



# The need and viability of a mediation index in Latin American scientific production and publication

## The case of the Redalyc System of Scientific Information

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### Abstract

**Purpose** – The purpose of this paper is to introduce the online information system Redalyc as an intermediary tool that provides Latin American scientific articles with international standards (mostly related to natural sciences and developed countries) as well as with specific areas to host local research.

**Design/methodology/approach** – Redalyc is based on a semantic intersection model proposed by Russian semiologist Yuri Lotman. This model allows us to visualize the role played by Redalyc as a mediator between opposites, i.e. local science versus global science, and natural sciences versus social sciences. The paper presents some of the projects Redalyc has developed in conjunction with different countries and different scientific communities.

**Findings** – The paper describes some characteristics that local projects, similar to Redalyc, must have in order to become an intermediary between scientific journal production indexes that link global parameters for scientific communication with local production. The paper finds that efforts should not only be centered on the development of strategies to change certain inertias that distinguish local social scientific production (e.g. dependence on literary resources, lack of recognition of periodical media), but also on the way they could help these disciplines and local media overcome certain barriers, namely: normalization, language and technological handicaps.

**Originality/value** – The recognition of Latin American scientific production implies a dual process that not only involves local policies (scientific councils), but also requires producing reliable databases to provide scientists and journal editors with global references on how to produce visible scientific literature and pertinent knowledge for their contexts. Redalyc is currently a database that contributes in both ways.

**Keywords** Mediation, Science communication, Publications, Information systems, Latin America, Local science, Databases, Communities, Case studies

**Paper type** Case study



### Scientific communication as a global system

A scientific community is a human group gathered around a communication system, as a functional set of people joined by common practices (networks) and their significant products (articles, patents and developments) rather than by their mere proximity, nationality or institutional adscription. Therefore, the process of

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development of a scientific community is directly related to its capacity to ensure its communication. This is the reason why scientific information works through filters, such as reviews of the proposed data, the formality of dissemination channels, citation and the reflection of this solidity in tables presented by the different indexations which certify the process of writing (according to certain quality standards)[1]. All these stages, by and large, have become unavoidable for the correct operation of the global scientific circuit. Nowadays, this scientific community has turned into an object at worldwide level, for different sorts of studies, which have taken full advantage of new technologies, such as the internet, mass databases, online registrations of publications, as well as laboratories, and research institutes, in order establish models based on measurable data[2], and qualitative ethnographies, which scientists present as a sort of global culture, determined by the very myths, rituals, and mainly, the language proper to scientists[3]. All of these socio-anthropological perspectives are clearly reflected, not only on the quotidian practice, but – and this is very important – on the set of written documents that reveal the ways of working, thinking and preserving the information of said community.

At present, statistical information related to scientific production has become a valuable resource, not only for internal references in different disciplinary groups of scholars, but also to determine the activity of the governments and institutions which fund and support research and development activities. Thomson-Reuters (formerly known as Institute for Scientific Information, ISI) in the USA, and Scopus, which belongs to Elsevier in the Netherlands, are nowadays the most widely recognized scientific databases; they provide comprehensive information and constitute the main parameter to discover new publications, citations and the collaboration that takes place between authors in all fields of knowledge. Their resources enable a perspective of how scientific work is developed in the world and emphasize differences between established scientific policies (such as the ones in more developed countries) and the emergent scientific agendas (as the ones developed in Latin America)[4].

Conversely, the scientific community has been criticized for being devoted to producing results bearing in mind rankings, certifications and criteria based on indexation which are generated by this central architecture of knowledge production (Prat, 2005), or as a specific market activity (De Vito, 2006) conformed to corporative, governmental and institutional parameters. These criticisms wield that the official science and technology councils all around the world have forced scientists to transform their research activities into simple visibility strategies in the so called “mainstream science”. It would seem as though the scientific toils have lost their “pure” and “original” research objectives (to solve problems, as a base for development, social action guidance and leader in inventions). The critics argue that science has become a political game, more focused on answering the demands of a system of rank measurement (solely based on written evidence diffused by specialized media) than on solving human problems.

According to some of these critical perspectives, the world of scientific communication can be divided into two internally excluding groups.

- (1) The first represented by the dichotomy between the production of “hard sciences” (chemistry, biology, mathematics, physics, astronomy) and the production of other “soft sciences” (sociology, anthropology, psychology, economy and other) where the highest quality levels are always attained by the former.

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- (2) The group composed of the association between what we call “the pole of developed countries” which not only has the control of the scientific media and information systems, but also the highest production level; and the “pole of the underdeveloped countries” which experiences cultural disadvantages, as language and tradition may be, and other challenges of technology transfer and the adoption of global production standards[5].

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If we follow these two argumentations we can visualize scientific taxonomies as two parallel objects which are always accepted where “hard sciences” and “first-world countries” are to be found. Not only does the weight they have come from controlling the principal communication means, but also from the fact that they produce the bases and criteria to evaluate scientific production (articles, patents, development prototypes and technology).

Then, if a scientific depends on physical evidence – such as written production, patents and practical projects and programs – and since it does not have territorial limits (for its boundaries are limited by its processes and consistence), what occurs to scientific work at the edge of these boundaries? What is the destination of those physical and written products, which are not recognized by the mainstream science and only follow local criteria of consistence? A mediator is needed, and with this term we refer to a platform that allows spreading and indexing and, at the same time, supplies the necessary references to maintain and adapt to global standards the way in which scientist from emergent regions work; this is the case of Latin America.

For Vessuri (1995), scientific policies shall follow certain logic and stimulate, in the first place, the impact of local media in order to “reflect national circumstances, including the processes to learn, monitor and adapt to characteristics of different countries in the process of ‘catching up’ with the most advanced, or simply reflect specific ‘scientific’ or ‘national’ agendas”. Hence, the national councils of science and technology in emergent countries must maintain an agenda based on financial support for scientific journals with the main objective of fostering science and securing a communication channel to diffuse scientific research, which, in the case of Latin America, is basically financed with public resources.

If we follow this agenda, then Latin American scientific policies should have already promoted heavy local development, as well as good international circulation of research results; nevertheless, this is not so, and it is explained by the lack of deftness in the instrumentation of research policies or agendas boosted by the governmental organisms; undoubtedly, the status quo under which Latin American scientists work, their practices and ways of developing research activities – particularly those linked to social sciences and humanities – largely explains the stagnation compared with the so called “mainstream science”.

### **Scientific communication at the edges**

Although a number of science and technology councils have set up scientific editorial policies in order to try to stimulate domestic production of Science and Technology, according to Vessuri (1995) scientists in Latin America still face historical obstacles that have delayed the consolidation of scientific and communication policies between sciences. Among the obstacles, the following are identified:

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- The documents and articles they produce are largely written only in Spanish; thereby, they do not have a significant impact on circuits closely linked to the English language (Cañedo *et al.*, 2005).
  - Their production is restricted to local or institutional impact; Vessuri (1995) calls this “parochialism” and it represents a non-symmetrical schema, where technologic, work and funding strategies mainly respond to politically-defined criteria.
  - Production and publication almost exclusively depend on public funds.
  - Scientists and practitioners in different disciplines do not take part in diffusing their own researches, or in verifying their impact in broader communication circuits[6].
  - The use of online resources is not a common practice yet, when it comes to discussing, confronting and searching for current perspectives in diverse disciplines.
  - Online resources are not yet recognized as the ideal platform to inform on research results (in particular repositories and other open access scientific databases).
  - In the particular case of social sciences in Latin America, there is an additional obstacle: their forms of production are based on a deep-seated tradition of writing centered on books (Pujol, 1995).

Technological barriers and access to infrastructure in developing countries have been two of the main setbacks to reach a solid strategy of science and technology (Molloy, 2011; and Aguado-López *et al.*, 2008). Latin American countries have struggled with lack of investment to generate appropriate technologic platforms that enable spreading and processing information. This has blocked the generation of indicators and has led to the development of two main problems:

- (1) The first related to governments, companies, professional associations, universities and higher education institutions which are not prepared to invest in technology without precise information of returns and dividends; therefore, they need information to better understand how their money will be used and what the generated benefits will be. These data can only be produced if they are previously supplied by a reliable index generator, capable of projecting specific data on the region, and consequently, on the investment impact.
- (2) The second principally deals with problems related to the constitution of a self-sustainable channel, which can gather large amounts of information produced in and about the region, and can collect and systematize data in views of offering practical and specific information.

