

The Brazilian National Impact: Movement of Journals Between Bradford Zones of Production and Consumption

Rogério Mugnaini¹ and Luciano A. Digiampietri²

¹ mugnaini@usp.br

University of São Paulo, School of Communication and Arts (ECA), Av. Prof. Lúcio Martins Rodrigues 443, 05508-020 São Paulo (Brazil)

² digiampietri@usp.br

University of São Paulo, School of Arts, Sciences and Humanities (EACH), Av. Arlindo Bettio 1000, 03828-000 São Paulo (Brazil)

Abstract

A specific aspect of the scientific communication in non-English-speaking countries is the need for insertion in the global knowledge flows since a significant part of their publications occurs in national or regional journals. This had led many countries to create alternative ways to assess national journals, allowing a more trustworthy view of the national scientific production. This study aimed to characterize the journals used in the Brazilian scientific production in Web of Science and SciELO, in order to observe the dynamics along five triennia and across the Bradford Zones for both production and consumption in the different areas. Bradford zones showed to be an interesting relative indicator, when applied to evaluative purposes. Especially the joint analysis of production and consumption dimensions can bring a more complete view of the scientific communication system, and this study showed the flows of journals through zones in both dimensions.

Conference Topic

Country-level studies

Introduction

In the last years, several efforts were undertaken by the developing countries in order to improve their position in the global scientific scenario. However, as important as (or even more important than) improve their position is to formulate and implement initiatives for improving their research system, in which the scientific communication plays important role.

A specific aspect of the scientific communication in these countries, mainly in the non-English-speaking ones, is the need for insertion in the global knowledge flows (Ponomariov & Toivanen, 2014), because a significant part of their publications occurs in national or regional journals (Mugnaini et al., 2014). The researchers from these countries, many of them involved in scientific editing, face the dilemma between maximizing efforts to publish in *mainstream journals* and improve the national journals in order to internationalize them – and its negative consequences of such a process (Rego, 2014). Both aspects are typically treated as ways to internationalize the national science, but is this enough (Buela-Casal et al., 2006)? This duality comes from the national science policy, which in one hand valorizes the journals with high Impact Factor (IF) and, on the other hand, tries to attend the clamor for recognition of the national journals (Miranda & Mugnaini, 2013).

This had led many countries to create alternative ways to assess or classify the national journals, allowing a more trustworthy view of the national scientific production, identifying the role of the national journals. In order to do this, some countries built national citations indexes: SciELO Project (Packer et al., 1998), Chinese Science Citation Database (Jim & Wang, 1999), Korea Citation Index (Kim et al., 2013), Citation database for Japanese papers (Negishi et al., 2004) and Islamic World Science Citation Center (Mehrad & Arastoopoor, 2012). Other countries considered this kind of initiative as a solution only for the Humanities and Social Sciences, and are looking for different ways to include the national journals in their scientific evaluation process: Taiwan (Chen, 2004), Spain (Piñeiro & Ricks, 2015),

Poland (Winklowska, 1996), Serbia (Šipka, 2005), among other countries from Eastern Europe (Pajić, 2014) and a project originally european – European Reference Index for the Humanities and the Social Sciences-ERIH PLUS – which currently reaches worldwide.

By the way, despite being considered, national journals are minimally punctuated in comparison to journals indexed in WoS. One of the reasons of this non-recognition is the fact that many of these journals are not peer-reviewed, and, among the ones that are, some present and endogen editorial board (Packer, 2014). These facts explain the non-inclusion of these journals in the most recognized citation databases. Consequently, the commissions of researchers that tread the paths of the national research assessment exercise have to deal with these characteristics as extra factors. On the other hand, the creation of national data sources with defined selection process can be a solution.

The limited insertion of these countries' research in mainstream science finds no echo (Tijssen et al., 2006), since it lacks potential audience (MacRoberts & MacRoberts, 1996), indispensable to a consistent citation analysis. Thus, the evaluation is based strictly on productivity indicators, which impose even bigger challenge to establishing quality criteria. Therefore it became necessary the classification of the journals. A side effect of this is the need, for these researchers who work in a research area with local/regional focus (as typically occurs in Social Sciences and Humanities), to publish a significantly higher number of papers, inflating the entire scholarly communication system (Rego, 2014).

