**United Nations
Educational, Scientific and
Cultural Organization**

Research Evaluation Metrics

Module

4

Research Evaluation Metrics

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MODULE INTRODUCTION

At present, research is going on all over the world practically in all subjects and generating millions of research articles and other documents. In some cases, the research works are generating very good results, in most cases mediocre, and in some cases negative results. Basing research results, awards, fellowships, promotion, selection for a job, etc are decided. For all these, evaluation of research output becomes sine qua non.

Centuries ago when the number of researchers were less, peers used to evaluate research. With the passage of time, the number of researchers increased, research areas proliferated, research output multiplied. The trend continued and after World War II the research workers and their outputs started growing exponentially. Today even on a moderate estimate there are around or more than one million researchers and they produce more than two million research papers and other documents per year.

In such a mind-boggling situation, research evaluation is continuously proving to be a tough job. For any award and fellowship there may be scores or hundreds of nominees. From among these, how to select the best candidate has turned out to be a big question. Peer reviews in many cases are proving to be subjective. As a result decisions are getting biased.

In 1963 *Science Citation Index (SCI)* appeared on the scene covering the literature of 1961. A few years hence, Eugene Garfield, the founder of *SCI*, prepared a list of 50 most cited scientists basing first author citation of 1967 *SCI*. The paper titled 'Can Nobel Prize Winners be Predicted?' was presented in 1968 (Garfield & Malin, 1968). In the very next year i.e. 1969, two scientists figuring in the list, e.g. Derek H R Barton and Murray Gell-Mann received the coveted Prize. This vindicated the usefulness of citation analysis. Every year several scientists belonging to the field of Physics, Chemistry, Physiology & Medicine receive the Nobel Prize. If out of a list of 50, two get the award it is no mean achievement for a prediction.

This prediction opened the floodgate of citation analysis as it was free from subjectivity. Even for peers, citation analysis became a useful tool. However, citation analysis was not free from faults. Even Garfield remarked – 'Using citation analysis for evaluation papers is a tricky business. It is fraught with opportunities for error' (Garfiled, 1983).

For research evaluation, some other indicators were needed. Citation analysis along with peer review ensured better judgment in innumerable cases. Something more was needed to make the judgment foolproof to a great extent. The advent of World Wide Web (WWW) provided the opportunity. Quite a number of indicators have come up based on the data available in WWW.

This module dwells on a number of methods (including old and new) available for research evaluation. The module comprises the following four units:
- Unit 1. Introduction to Research Evaluation Metrics and Related Indicators.
- Unit 2. Innovations in Measuring Science and Scholarship: Analytical Tools and Indicators in Evaluation Scholarship Communications.
- Unit 3. Article and Author Level Measurements, and
- Unit 4. Online Citation and Reference Management Tools.

Brief overviews of the units are presented below.

Unit 1 encompassed and discussed citation analysis, use of citation-based indicators for research evaluation, common bibliometric indicators, classical bibliometric laws, author level indicators using authors' public profiles, article level metrics using altmetric tools. It is to be noted that author level indicators and article level metrics are new tools for research evaluation. Author level indicators encompasses h index, citations count, i10 index, g index, articles with citation, average citations per article, Eigenfactor® score, impact points, and RG score. Article level metrics or altmetrics are based on Twitter, Facebook, Mendeley, CiteULike, and Delicious which have been discussed. All technical terms used in the Unit have been defined.

Unit 2 deals with analytical tools and indicators used in evaluating scholarly communications. The tools covered are The Web of Science, *Scopus*, *Indian Citation Index* (*ICI*), CiteSeerX, Google Scholar and Google Scholar Citations. Among these all the tools except *Indian Citation Index* (*ICI*) are international in scope. *ICI* is not very much known outside India. It is a powerful tool as far Indian scholarly literature is concerned. As Indian journals publish a sizable amount of foreign literature, the tool will be useful for foreign countries as well. The analytical products with journal performance metrics *Journal Citation Reports* (*JCR®*) has also been described. In the chapter titled New Platforms for Evaluating Scholarly Communications three websites i.e. SCImago Journal & Country Rank (SJR) [ScimagoJR.com], eigenFACTOR.org, JournalMetrics.com and one software called Publish or Perish (POP) Software have been discussed.