An information channel of this sort must have the necessary technical support and a solid platform of data, with which work to generate cartographies, statistics and schemas of scientific work in collaboration or the region. It is important to note that a region such as Latin America, is not used to producing in accordance with normalized processes, standardized conditions and above all, using particular technologic platforms. Heeding Molloy’s (2011) proposals so that Latin American scholars increase their awareness of online resources, it is clear that the options available to publish are yet to be

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discovered by most of the local scientists. Repositories, e-journals, Open Access resources, and electronic managers of the editorial process (i.e. CMS) are relatively unused in the region. Additionally, there is need for technological adaptation (the change from “paper to pixel”), normalization (quotes, bibliography, journalistic resources, and media indexes), periodicity and improvement of scientific editorial processes; as these conditions are not always present. These are some of the reasons, which make the process of scientific editorial production a great challenge for Latin America.

Even if there are some noticeable endeavors to create a regional platform for scientific production in Latin America – most of them promoted by governmental agencies of science and technology, these tend to take as a pattern the information generated by Thomson-Reuters and Scopus. According to Molloy (2005) regional databases in Latin America, especially Open Access ones, are a growing platform for the global projection of the scientific production of the region, since individual production (articles, not journals) acquires a visibility that transcends their “local packaging” and they are referred to or cited around the world. Molloy’s work offers a general but detailed listing of reference centers, databases and indexes currently available in Latin America, suppliers of scientific references, abstracts and full texts from specialized journals. There are two outstanding projects, that have developed their own platform, and their objective is to strengthen, not only the visibility of the scientific production of the region, but also of contributing to generate bibliometric indicators, on the basis of the production generated in the region: the Online Electronic Scientific Library, known as Scielo – an initiative fostered from Brazil: [www.scielo.org](http://www.scielo.org) – and the Redalyc System of Scientific Information – developed by the Universidad Nacional Autónoma del Estado de México (Autonomous University of the State of Mexico): [www.redalyc.org](http://www.redalyc.org). Another noteworthy project is the Virtual Library of the Latin American Council of Social Sciences (CLACSO), in Argentina: [www.clacso.org](http://www.clacso.org)

Scielo and Redalyc and CLACSO are resources of specialized information for Latin America which are noteworthy not only because of the magnitude of their libraries, but mainly because all of them are developed in the framework of the principia of Open Access to knowledge, which means an indisputable support in reducing the inequality breaches, which characterize the countries of the Latin American region, and also contribute to the democratization of knowledge access. Both Scielo and Redalyc offer full text content of the journals they have in their respective libraries and draw to detailed selection criteria in order to incorporate journals. The collection of Scielo stands out because of a higher presence of medical, exact and natural sciences, whereas Redalyc holds a higher proportion of journals of social sciences and humanities. As a whole they offer more than 1,200 different journals and more than 300,000 full texts free of charge. On its own, CLACSO is a resource specialized in social sciences, which offers access to full texts from books and journals published by its affiliate research centers.

Regional efforts, such as these, represent important steps in what we may call: “the formation of national indexes or systems of scientific communication”. They reflect the rates of regional disciplinary cooperation and the condition of science in Hispanic and Portuguese-speaking countries. All of them are widely recognized by different national and regional councils of science and technology in the Latin American and Iberian regions and they continually search for diverse forms of supporting the local and regional scientific activity.

The aim of the present article is to describe and analyze the contribution of Redalyc.

**A mediator between the official culture and regional demands**

The Latin American region as a whole – and not only Mexico – nowadays faces enormous difficulties to consolidate its scientific policies. According to Casas (2001), the creation of a regional program must include the restructuration of scientific and technologic capacities (which are basically relayed to infrastructure) and the consolidation of research networks sufficiently capable of including multiple participation levels[7]. It is in this point where such communication channels are the key for development. We will call them mediators.

The mediator is an agent or element that “is in the middle”; in this case, two different requirements and two different capacities. As a response to the aforementioned problem, it appears as a hybrid source of scientific communication, which obtains references to operate either from the mainstream science at a global level and from regional and specific demands (in this case from Latin American cultures).

This intermediate agent must comprise two levels that include:

- (1) Increase the visibility and availability of high quality scientific journals published in emergent countries; this can be guaranteed by means of their inclusion in Open Access information systems and databases, with protocols of automatic metadata interchange and harvest (such as Open Archives Initiative, Protocol for Metadata Harvesting: OAI-PMH).
- (2) Progressively adapt and transform reliable information to build indexes according to the local and global possibilities for references[8], in accordance with the differences between “hard and soft sciences”.
- (3) Normalize in order to adjust to the international circuits of scientific communication.

The intersection Figure 1 is developed from the perspective of Lotman’s communications (1999) and shapes the way in which this intermediate element is between two systems, joining them to gradually integrate their differences – which may be cultural, economic, institutional, historic or traditional. The importance of this schema is not however, the mere presentation of said intersection, but the expression of the way its expands the systemic limits to develop a more consistent program where diverse “forms of local production” and “soft disciplinarian perspectives” coexist with “global parameters” and “hard disciplinary extensions” (see Figure 2).

Each Figure may operate a certain analysis category which leads to comparative perspectives between “global conditions” and “local proceedings”, and between “hard sciences” and “social disciplines”. As an instance of the first case, we think of a relation

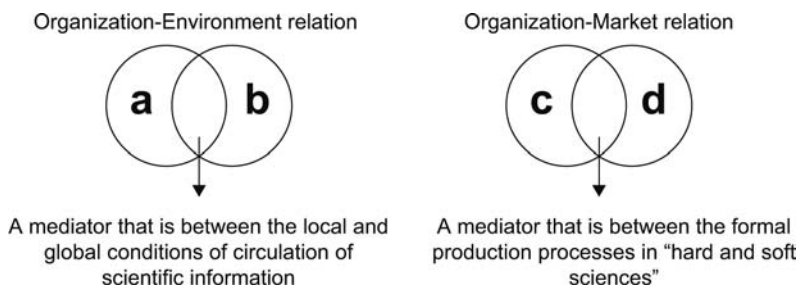


Figure 1.

based on the accessibility to scientific information between two different regions (see Figure 3).

The advantage of this schematic relation is that the resulting intersection is not necessarily passive, but dynamic. In it the information supplied to local users can also be the base for the comparison and progressive adaption of online resources to the parameters of global circuits, and this can make scientists change their election of dissemination channels or even change their forms of producing written evidence.

Problems such as dependence on “grey literature” (Pujol, 1995) and limited accessibility to data might be progressively resolved adjusting parameters in the local system to global references. Hence, mediation may be visualized as a mechanism to analyze the way in which new scientific policies stimulate the formation of collaboration networks and new distribution channels and the impact they have in a region or country. The networks are projected by means of their productivity and their channels through their capability to accumulate and distribute information from inter-operable international databases and online libraries in an open access format.

Therefore, as a conclusion: not only is the role of the mediator that of providing information, but also acting as a reference that links different forms of scientific



The mediator provides production with tools to extend to global standards

The mediator gives “soft disciplines” new ways to spread their research

Figure 2.



The mediator appears as a source of online resources which can be obtained free of charge and through minimal financial and technologic resources. This is the core idea of certain initiatives such as *Open Access* and *Creative Commons*

Figure 3.

production and dissemination in order to generate changes. In Figure 4, the mediator appears as a starting point for several changes related to local production, in accordance with external references (dotted and solid lines). These changes imply the progressive local integration (dotted and solid ellipses) according to global references as technological improvements, software development, network formation, consolidation of communication means, and adaption of practices/conditions of work, and consequently, the orientation of a regional scientific policy.