The journals evaluation performed by CAPES in Brazil fit these aspects and have considerably different criteria among the 48 areas (Miranda & Mugnaini, 2013). The most common criteria are (sorted in a decreasing way, according with the assigned importance): citation indicators (JCR Impact Factor, Scopus/SCImago or Google Scholar H-index, SCImago Journal Ranking, or a mix of more than one); indexing in databases with explicit selection criteria (such as Web of Science, Scopus, SciELO, thematic bases - e.g. MEDLINE, or regionals – such as, Redalyc, Latindex) or without explicit selection criteria (e.g. PASCAL); journals characteristics. All the journals where Brazilian researchers published their papers during the preceding triennium are classified. Some journals can receive different classifications from different areas (e.g. Cadernos de Saúde Publica).

Considering this scenario, stands out the need to complement the range of citation indicators for journals classification, providing a consistent view to the national context. In order to fulfill this need, in this paper a nationally recognized base - whose selection process considers explicit criteria – were created aggregating the national scientific production from SciELO and WoS (including the publications bibliographic references). The papers from this base were used to evaluate the national production and the references to evaluate the consumption. The former indicates the utility of each journal for its area; the latter indicates its impact. For both, the Bradford Zones (BZs) were calculated for each area and triennium.

This study aims to characterize the journals dynamics along five triennia and across the Bradford Zones for both production and consumption in the different areas. This study also searched for specific behaviors when comparing the journals from Brazil, from Latin America, and from the rest of the world. Other aspect analyzed was the temporal relationship in the climbs for the journals that presented climbs in both: production and consumption.

Methods

We retrieved the articles of Brazilian authors from Web of Science (WoS) and SciELO databases in a fifteen years period (1998 and 2012) - five triennia that match the national assessment exercise performed by CAPES. It was called production (PROD) data set, with 395,650 articles, published in 9,092 journals. WoS journals cover 56.4% of the articles, while 12.5% came from SciELO journals, and 28.8% from journals indexed in both databases. The remainder 23% came from journals indexed in SciELO in less than a half of a triennium

period, getting "not indexed" in such triennium - likewise, some SciELO journals turned SciELO/WoS in a triennial transition. We classified the journals using the Science Watch (2014) schema that relates WoS categories to 22 Essential Science Indicators categories, to which we added the Human Sciences. SciELO journals were classified at the same way.

Respectively, de consumption (CONS) data set was formed by 10,759,279 bibliographic references of the articles. In the case of SciELO, we just added references related to journals, but WoS data include references to proceedings, and sometimes, to thesis. These citations remained in such amount once it was discarded in the normalization process (described below) that resolved 71.3% of the references (7.67 million), as presented in Table 1.

For this first approach, we decided to restrict CONS information to citations directed to those titles that belong to PROD data set. The reason was the fact that we have almost 29% of total references not normalized automatically, and that PROD journals capture 90.3% of the normalized citation amount.

Table 1. Consumption data sets and its prevalence in the whole data set.

CONS data set (filters)	Citation window	Freq.	% of All citations	% of Normalized	% of Citations to PROD journals	
					from any area	restricted to
All citations	all	10,759,279	100.0%			
	5 year	3,731,745	34.7%			
Normalized cited journal titles	all	7,666,238	71.3%	100.0%		
	5 year	2,777,013	25.8%	36.2%		
Citations to PROD journals, from any area	all	6,922,780	64.3%	90.3%	100.0%	
	5 year	2,655,547	24.7%	34.6%	38.4%	
Citations to PROD journals, restricted to its own area	all	3,748,044	34.8%	48.9%	54.1%	100.0%
	5 year	1,485,463	13.8%	19.4%	21.5%	39.6%

So we created four different CONS data sets (featured in bold in Tab. 1), resulting of crossing two dummy variables. The first one was the restriction or not of the citation window (all citations/5-year). The second concerns to the area from which the citation comes to one title. In one case we considered just the citation received from titles of the same ESI category (not too restrictive, since it aggregates lot of WoS categories). In the other case, we count the citations regardless the area. The former corresponds to 54.1% of the latter. To give an idea of our purpose on doing this, we calculated the share of citations each area receives on its own area. The first one in the list was Space Science (whose impact is the most endogenous, with 81.2%) and the last is Multidisciplinary (the least endogenous, as one can expect, with 2.3%). The cited journal title normalization has been performed relating the ways a journal was cited by the papers' authors with a reference base which contains several variations of cited journal title for each journal obtained from different databases (ISSN, WoS, Scopus, SciELO and Lattes Platform). Thus, it was possible to identify the ISSN from the most of the cited journals. Whenever there were conflicts in this identification, i.e., the cited title could be referring to more than one journal, the year and volume of the publication was used. In order to do this, a database containing the valid years and volumes for each journal was created using information available from the citations were the normalization presented no conflict. If, even after the use of year and volume, the conflict persisted, the normalization was not performed for the respective citation.