Article and author level measurements have been discussed in **Unit 3**. Author and researcher identifiers are absolutely essential for searching databases in the WWW because a name like D Singh can harbour a number of names such as Dan Singh, Dhan Singh, Dhyan Singh, Darbara Singh, Daulat Singh, Durlabh Singh and more. The ResearcherID.com, launched by Thomson Reuters, is a web-based global registry of authors and researchers that individualises each and every name. Open Researcher and Contributor ID (ORCID) is also a registry that uniquely identifies an author or researcher. Both have been discussed in this Unit. Article Level Metrics (Altmetrics) has been treated in this Unit with the discussion as to how altmetrics can be measured with Altmetric.com and ImpactStory.org. Altmetrics for Online Journals has also been touched. There are a number of academic social networks of which ResearchGate.net, Academia.edu, GetCited.org, etc. have been discussed. Regional journal networks with bibliometric indicators are also in existence. Two networks of this type such as SciELO – Scientific Electronic Library Online, and Redalyc have been dealt with.

The last unit (**Unit 4**) is on online citation and reference management tools. The tools discussed are Mendeley, CiteULike, Zotero, Google Scholar Library, and EndNote Basic. The features of all the management tools have been discussed with figures, tables, and text boxes.

Written by B K Sen

UNIT 3   ARTICLE AND AUTHOR LEVEL MEASUREMENTS

Structure

3.0   INTRODUCTION

In the previous Unit you have learned about citation-related indicators available from citation databases and related web-based services. Now, you will know about more personalized tools available for increasing your visibility in social media and interacting with online academic communities based on your research interests.

In this Unit you will learn about article and author level measurements and more particularly as to how an article level metrics is built around counting an article's presence in the social media and online media space. You can create your own researcher's profile in academic social networks, providers of unique identifiers as well as altmetric service providers for increasing global visibility not only of your research works but also of your institutions and research team members.

This Unit will make you understand what web resources and solutions are available to researchers across the world in all subject areas.

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[31] http://www.youtube.com/watch?v=fw4qalLWhjM

3.1 LEARNING OUTCOMES

At the end of this unit, you are expected to be able to

- Use article-level metrics or altmetrics using online altmetrics tools such as Altmetric.com[32] and ImpactStory.org[33];
- Create and use researcher's profile in social networks for academics and researchers for reaching out to global researchers' communities;
- Create unique author's identity at ResearcherID.com[34] and ORCID.org[35] online registries, and their interoperability for accessing contributed/ published papers; and
- Understand the functions of two regional journal networks namely Scielo[36] and Redalyc[37] and their impact in open access publishing in the global South.

3.2 UNIQUE IDENTIFIERS FOR AUTHORS AND RESEARCHERS

In many countries some names of individuals, with a combination of one's first name and surname, are very common or similar. When searching online databases by a particular name of a contributor, a search result may show more than expected number of bibliographic records of papers although contributed by different persons with a similar name. Thus, a unique identifier for an author or a contributor of a scholarly publication is very essential to distinguish an individual from a group of individuals with a similar name. A unique identifier helps in resolving the author ambiguity. Presently, two online systems are widely available to the researchers' communities for obtaining a unique identifier of an author or a research contributor. These two systems are namely ResearcherID and Open Researcher and Contributor ID (ORCID), which are available at ResearcherID.com and ORCID.org websites respectively.

These two systems are interoperable and can have linked data between them. Authors' IDs in ResearcherID.com are linked with *Web of Science* (*WoS*) database. A profile in this website can obtain bibliographic records from *WoS* database, matching author's contributions. Authors' IDs in ORCID.org are linked with *Scopus* database. A profile in this website can obtain bibliographic records from *Scopus* database, matching author's contributions. When you submit your manuscripts to *WoS*-covered or *Scopus*-covered journals for publishing, they usually accept manuscripts through an online submission and peer review system. In the submission process, journals usually ask any of the unique identifiers, ResearcherID or ORCID iD. *WoS*-covered journals usually

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[32] http://www.altmetric.com/
[33] http://impactstory.org/
[34] http://www.researcherid.com/Home.action
[35] http://orcid.org/
[36] http://www.scielo.br/
[37] http://www.redalyc.org/home.oa

prefer ResearcherID, whereas *Scopus*-covered journals prefer ORCID iD. Some online manuscripts submission systems accept both IDs. *WoS* database is searchable by both unique identifiers.