Redalyc System of Scientific Information clearly has some of the aforementioned characteristics of a mediator. Among its main objectives, as well as strengthening the visibility of the main scientific journals of the region, is to offer tools that aid in the analysis of regional scientific production, as a support to diagnose and define action lines in favor of R&D activities for universities, research centers and higher education institutions, as well as governmental and non-governmental agencies. Bearing this in mind, the work of Redalyc System focuses on:

- Developing supportive actions for the improvement of scientific editorial processes in the region, with the aim of increasing the competitiveness of Latin American scientific journals and their presence in the mainstream of science.
- Providing an integral technologic platform, robust and inter-operable, which facilitates the interchange of metadata with the main specialized databases, strengthens working at distance, and thus guarantees the sustainability and permanence of the system.
- Offering newfangled technologic development, for example the Scientometric Atlas of Ibero-America, a one of a kind tool, which aids in discovering the state of scientific production in the region.

### The Redalyc System of Scientific Information

Redalyc is a research program, with its headquarters in the Faculty of Political and Social Sciences of the Autonomous University of the State of Mexico, where a group of academicians, interested in analyzing new communicational strategies, and mechanisms of the Latin American[9] scientists, found ourselves in the need of developing a database in order to obtain information on the performance of scientific activities, and their communication strategies. Before the setting in motion of Redalyc, in the year 2003, most of the databases which registered scientific activity were characterized by a stressed under-representation of Latin America; moreover, they were – in most of the cases – databases for which universities had to pay very high fees in order to grant access to their full text contents.

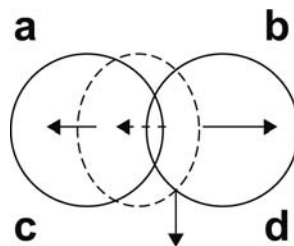


Figure 4.



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From its inception, and since it was born as a project with scientific research ends, charging a fee to grant access to the information contained in the database was never considered; this made Redalyc one of the first Open Access systems of scientific information in the Ibero-American region. Likewise, from the start we stated the need to register and hold only academic journals with the highest quality in the region. To do so, we resorted to diverse strategies to select the journals up to the year 2008, when the scientific advisory board of Redalyc was constituted and which became responsible for defining the editorial policy and approving the evaluation methodology for Redalyc journals.

Today, after eight years of work, we start to see how some fragments of the initial goals are accomplished: we offer indicators of the use of the available material, as well as a number of bibliometric indicators that allow learning some characteristics of the scientific endeavour in Ibero-America. The most distinguishable nevertheless is perhaps being precursors in the development of the analysis of socio-scientific networks in the region, after the release of the beta version of the “Scientometric Atlas of Ibero-America”, whose launching was held in November 2010 in the Meeting of Redalyc Editors, in Valdivia in southern Chile. Redalyc is not only an Open Access online scientific library, but also one of the most robust systems of scientific information in Ibero-America.

### **Redalyc as a mediator in two main aspects: international and disciplinary**

As from the early 1990s, a common practice in Latin America has been the creation of governmental instances to support R&D, with the objective to strengthen scientific communities – by means of the consolidation of active researchers, as well as the formation of new panels – and stimulate the most pressing research in accordance to the needs of each country. In the planning and organization of these tasks, the role of the evaluation of the performed work is fundamental, as it allows identifying what the advancement has been and in which fields, but chiefly, what there is still to be done to fulfill the established goals.

Even if the evaluation of scientific activities has been harshly criticized because of its merely qualitative character – the number of articles published in high impact factor journals, citations received, “h” index, among others – in detriment of the recognition of qualitative parameters – such as social impact and disciplinary relevance – it is also true that scientific communities, in general, end up making their best efforts to adjust to the demands stated by governmental organisms, and to some extent to meet the guidelines established by them, for the funding of their activities ultimately depends on this. However, it is indispensable to recognize that the presence of Latin American science is underrepresented in the databases, which work as platforms to design public policies to foster research. For instance, taking a look at the yearly reports issued by the organism responsible for Scientific and Technologic Development in Mexico, where one sees exiguous results as only articles published in scientific journals registered in Thomson-Reuters are reported (see Table I).

Indubitably, the information in said report is not the only production; nonetheless, in order to ensure the visibility of research results that circulate in high quality journals, which are not registered in such databases, one shall resort to information from regional databases, as is the case of Redalyc.

	2007	2003-2007
<i>Countries with the highest participation at worldwide level</i>		
The USA	31.52	32.65
The UK	8.53	8.62
Japan	7.75	8.49
Germany	7.95	8.22
France	5.63	5.85
Canada	4.88	4.74
<i>Countries with the highest participation in Ibero-America</i>		
Spain	3.51	3.32
Brazil	1.91	1.80
Mexico	0.77	0.76
Argentina	0.58	0.58
Chile	0.34	0.33
Venezuela	0.10	0.11
Colombia	0.11	0.10

**Source:** Thompson-Reuter (2008), taken from *Report on the General State of Science and Technology*, (Conacyt, 2008)

**Table I.**  
Share of the global production of articles of OECD country members

In this scenario it is clear that the policies of scientific production must be developed in a gradual manner, by means of progressively demonstrating the benefits of changing work, as well as the implications for the scientist. Terms such as “collaborative work” (Russell, 2007), “network procedures” (Luna and Velasco, 2006), “integration of working groups” (Casas, 2001), “development of general guidelines of production” and “editorial criteria” are common in the quotidian scientific endeavors in Mexico. However, they lack meaning as we do not have criteria that allow us to operationalize said variables.

The instrumentation of a permanent program to gradually change from the purely measuring elements toward a detailed comprehension of its impact (beyond the mere relation to budgets) is one of the main objectives of Redalyc. Currently one of the programs of Redalyc aims is to produce a map or cartography of the science in Ibero-America, in views of visualizing the general panorama of the local scientific work and offering a tool to develop policies that permit, in the long term, adjusting the apparatus to new forms of work (see Figure 5).

The objective is to dialogue with scientists and personnel in charge of scientific policies and editors on how scientific publication and production can operate in Latin America. By drawing from the information contained in its own database, Redalyc works on the configuration of indicators and regional, national, disciplinary and institutional maps of science, so as to provide useful data for the people who work in these areas and for those who are in charge of devising policies and planning strategies for science and technology.

### As a disciplinary mediation

It is clear that Latin American social scientists’ arguments about an unfair representation under the current indicators is legitimate; the numbers reflected on their publishing rates and the importance given to their practices are always lower than

**Figure 5.**  
Scientometric Atlas of  
Ibero-America and Chile



those projected by the “hard disciplines”. Low international publishing rates and deficient impact factors in this area are not a consequence of negligence, but the inadequate interpolation of the global processes of scientific communication. This also offers, at least at national or continental level, a counterproposal for the official numeric indicators, arguing that there might be a more suitable reference to express the peculiarities of the production of social sciences in the region.

The methods employed by Thomson-Reuters and Scopus – within a western research tradition – are more based on the practices of the “hard sciences” than on the practices of the “soft”. Once again, the examples of the Royal Society of London and the French Academy arise as the first cases of systematization of scientific information, and as referents of additional efforts in scientific communication.

We face the necessity of having tools that enable us to learn how science operates; notwithstanding, currently those we have developed – and legitimized – only let us notice the reality privileging a single point of view, thus distorting a part of that other reality which, if recognized, would allow us to learn new possible worlds. Similarly to the navigators and explorers of the Renaissance who produced cartographies that allowed them to travel to the “New World”, and once there, little by little they realized how distorted their maps were, and found themselves in the need to draw new ones, where the overlooked geographic points were included, as their existence was not known. Hence, scientists have also drawn their own maps and created rules to update them (Serres, 1995).

Scientific cartographies and databases are becoming a must in many peripheral nations; they are considered a substantive remedy that secures access to information and a permanent updated source in diverse fields of knowledge. The size of these cartographies, their profiles, and potential to systematize objectives and references on a large scale depend on the construction of local indexes. Once these are consolidated by means of a collection that includes “source journals” with the highest quality, the correct use of citations, normalization and development of technologies that enable the interoperability of their information, as well as the analysis of the socio-scientific networks that will appear, then it will be possible to acknowledge the conditions wherefrom scientific work operates in Latin America.