Having the normalized data from PROD and CONS from the 9,092 journals, as well as their basic information (title, ISSN, classification area and citing and cited years) we identified BZs, with three partitions, for which of the 23 areas in each of the 5 triennia, totalizing 115 Bradford's distributions for PROD data set. In the case of CONS data sets we did the same,

but four times, resulting 460 distributions. Moreover, it was not assigned a BZ for the journals without production or consumption in a given triennium.

An initial analysis suggested some journals had to be discarded because there was not enough information to correctly identify the behavior of these journals along the triennia. It was the case of 2,376 journals that entered the PROD data set in the last two triennia (publishing less than ten papers per triennium). An opposite case consists of 39 journals that the community stopped publishing, having no publications in the last triennium. We also found 247 journals with no articles in four triennia, and no citation in four of five triennia. Without these exclusions, 6,492 journals remained in the analysis.

The dynamics of each journal across BZs in its area was assessed along the triennia. Journals without any change in the BZ along the five triennia were classified as Stable (S). The ones that climbed zones along the triennia without any fall were considered Up (U), and oppositely, journals that fell BZs across the triennia without any climb were considered Down (D). And a journal that had climbs and falls along the triennia was considered Oscillating (O).

Findings

The great amount of data demanded many cross-tabulations to define the way of treating the information of each variable. At this time, we decided not to differentiate if a journal climbed one (Z3 to Z2 or Z2 to Z1) or two (Z3 to Z1, in different triennium or in a unique double step). The same was proceeded in relation to journals that fell BZs.

As we needed to create a journal profile of change that combine both PROD and CONS, we aggregated it with the following ordered classification scheme: U, to any combination that occurred at least one Up, permitting one of them to be Stable (U-U, U-S or S-U, to both PROD and CONS, respectively); S-S, if the journal has being Stable in both dimensions; O, if it was found swinging in any of dimensions; and D, to any combination occurring a Down.

Table 2. Distribution of journals by profile of changes in Bradford zones of production and consumption, in the four CONS data sets – period 1998-2012.

Citation data sets Publication country	Journals (total)					
	U	S	S	O	D	% Freq.
<i>CONS, considering citations to PROD journals, from all areas</i>						
all	10.8%	76.1%		8.7%	4.4%	100.0% 6,492
Other	9.5%	77.3%		8.7%	4.4%	100.0% 5,949
Latin Am. &Caribe	2.6%	93.1%		3.4%	0.9%	100.0% 233
Brazil	41.0%	39.7%		11.0%	8.4%	100.0% 310
5 year	10.4%	73.4%		10.6%	5.6%	100.0% 6,410
Other	9.3%	74.5%		10.6%	5.7%	100.0% 5,873
Latin Am. &Caribe	3.1%	92.5%		3.9%	0.4%	100.0% 228
Brazil	38.2%	38.2%		14.9%	8.7%	100.0% 309
<i>CONS, considering citation to PROD journals, restricted to its own area</i>						
all	17.7%	65.0%		12.1%	5.3%	100.0% 6,430
Other	16.5%	65.8%		12.4%	5.2%	100.0% 5,890
Latin Am. &Caribe	3.9%	90.9%		3.9%	1.3%	100.0% 232
Brazil	50.3%	28.6%		12.3%	8.8%	100.0% 308
5 year	16.8%	60.9%		15.2%	7.0%	100.0% 6,310
Other	15.8%	61.6%		15.6%	7.0%	100.0% 5,777
Latin Am. &Caribe	4.8%	90.3%		3.5%	1.3%	100.0% 227
Brazil	45.8%	25.8%		17.6%	10.8%	100.0% 306

So we first have looked to the general behavior of the journals, but focusing on the ones that improved across the triennia, at least in one of the dimensions. Tab. 2 shows that the great amount of journals (about 75%) are Stable in both dimensions, but we find 10% less journals

with this profile when we restrict the citations to the journals own area. It reveals that closing the context of citation to the specific area, we find more changes (and this tendency is even more evident in the 5-year citation window), especially for the journals that got climbed BZs.