Both ResearcherID.com and ORCID.org websites have become valuable resources to authors and other researchers as well as institutions. While an author can create public profile in these two websites and obtain a unique identifier respectively, both websites maintain online registry of authors that can be searchable by name, keywords, affiliation and country. If a public profile is available for an author, his list of publications and full-text contents of these publications (through external hyperlinks) can be viewed by other researchers, funding agencies and institutions seeking academic collaborations.

3.2.1 ResearcherID

The ResearcherID.com, facilitated by Thomson Reuters, is a web-based global registry of authors and researchers. A researcher can freely create a unique identifier called ResearcherID in this system, which is permanent in nature and can be added to publishers' databases for uniquely identifying him/her as a contributor. In addition to becoming part of an authors' registry, the researcher can create a public profile and add his/her publication list from *WoS* database or RIS file. While the publication list is available in a researcher's profile, certain citation metrics, citing articles network and collaboration network can be visible to the profile owner as well as other users' searching profiles in this online registry.

ResearcherID profile helps in tracking citation count, average citations and h-index of an author from *WoS* database. Thus, this website becomes very useful tool for author level measurement if a researcher has good number of papers in his/her credit, which are indexed in *WoS* database.

Figure 30 shows the basic functions of ResearcherID registry and how a researcher can obtain citation metrics and analyse impact of research works while making his/her profile public. ResearcherID.com website offers a number of useful features and benefits to researchers as indicated in Text Box 1. Figure 31 displays citation metrics of a registered author having a unique ResearcherID and a public profile in this website. Figure 32 displays citing articles network of the same author depicting top twenty countries citing his works. This Figure also visually displays citation relationships based on *WoS* data.

ResearcherID profile can also be interlinked with EndNoteBasic[38], an online reference manager tool freely available to researchers. EndNoteBasic imports bibliographic data of your published works from ResearcherID profile and stores in your publication list. Here, you can store up to 50,000 bibliographic references in your account, which will help you to prepare bibliographies on different topics or authors for ongoing or future research.
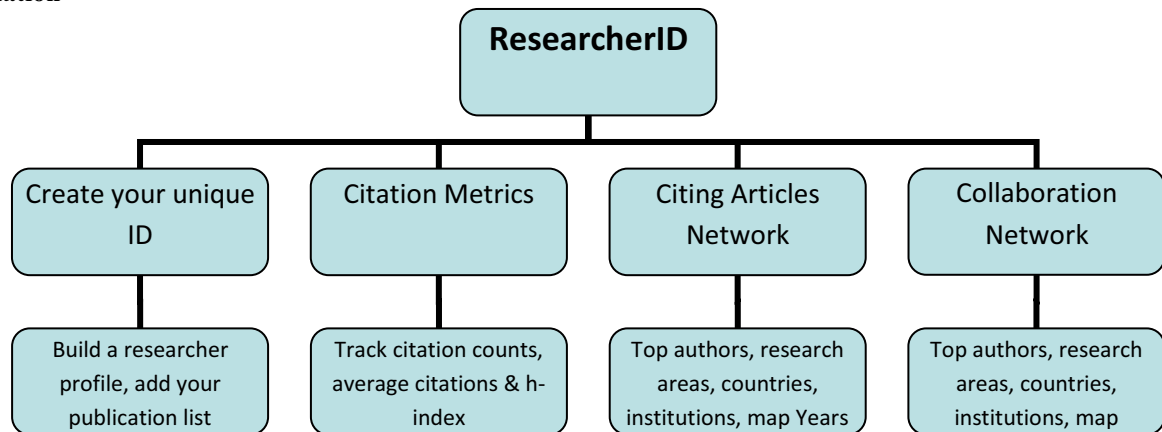
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[38] http://www.myendnoteweb.com

Figure 30: Basic Functions of ResearcherID Registry

Text Box 1: Main Features and Benefits of ResearcherID.com

Benefits

- Creates a custom profile, choosing what information is public or private.

- Builds an online publication list using *Web of Science* search services, the EndNote Basic online search, or by uploading RIS files.

- Manages your ResearcherID publication list with EndNote Basic.