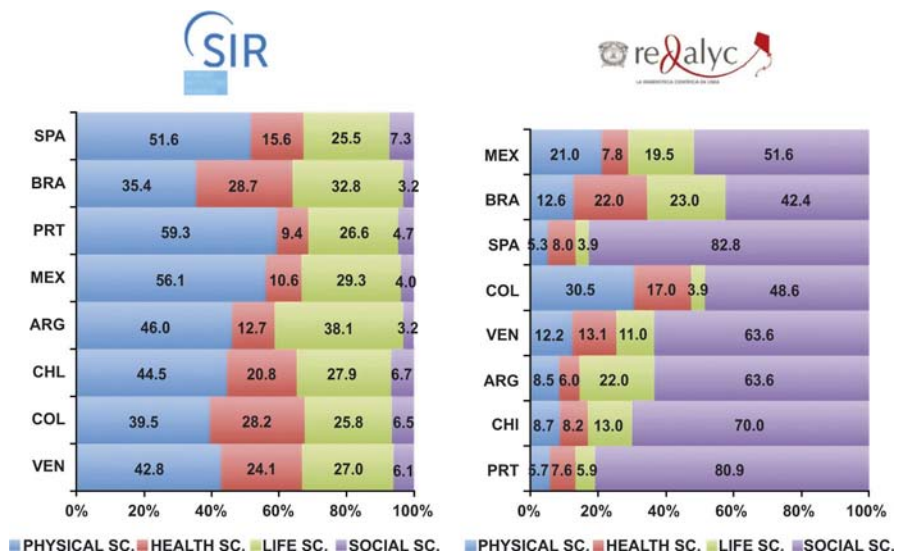
This need is clearly noticed when one compares the thematic distribution of the contents of the included journals, for instance, in Scimago Institutions Rankings (Scopus) and Redalyc System of Scientific Information (see Figure 6). The scarce representation of Latin American social sciences is blatantly evident. It is not that science is not produced in Latin America; it is that its performance cannot be analyzed if one only draws from information supplied by the databases, which traditionally generate bibliometric indicators.

The work of a local index cannot be exclusively based on attempts to break linguistic barriers, but it must also take into consideration disciplinary traditions, the specific demands of geographic areas, as well as international scientific practices.

In order to fulfill these conditions Redalyc integrates a number of objectives:

- (1) A platform that gathers the Latin American journal with the highest quality.
- (2) One of the main suppliers of scientific articles in Open Access.
- (3) A space that preserves and consolidates Spanish and Portuguese languages as adequate means for scientific communication.
- (4) A recognized indexation system, with solid and transparent policies of inclusion, rejection and permanence.
- (5) A one-of-a-kind information system, which generates scientometric data from the specificity of its library.
- (6) A system that generates bibliometric indicators with its own methodology.
- (7) A project that looks for the incorporation of disciplinary needs, acknowledging the official culture and the tradition of publication and dissemination.

The first four are supported by the online library; the fifth and sixth on the capacity of data gathering and software development to generate automatic information; and the



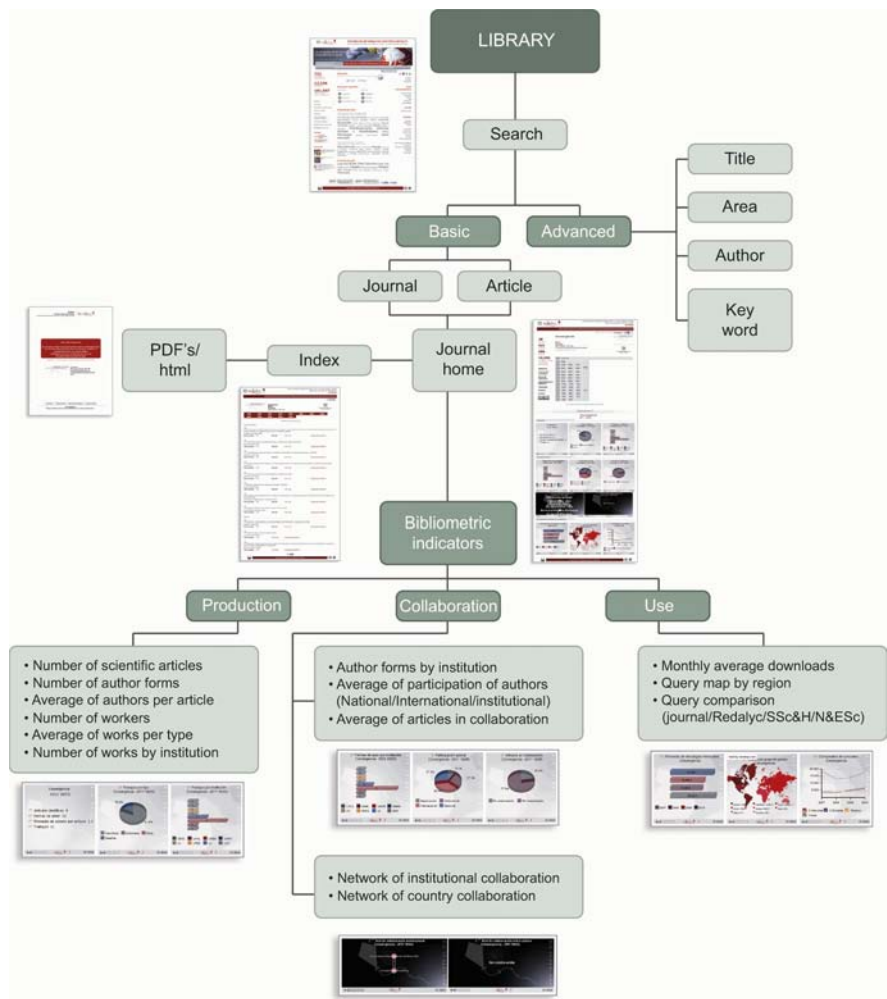
**Figure 6.** Comparison of thematic distribution of Scimago Institutions Rankings (Scopus) and Redalyc

seventh on the portals of scientific communities. These are described as follows (see Figures 7 and 8).

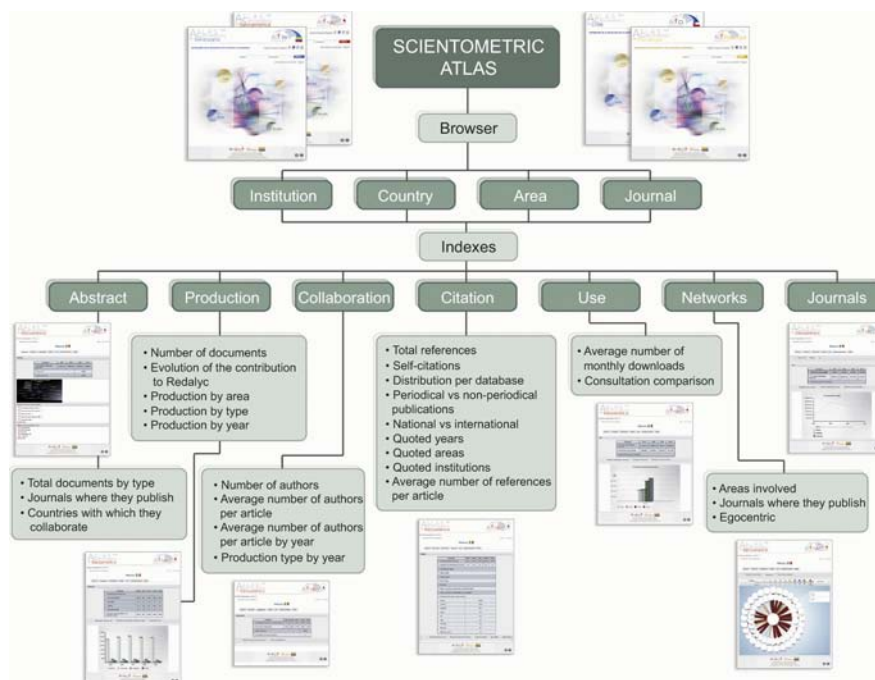
*Online library*

Redalyc library is an Open Access collaborative collection; it offers full texts (both in PDF and HTML), abstracts, and diverse indicators of more than 160 thousand articles, published by 732 high-quality journals (see Figure 9).