Considering the publication country, we can realize that Brazilian journals present lesser stability, what is interesting to analyze changes, which is what we find abundantly: about 40% when considering citation from any area, and about 50% in the journals own area. Revealing the importance of studying the impact of these journals in their context.

Despite being less frequent, journals falling are more prevalent in the 5-year citation window. All this tendencies have to be analyzed more carefully subsequently, since specific characteristics of the journals can help to understand such evidences.

Now focusing our analysis in U-U journals, it is important to mention that Clinical Medicine presents more journals (about 30), followed by Engineering (about 15), and in the opposite side is Physics (with 2). Another observation is that U-U Brazilian journals correspond to 14.5%, considering citations from all areas, and 18% in the journals own area. This is strongly different of journals out of Latin America & Caribe, whose correspondent percentage is about 3%. Among Brazilian journals, those indexed just in SciELO presents prevalence about 5% bigger than those indexed in both databases, when considering the citations in the journals own area. It reveals the growing importance of some journals in the national context, inside the area of specialty (data not shown).

Table 3. Distribution of journals U-U by triennium of first climb in Bradford zones of production and consumption, in the four CONS data sets – period 1998-2012.

Citation data sets		% of journals: triennium of 1st climb in BZs (CONS)				Journals (total)	
U-U Journals		2	3	4	5	%	Freq.
<i>CONS, considering citations to PROD journals, from all areas</i>							
all		11.4%	24.6%	29.8%	34.2%	100.0%	114
Triennium of 1st climb in BZs (PROD)	2	17.2%	44.8%	20.7%	17.2%	100.0%	29
	3	12.9%	29.0%	32.3%	25.8%	100.0%	31
	4	5.3%	10.5%	34.2%	50.0%	100.0%	38
	5	12.5%	12.5%	31.3%	43.8%	100.0%	16
5 year		14.1%	25.6%	30.1%	30.1%	100.0%	156
Triennium of 1st climb in BZs (PROD)	2	34.5%	37.9%	13.8%	13.8%	100.0%	29
	3	19.5%	41.5%	31.7%	7.3%	100.0%	41
	4	3.7%	11.1%	40.7%	44.4%	100.0%	54
	5	6.3%	18.8%	25.0%	50.0%	100.0%	32
<i>CONS, considering citation to PROD journals, restricted to its own area</i>							
all		18.5%	24.3%	27.2%	30.1%	100.0%	173
Triennium of 1st climb in BZs (PROD)	2	41.4%	31.0%	20.7%	6.9%	100.0%	29
	3	8.6%	51.4%	28.6%	11.4%	100.0%	35
	4	22.2%	20.4%	31.5%	25.9%	100.0%	54
	5	9.1%	7.3%	25.5%	58.2%	100.0%	55
5 year		22.9%	24.0%	29.6%	23.5%	100.0%	179
Triennium of 1st climb in BZs (PROD)	2	44.0%	32.0%	24.0%	0.0%	100.0%	25
	3	20.0%	48.6%	25.7%	5.7%	100.0%	35
	4	27.3%	20.0%	40.0%	12.7%	100.0%	55
	5	12.5%	10.9%	25.0%	51.6%	100.0%	64

Attempting to the temporal relation between Ups in PROD and CONS BZs, we performed a bivariate analysis considering the triennium each journal had its first climb in BZs. Tab. 3 presents the distribution of journals of different triennia of CONS (columns), related to each triennium of PROD (lines). The row cells with bigger prevalence of journals are identified in grey scale. The row cells with bigger prevalence of journals are identified in grey scale. In the first CONS data set, considering the first line, that respect to 29 journals that climbed BZs first time in the 2nd triennium, we see that most of the journals climbed in CONS in the 3rd,

followed by the 4th. It shows that most of them improved CONS BZs after (as to say, both of them above the principal diagonal). When we drop to the next lines the two more prevalent cells change to the diagonal and one before. The same can be observed in the second CONS data set (5-year citation window) and a little bit more concentrated in the principal diagonal when restricting the citation to the journals own area. Maybe in subsequent analysis we can verify properly if the increasing of consumption is pulling the increasing of production.

Final remarks

As we can observe in this first approach, a national system combining publications from both contexts (national and international) can be a useful tool to research evaluation. Bradford zones showed to be an interesting relative indicator, when applied to evaluative purposes. Especially the joint analysis of production and consumption dimensions can bring a more complete view of the scientific communication flow, considering the changes of journals through zones in both dimensions. National impact indicators can complement Impact Factor, in the sense it can add the local importance, as observed about SciELO journals.

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