- Generates citation metrics with times cited information for items added from *Web of Science*.

- Gets links to full text for items added from *Web of Science* (subject to your subscriptions to full text).

- Adds past institution affiliations to your profile.

- Explores the world of research with an interactive map that can help locate researchers by a country and topic, or use the new country tag cloud.

- ResearcherID can automatically track times cited counts and citation metrics for records found in *Web of Science*. Add your publications directly from *Web of Science* searches.

Features

- ResearcherID Badge: Advertise a member's ResearcherID profile on your Web page or Blog. The Badge creates a hovering display of recent publications, and allows viewers to also link to the member's full profile in ResearcherID.

- Collaboration Network: Visually explore who the researcher is collaborating with.

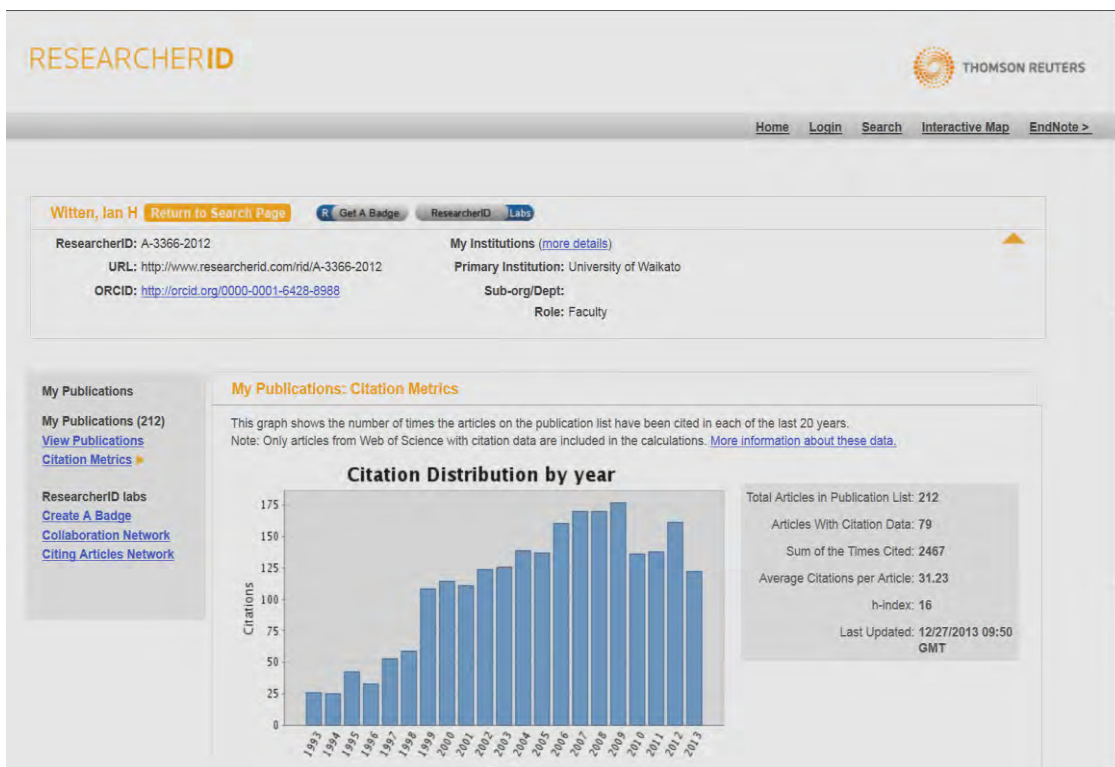- Citing Articles Network: Visually explore citation relationships based on *Web of Science* data.

