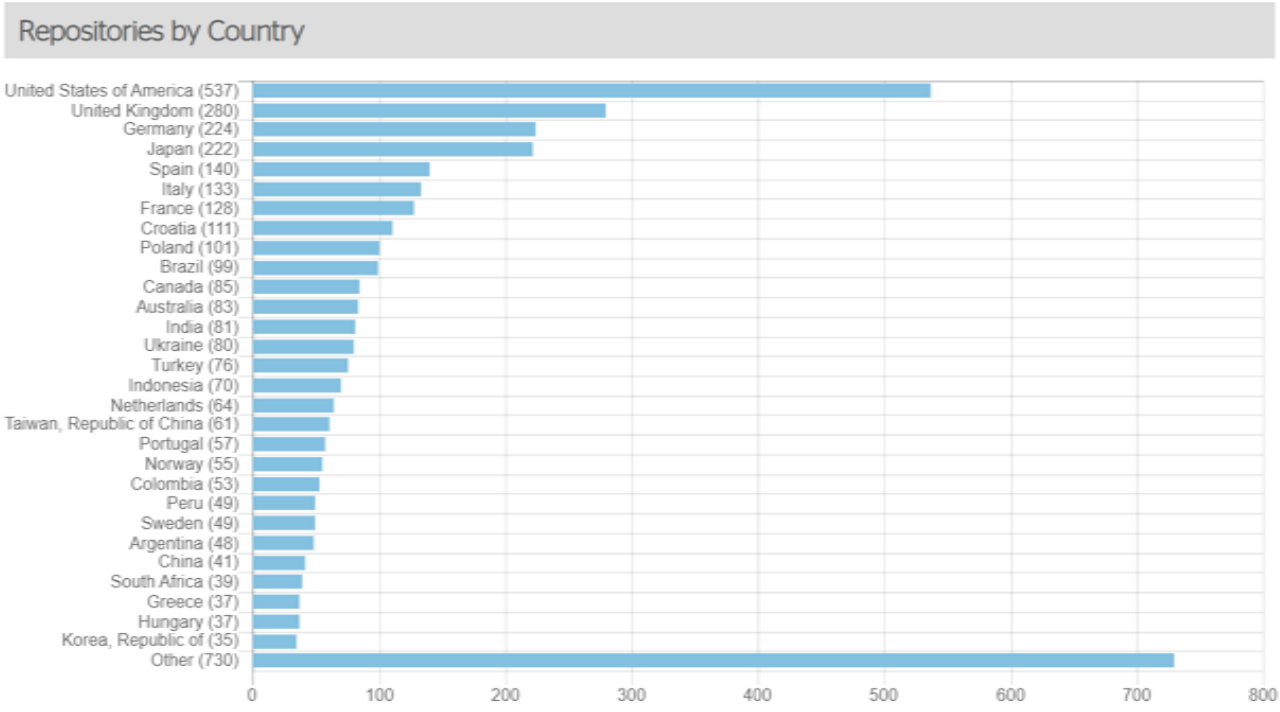

Fig. 1 – OpenDOAR, number of institutional digital repositories, hierarchy by countries

Scimago (Scimagojr.com, 2018) performs the hierarchy of countries by taking into consideration the database of documents indexed in SCOPUS. The countries are hierarchized according to several criteria, the most important is the number of published documents. (Figure 2)