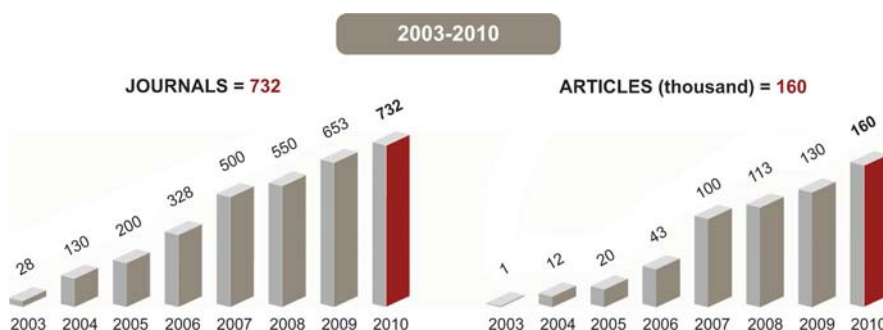
Up to January 2011, Redalyc System covers 15 countries: 13 in Latin America, in addition to Spain and Portugal, and it also holds journals edited in other countries, whose contents address problems related to Latin America. The distribution by country somewhat shows the presence of research and development activities in the countries which partake this endeavor. From the beginning, Mexico has been the most



**Figure 7.**  
Library structure



**Figure 8.**  
Scientometric Atlas Structure



**Figure 9.**  
Journals and articles in Redalyc library (January 2011)

represented country in Redalyc library; this is explained because Redalyc is an initiative started in a Mexican university, whose relation networks contributed to the initial take-off of the project. In recent years, nevertheless, the highest rates of journal incorporation have been from Colombia, Brazil, Spain, Chile, and Venezuela. These five countries, together with Mexico, as a whole concentrate 624 journals and more than 142 thousand articles (85.2 percent). The participation of Argentina however, compared with its participation in Science and Technology activities in the region, shows a low representation with only 41 journals (see Table II).

Redalyc system offers in so far as possible, the contents of journals in its library, and, also – if it is so disposed – historic contents. As one accesses the page of any

	Journal and article distribution by country							
	Journals	(%)	Fascicles	(%)	Articles	(%)	Authors	(%)
Argentina	41	5.6	534	4.1	6,011	3.8	10,722	3.4
Brazil	108	14.8	1,753	13.4	26,364	16.5	66,008	21.2
Chile	64	8.7	943	7.2	11,002	6.9	17,717	5.7
Colombia	134	18.3	1,794	13.7	22,284	13.9	41,169	13.2
Costa Rica	15	2.0	267	2.0	3,327	2.1	5,336	1.7
Cuba	20	2.7	139	1.1	1,524	1.0	4,681	1.5
Ecuador	3	0.4	62	0.5	990	0.6	824	0.3
Spain	94	12.8	1,802	13.8	26,011	16.2	48,079	15.4
L. America scholars	5	0.7	93	0.7	1,111	0.7	1,754	0.6
Mexico	168	23.0	4,358	33.4	47,408	29.6	90,023	28.8
Peru	11	1.5	205	1.6	2,402	1.5	5,396	1.7
Portugal	8	1.1	94	0.7	1,167	0.7	1,625	0.5
Puerto Rico	3	0.4	34	0.3	345	0.2	397	0.1
Dominican Rep.	1	0.1	41	0.3	286	0.2	428	0.1
Uruguay	1	0.1	8	0.1	53	0.0	57	0.0
Venezuela	56	7.7	936	7.2	9,868	6.2	17,828	5.7
Total	732	100.0	13,063	100.0	160,153	100.0	312,044	100.0

**Table II.**  
Redalyc system of  
scientific information

**Source:** Database of Redalyc System of Scientific Information, data retrieved in December 2010

journal, a personalized home page displays, where, besides the basic information of the journal, one finds individualized indicators, which are called “home indicators” (data on the use of each journal within Redalyc); well now, to generate both “home indicators” and Scientometric Atlases, we only take into account the information on the library from 2005 to 2010. It is a six-year window, for which there are 729 journals, 97,812 full text articles, and 223,907 authors.

As for the representation of databases by field of knowledge, it is undisputable that its strength is to be found in social and human sciences, both in the amount of journals and the number of articles as a whole. This situation is because, from its inception in 2003, Redalyc appeared as a project that exclusively agglutinated journals on social sciences and humanities, as back then it was noticed that said fields of knowledge were the ones which experienced the most marginalization, both in their incorporation to databases and the consolidation of their editorial processes.

At present, social and human areas still hold the largest presence in the database; however, the consistent presence of some particular areas, such as psychology, education, and sociology, is noteworthy. In these cases, we can affirm that Redalyc virtually agglutinates all of the source journals of the region. Separately, it is necessary to distinguish the promptness with which Redalyc System has been taken in by the communities of natural and exact sciences, particularly the Biomedical and Agro-science areas, whose high productivity rates, have impacted the total balance of the database (see Figure 10).

The current challenge for Redalyc is to procure a more representative participation of other countries such as Argentina, to better reflect their actual scientific production.

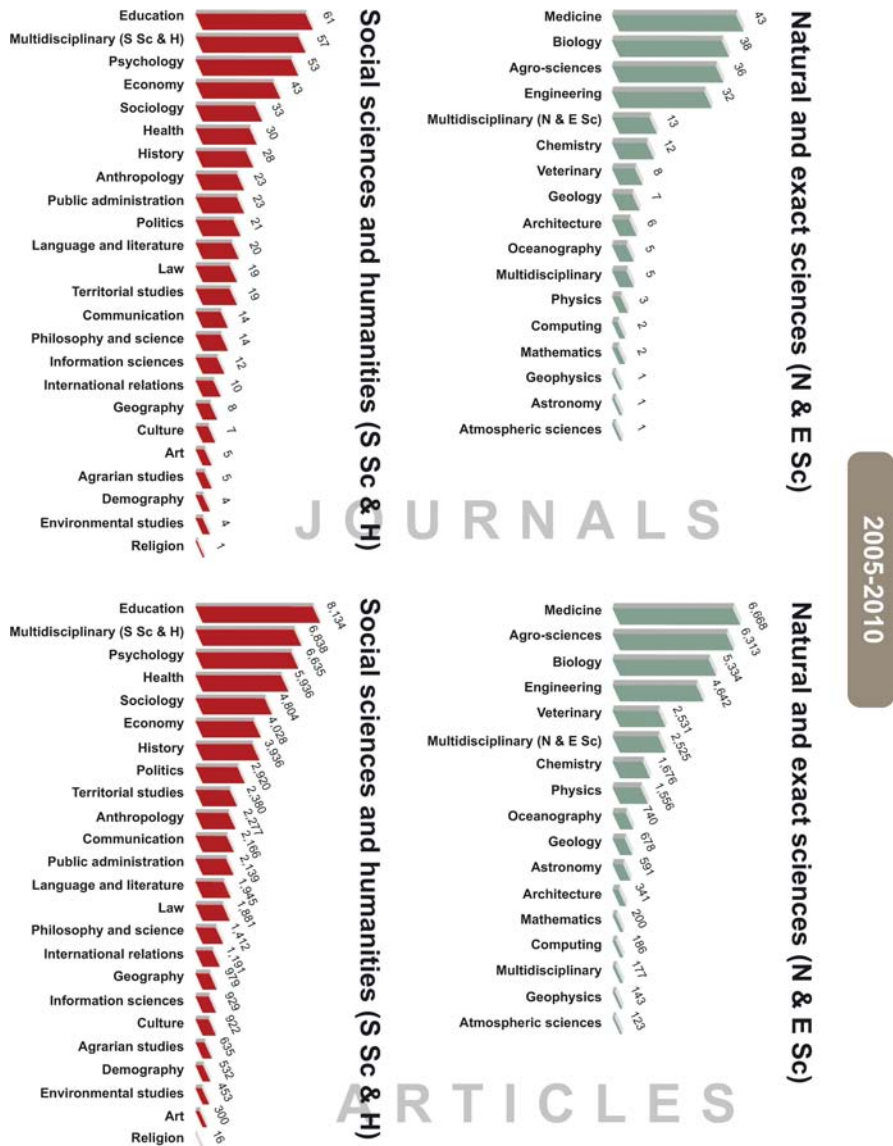


Figure 10. Journal distribution by field of knowledge

*Editorial processes*

Building a regional database with a scientific content is a great challenge, but when it is linked to the interest in including exclusively high-quality contents, the challenge is even greater. In order to form part of Redalyc, journals interested in becoming part of the library must undergo a thorough evaluation process. The evaluation methodology of Redalyc journals was approved in April 2008 by the members of the Scientific



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Advisory Board, and ratified November 2010[10]. In it a series of parameters with different indicators to identify editorial practices in two areas are considered:

- (1) Aspects related to the scientific content of the journal.
- (2) Editorial management.