Source: http://thomsonreuters.com/researcherid/

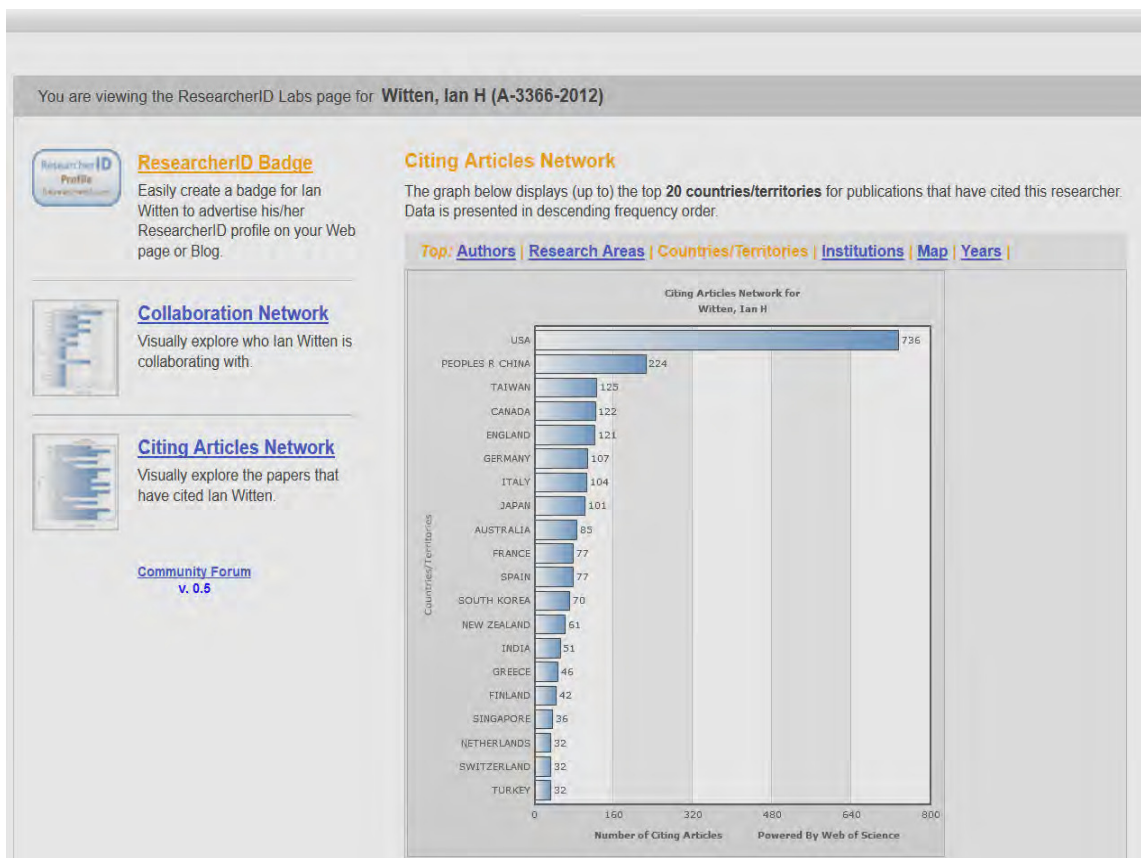**Figure 31: Citation Metrics of a Registered Author**

Figure 32: Citing Articles Network of the Same Author

3.2.2   ORCID (Open Researcher and Contributor ID)

Similar to ResearcherID.com, ORCID.org provides a persistent digital identifier that distinguishes a researcher from every other researcher. Creation of an ORCID iD for a researcher is very easy and free. Here, you have to provide certain personal and professional details to include your name in a registry of unique researcher identifiers. After successful registration, a unique ORCID iD is generated and a user profile is created in the website. You can integrate your other profiles or unique author's identifiers available elsewhere such as ResearcherID, *Scopus* and LinkedIn. Your publication list will also be added to your profile, which includes bibliographic information of published scholarly works and hyperlink to full-text contents of each work. A publication list can be obtained from *Scopus* database that will include bibliographic record of papers published in *Scopus*-covered journals. Other relevant works can also be added in your profile through importing bibliographic data from a RIS file of your list of publications.