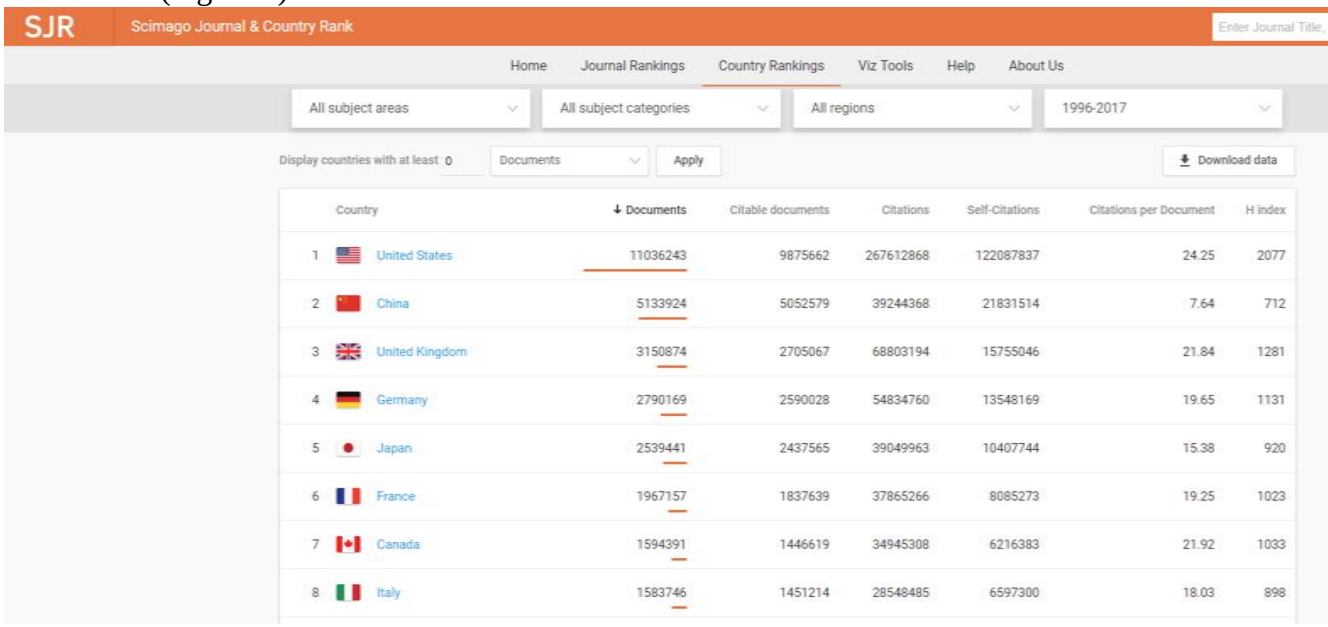

Fig. 2 – SCIMAGO, the number of documents published in SCOPUS, hierarchy by countries

RESEARCH METHODOLOGY

I downloaded the database in Excel provided by SCIMAGO, I filled in with the information provided by OpenDOAR and obtained the following database in Excel (Table 2):

TABLE 2: Correlation of the number of digital repositories and the number of documents indexed in SCOPUS

Rank	Country	Number of IR - OpenDOAR	Documents
1	United States	537	11036243
2	China	41	5133924
3	United Kingdom	280	3150874
4	Germany	224	2790169
5	Japan	222	2539441
6	France	128	1967157
7	Canada	85	1594391
8	Italy	133	1583746
9	India	81	1472192
10	Spain	140	1256556
12	South Korea	35	1004042
14	Netherlands	64	886135
15	Brazil	99	834526
17	Taiwan	61	614487
18	Sweden	49	600233
19	Poland	101	580205
20	Turkey	76	531899
28	Greece	37	290718

30	Norway	55	281530
31	Portugal	57	270634
35	South Africa	39	241587
37	Argentina	48	190637
41	Ukraine	80	171571
48	Croatia	111	95058
50	Colombia	53	84734
52	Indonesia	70	75220

Using the Data Analyzes function in Excel, I obtained the correlation coefficient of the two value strings r = 0.844655, indicating a strong correlation between the number of documents and the number of institutional digital repositories in each country.

CONCLUSIONS

Open Access introduces a new paradigm for capitalizing on scientific research and academic communication flows through a model that is more equitable for the entire society. Open Access is intimately linked to issues involving copyright and the protection of sui generis databases. These components of academic communication flow aim to have the widest exposure to content and data through the intermediation of electronic networks, as is the Internet.

The visibility and impact of scientific production of the countries can be significantly increased through the development of institutional digital repositories. There is a strong correlation between the number of published documents and the number of institutional digital repositories in different countries.

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