To evaluate these aspects, the editors must postulate their journals filling the corresponding format in and meeting the requirements asked for in “postulation of journals”, in Redalyc homepage. The evaluation of journals is carried out from the Redalyc methodology, which contemplates three modules, namely: basic admission, general editorial quality, and editorial criteria. For a journal to be included in Redalyc library, it must fulfill at least 82 percent of the criteria established[11]. After this, the members of Redalyc Scientific Advisory Board, who analyze each case and recommend or not the inclusion of a journal into the library (see Figure 11).

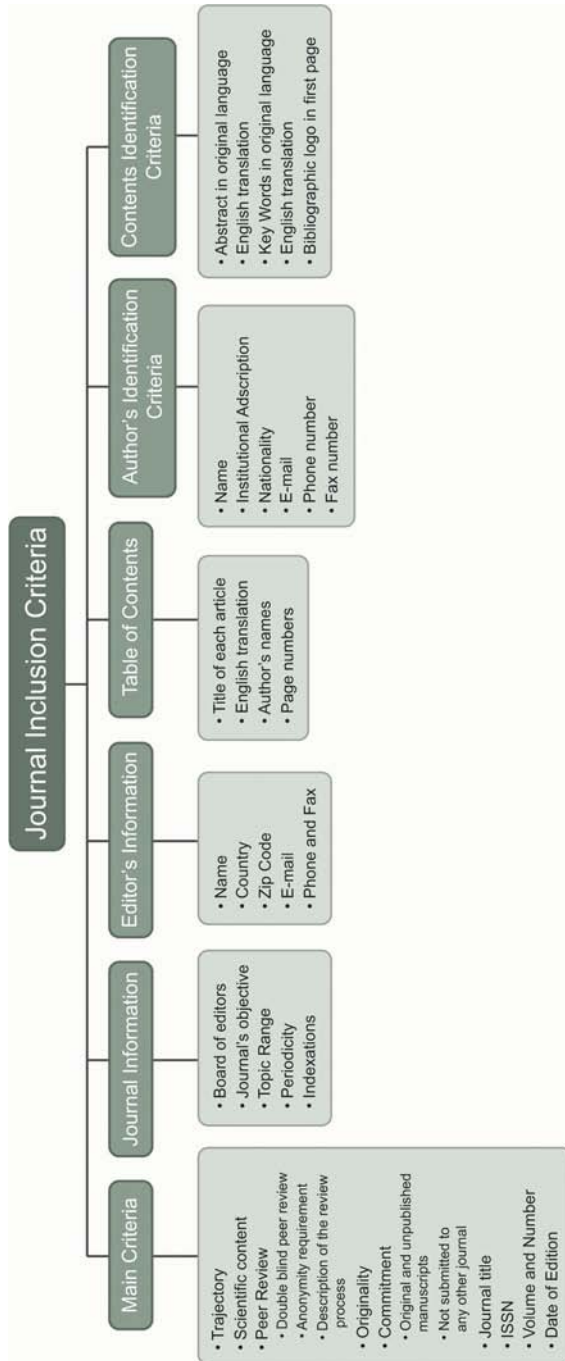
The selection process is a method that discerns the quality and is meant to grant legitimacy to local scientific production. By and large, we have found that the Latin American journals, which fulfill most of the aforementioned requirements, have the highest possibilities of being included into international indexation systems. Likewise, this exercise has made room for the improvement of editorial processes of different journals, which on their own have attained their inclusion into very specialized indexes.

#### *Bases for quality cartographies*

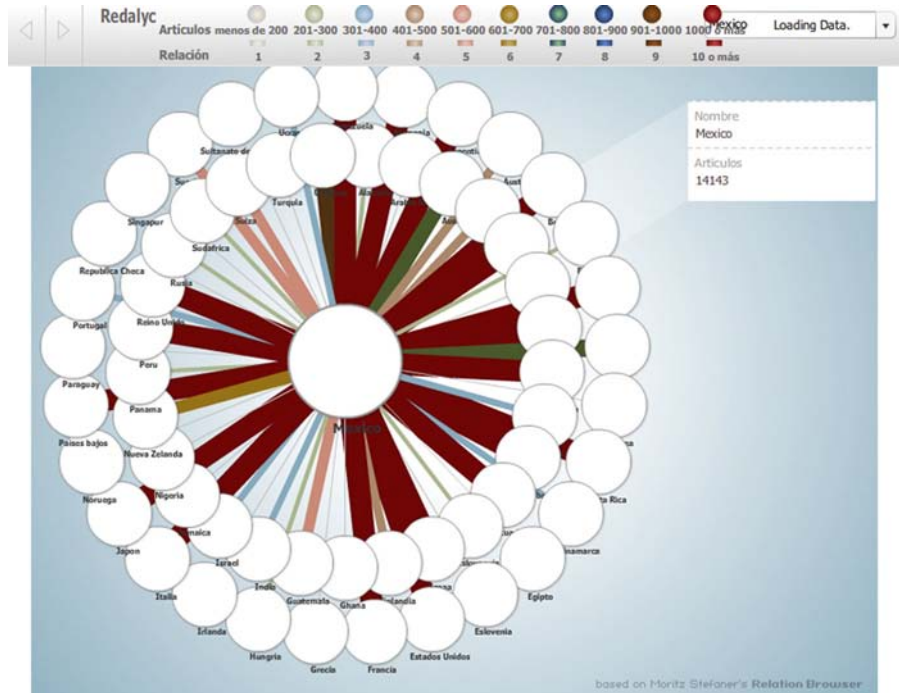
For Redalyc the generation of science maps is an ongoing project that seeks to make the dynamics of the scientific relationships between Latin American nations explicit, thereby, the benefits of the cooperation between scientists in similar (or different) fields of knowledge, institutions and research groups. It is expected that in the short term the result of these efforts will be the ability to prove that collective work is the key for scientific production to move from the local to the global.

A better analysis of scientific and collaborative networks will make it easier for governments, institutions and academicians to define fields of knowledge, to determine which institution develop which sort of research and to recognize the role scientists have in the network. This knowledge will help develop policies, which capitalize the existing strengths and alleviate the weaknesses. Collaboration may occur at a national scale, when two or more researchers from the same country – but from different organizations – work in a collaborative project; regional when two scientists, from different countries in the same geographic region, collaborate; and international when the research involves two or more scientists from different countries. The identification and visualization of these networks of collaboration allows us to observe the dynamic of the scientific structure of knowledge and identify the relative level of progress in relation to the internationalization of research (see Figures 12 and 13).

These samples of cartographies are the result of organizing a database with more than 730 Latin American journals, grouped by country and institution, which are analyzed according to their systems of relations. Understanding the types of relationships between countries, institutions, and/or authors allows us to visually translate the density of institutional, national and international cooperation. It is useful for the diagnosis and definition of research policies as well as an instrument to analyze the accomplished results.



**Figure 11.** Journal inclusion process into Redalyc library



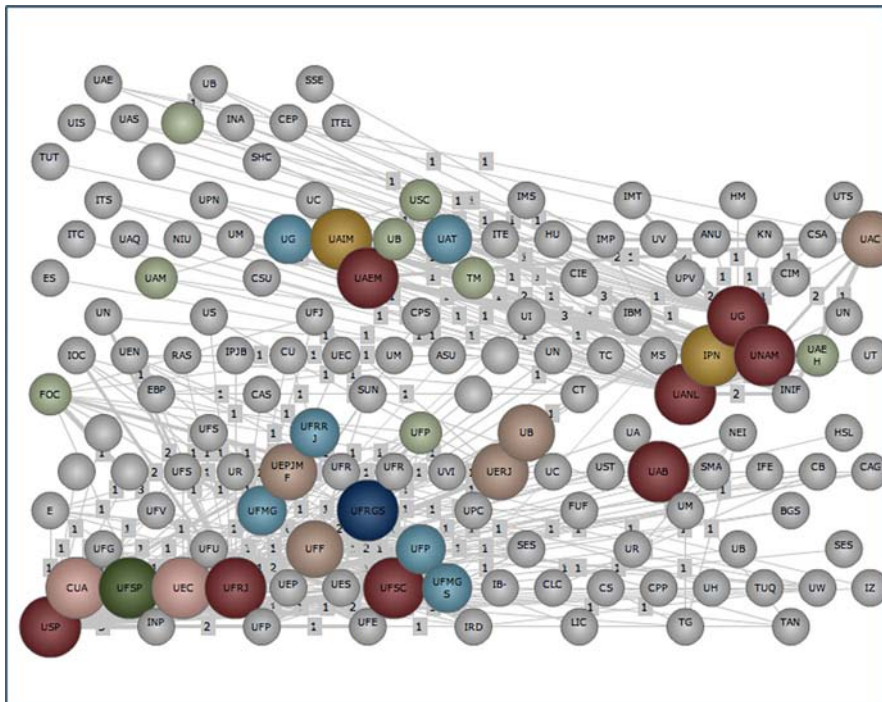
**Figure 12.** Example of collaboration between countries developed by the system of Redalyc, and of a network of institutional collaboration developed by the system of Redalyc

When in the Scientometric Atlas developed by Redalyc collaboration is analyzed, the network of academic relations carried out by area unfolds and it is possible to compare this by country and institution, and also compare with other fields of knowledge. Hence, one can learn whether the mediating instruments of regional production – such as Redalyc – are modifying the existing tendency in cooperation; what is more, they let us know what actor (country or institution) has tendencies above or below the average.

*Local and disciplinary supportive communities*

Scientific communities in Latin America are conditioned by a complex system of problems, which not only affect the results of the publications, but also other forms of production. As Acevedo (2003) demonstrates, scientific communities in Latin America tend to present low levels of utilization and development of information technologies. This problem leads to systems storing, managing and evaluating scientific production with low development levels, which at the time conveys serious handicaps to produce institutional and scientific policies. Information is key to creating development strategies, and since there is a gap in the means and infrastructure to process, measure, and circulate information, severe difficulties appear when channeling funds and investments from the political and financial actors.

Developing and consolidating research communities are, thereby, one of Redalyc's main efforts. Every portal in the web page has a disciplinary committee, which comprises prestigious scholars, who review and propose specific tasks, actions, and objectives for the portal. Sociology, political science, psychology, territorial studies,



**Figure 13.** Example of collaboration between countries developed by the system of Redalyc, and of a network of institutional collaboration developed by the system of Redalyc

communication, education, and public administration are seven different areas that operate independently in Redalyc web page. All of them keep an internal agenda, which is sent to Redalyc team, these agendas are uploaded to the community page, in the shape of notices, hypertexts, calls, invitations to courses and seminars, or links to directly connect to other electronic pages which might be interesting for the practitioners of the different areas.

These communities may also function as a base (or at least as a link) for specialized literature repositories; scholars can access dissertations, articles in review, printing manuals, libraries, and auxiliary data resources for research or disciplinary development.

Notwithstanding, the main resource for research is undoubtedly the permanent production of statistics, which reflect the disciplinary impact of the community according to the use and number of downloads from the online library by journal and author. With these data, the users of every community can access information on the impact of their disciplines on broader circuits to publish their results or research advancements.

With the development of the potential of these communities and encouraging the formation of new ones, Redalyc aspires to become one of the main sources to provide researchers and disciplinary groups with tools to compete in the so-called “mainstream science”, as well as data to know their local impact. This is the effect of the mediator and it is the road, which Redalyc as a whole opens in views of supplying visibility platforms and potential to scientific communication in the region.

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**Conclusions**

In general, it is possible to state that Latin American scientific production faces a double tension: on the one side, a scientific production with strong local relevance but with scant international scientific impact, and on the other, scientists in disciplines linked to natural and exact sciences whose practices have ended up “coupling” with the working ways of the countries with the highest relative development levels; while in social and human sciences, the scientists have chosen to strengthen their links with local problems, and by doing so they risk their international presence and recognition.

In natural and exact disciplines we observe this tendency has led scientists from peripheral countries to publish what they consider “their best research results” in English language and preferably in the so called “international journals” – with this they almost exclusively refer to those published in the U.S. and in some European countries. Even if this has undeniable advantages, as it might imply “recognition” for researchers, when it comes to studies on issues of local interest it means an important loss since the addressees of the studies are left out of the research circuit. Separately, the potential recognition is not proportional, for different analyses allow stating that the most widespread journals in each country are still published domestically and in the native language (Navarro, 2001).

This disjunctive has diverse implications which are difficult to distinguish if they are not seen from the very peripheral countries, we refer, for example, to the need to adapt research topics, concepts and methods to the ones followed in the countries that publish the so called “international journals” in detriment to the creation of alternative analytical proposals, at least to make them visible and subject to discussion. Likewise, a linguistic barrier is created; it widens the gap between the “foremost science” and the “nascent science” in peripheral countries. What is more, this makes the agencies, which support scientific, and technological development, suppose that the quality of research works in function of the language, and the country where it is published, and that any research is more relevant – not because of the intrinsic value of its results – but because of the impact factor of the journal where it is published.

A possible way to face this crisis may come as a consequence from a mediation strategy enveloped by a local information system capable of representing diagnoses of the local status of science, and from this, to promote references of change and incorporation of local work. Then, this system would have to operate as an intersection between local and global scientific communities, and “soft” and “hard” sciences, in views of progressively incorporate them into the local cartography of Latin America science.

Among the concrete functions this system would have to develop, we find: the consolidation of an Open Access policy that helps distribute global scientific production in the region; the constitution of local indexes to produce in Spanish and Portuguese languages; becoming a reliable repository capable of supplying data from local cartographies, comparative analyses and scientific consolidation policies; building up databases to promote progressive changes in certain habits and inertias of the local scientific communities; consolidating information platforms used by the disciplines and generating parameters for qualitative analysis. In this sense, the participation of Redalyc appears as a dual movement that offers global parameters for science at local level, as well as data for specific disciplinary needs.

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**Notes**

1. Based on the “impact” a particular article has on a specific community of practitioners, measuring how many times it has been cited or referred in other articles; an indicator that is known among scientists as Impact Factor: IF
2. De Solla Price, 1986: “science as a thermo-dynamic system”; Garfield, 1973: “science as a system of rankings”.
3. For instance Latour, 1992, considers “laboratories as frameworks for human relationships”; Woolgar (1991), *Ciencia, abriendo la caja negra*, Editorial Anthropos, Spain; Callon *et al.*, 1995 “measurements of scientific actions through scientific literature and vigilance”.
4. A recent article by Leydesdorff and Wagner (2009) offers a clear graphic instance of the proportions of scientific publications in the European Union, The USA, England, Germany, France and Japan up to 2006 and the growing presence of China. It is clear that the production of these countries accounts for more than 85 percent of the global production, but now the individual proportions are being affected by the presence of the Asian nation.
5. The largest and most important database in the world, Thomson-Reuters (formerly known as Institute for Scientific Information: ISI), actually separates into different indexes the sciences called “hard” (accounted for in Science Citation Index – SCI) from those qualified as “soft” (accounted for in Social Sciences Citation Index – SSCI). The importance of this database and index generator is in the selection process of submitted journals (Testa, 2008); it is clear however, that it mainly centers its activity on production written in English.
6. Taking as a model the UN Vienna Agenda (Albornoz, 2001), different national councils of science and technology in Latin America have used international information (mainly from Thomson-Reuters) as a reference to evaluate scientists, research groups and universities, so as to provide them with resources. The problem is that said evaluation has not necessarily passed through the adjustment of the local structures of science.
7. For instance political institutions, private companies, non-governmental organizations, universities, professional associations, international communities, banks and financial institutions, among other, may be both investors and beneficiaries of the research projects. In this respect, one of the main advantages of Anglo-American countries is that, from the start, their agendas included different participation levels according to a pragmatic perspective inherited from Bacon.
8. This mediator can be taken as a “third party” necessary to connect politics and the specific needs of universities and research centers. It can also be taken as a starting point wherefrom the scientific dependence of Latin America can be overcome (Albornoz, 2001), and work as a complement for global indicators which basically consider the production of developed countries (Cañedo *et al.*, 2005).
9. Currently, Redalyc incorporates in its library publications from Spain and Portugal, as well as journals of Latin American studies; this is to say, those which are not published in Latin American countries, but which approach topics linked to the region. However, the central concern of this project sets off from recognizing that the countries from the Latin American region are the ones which need the most support in respect to scientific and technological development.
10. The scientific advisory board is composed of experts in the use and management of databases, as well as academicians of recognized professional trajectories, with wide experience in editorial work. Their objective is to support the definition of editorial policies and back the incorporation of journals. For further information see: <http://redalyc.uaemex.mx/redalyc/media/principal/proyecto/comiteAsesor1114.html>

11. For further details, see postulation process and evaluation methodology, Redalyc 2008, available at: <http://redalyc.uaemex.mx/media/principal/proyecto/metvalref.html>

### References

- Acevedo, E. (2003), "Comunidades científicas desde la periferia. Una lectura compleja", *CTSI (Science, Technology, Society and Innovation)*, Organización de los Estados Iberoamericanos, available at: [www.oei.es/salactsi/COMUNIDADES.pdf](http://www.oei.es/salactsi/COMUNIDADES.pdf)
- Aguado-López, E., Rogel-Salazar, R., Garduño-Oropeza, G. and Zúñiga-Roca, M.F. (2008), "Redalyc: una alternativa a las asimetrías en la distribución del conocimiento científico", *Revista Ciencia, Tecnología y Docencia*, Vol. 37, XIX, pp. 11-30.
- Albornoz, M. (2001), *El Estado de la Ciencia, Principales Indicadores de Ciencia y Tecnología Iberoamericanos/Interamericanos*, Red de Indicadores de Ciencia y Tecnología Iberoamericana e Interamericana (RICYT), Buenos Aires.
- Callon, M., Courtial, J.-P. and Penan, H. (1995), *Cienciometría. La medición de la actividad científica: de la bibliometría a la vigilancia tecnológica*, Editorial Trea, Pontevedra.
- Casas, R. (2001), *La formación de redes de conocimiento. Una perspectiva regional desde México*, editorial Anthropos/Universidad Nacional Autónoma de México, Mexico City.
- Cañedo, A., Rodríguez, M.N., Pupo, J.C.G. and Ochoa, R.E.R. (2005), *Algunas precisiones necesarias en torno al uso del factor de impacto como herramienta de evaluación científica*, ACIMED, Ciudad de La Habana, available at: [http://bvs.sld.cu/revistas/aci/vol13\\_5\\_05/aci01505](http://bvs.sld.cu/revistas/aci/vol13_5_05/aci01505)
- Conacyt (2008), *Informe del Estado General de la Ciencia y la Tecnología*, Consejo Nacional de Ciencia y Tecnología, Mexico City.
- De Solla Price, D. (1986), *Little Science, Big Science*, Columbia University Press, New York, NY.
- De Vito, E.L. (2006), "Algunas consideraciones en torno al uso del factor de impacto y de la bibliometría como herramienta de evaluación científica", *Revista Argentina de Medicina Respiratoria*, Vol. 1, pp. 37-45.
- Garfield, E. (1973), "Citation and distinction", *Nature*, Vol. 242, p. 485.
- Latour, B. (1992), *La ciencia en acción. Cómo seguir a los científicos e ingenieros a través de la sociedad*, Editorial Labor, Barcelona.
- Leydesdorff, L. and Wagner, C. (2009), "Is the United States losing ground in science? A global perspective on the world science system", *Scientometrics*, Vol. 78 No. 1, pp. 23-36.
- Lotman, Y.M. (1999), *Cultura y explosión. Lo previsible y lo imprevisible en los procesos de cambio social*, Editorial Gedisa, Barcelona.
- Luna, M. and Velasco, J.L. (2006), "Redes de conocimiento. Principios de coordinación y mecanismos de integración", in Abornoz, M. and Alfaraz, C. (Eds), *Redes de Conocimiento, Construcción, dinámica y gestión*, Red Iberoamericana de Indicadores de Ciencia y Tecnología Iberoamericana e Interamericana (RICYT)/UNESCO, Buenos Aires, available at: [www.ricyt.org](http://www.ricyt.org)
- Molloy, M. (2011), "The internet in Latin America", *Journal of Library Administration*, Vol. 43 Nos 3-4, available at: [www.hawthornepress.com/web/LA](http://www.hawthornepress.com/web/LA)
- Navarro, F. (2001), "El inglés, idioma internacional de la medicina: causas y consecuencias de un fenómeno actual", *Panacea@*, Vol. 2 No. 3, pp. 35-51, available at: [www.medtrad.org/panacea/IndiceGeneral/n3\\_FANavarro.pdf](http://www.medtrad.org/panacea/IndiceGeneral/n3_FANavarro.pdf)
- Prat, A. (2005), *Revistas electrónicas y la comunicación científica en mutación*, available at: [www.ricyt.org/interior/normalizacion/III\\_bib/Prat.pdf](http://www.ricyt.org/interior/normalizacion/III_bib/Prat.pdf) > in CONICITYT

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- Pujol, R. (1995), "Literatura gris en expansión", *El profesional de la información*, Vol. 32, March, available at: [www.elprofesionaldelainformacion.com](http://www.elprofesionaldelainformacion.com)
- Russell, J. (2007), "Colaboración científica entre países de la región latinoamericana", *Revista Española de Documentación Científica*, Vol. 30 No. 2, pp. 178-204.
- Serres, M. (1995), *Atlas*, Editorial Cátedra, Madrid.
- Testa, J. (2008), "The Thompson Scientific Journal selection process", *Contributions to Science*, Vol. 4, pp. 69-73, available at: <http://www.cat-science.cat>
- Molloy, M. (2005), "The internet in Latin America", *Journal of Library Administration*, Vol. 43 Nos 3-4, pp. 129-47, available at: [http://dx.doi.org/10.1300/J111v43n03\\_11](http://dx.doi.org/10.1300/J111v43n03_11)
- Vessuri, H. (1995), "Recent strategies for adding value to scientific journals in Latin America", *Scientometrics*, Vol. 34 No. 1, pp. 139-61.
- Woolgar, S. (1991), *Ciencia, abriendo la caja negra*, Editorial Anthropos, Barcelona.

### Further reading

- Albornoz, M. and Alfaraz, C. (2006), *Redes de Conocimiento, Construcción, dinámica y gestión*, Red Iberoamericana de Indicadores de Ciencia y Tecnología Iberoamericana e Interamericana (RICYT)/UNESCO, Buenos Aires, available at: [www.riicyt.org](http://www.riicyt.org)
- Garfield, E. (2003), "The meaning of the impact factor", *International Journal of Clinical and Health Psychology*, Vol. 3 No. 3, pp. 363-9.

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