ORCID.org maintains a searchable registry of researchers that helps in identifying researchers from your field, from an institution, a collaborator, a city or a country. Funding agencies also can keep track on researchers' works, funded by them or considering funding in near future. The website provides APIs that support system-to-system communication and authentication to online systems of funders, publishers and others that require ORCID identifiers.
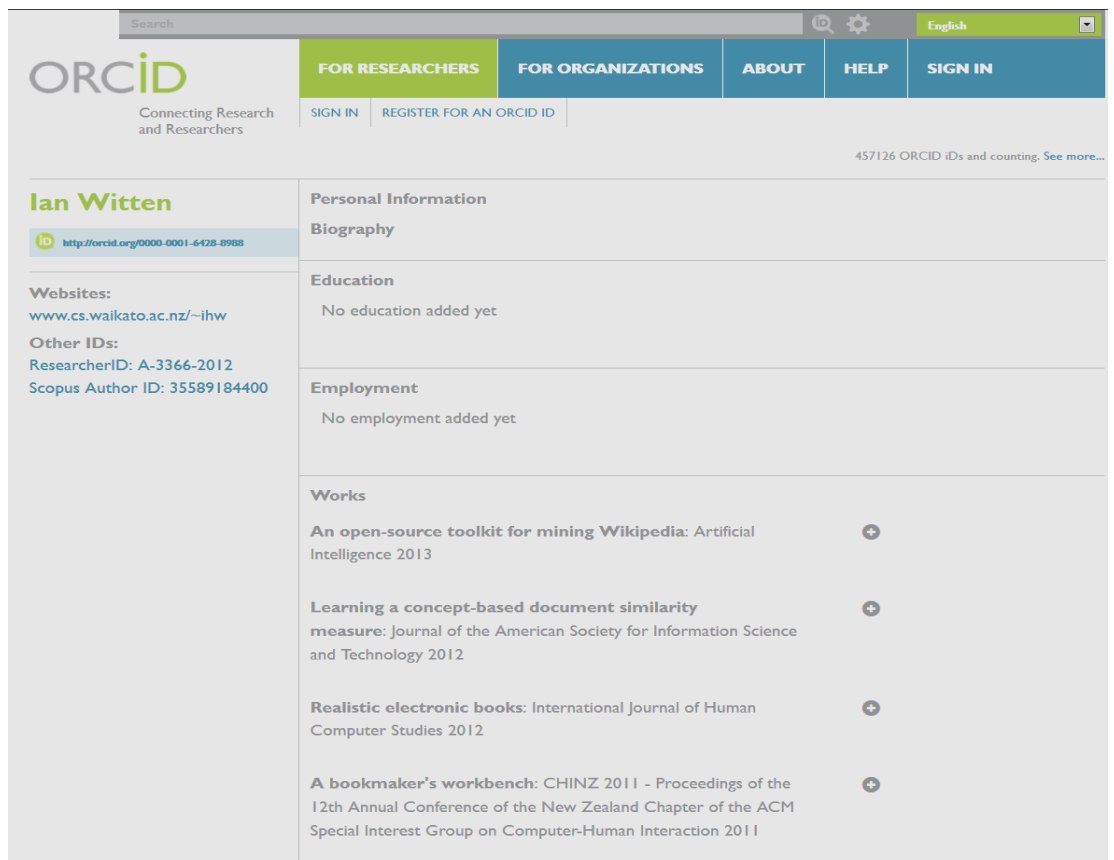

Figure 33: An Author's ID and Profile in ORCID.org website

Mission

ORCID aims to solve the name ambiguity problem in research and scholarly communications by creating a central registry of unique identifiers for individual researchers and an open and transparent linking mechanism between ORCID and other current researcher ID schemes. These identifiers, and the relationships among them, can be linked to the researcher's output to enhance the scientific discovery process and to improve the efficiency of research funding and collaboration within the research community.

Principles

- ORCID will work to support the creation of a permanent, clear and unambiguous record of research and scholarly communication by enabling reliable attribution of authors and contributors.

- ORCID will transcend discipline, geographic, national and institutional, boundaries.

- Participation in ORCID is open to any organization that has an interest in research and scholarly communications.

- Access to ORCID services will be based on transparent and non-discriminatory terms posted on the ORCID website.

- Researchers will be able to create, edit, and maintain an ORCID identifier and record free of charge.

- Researchers will control the defined privacy settings of their own ORCID record data.

- All data contributed to ORCID by researchers or claimed by them will be available in standard formats for free download (subject to the researchers' own privacy settings) that is updated once a year and released under a CC0 waiver.

- All software developed by ORCID will be publicly released under an Open Source Software license approved by the Open Source Initiative. For the software it adopts, ORCID will prefer Open Source.

- ORCID identifiers and record data (subject to privacy settings) will be made available via a combination of no charge and for a fee APIs and services. Any fees will be set to ensure the sustainability of ORCID as a not-for-profit, charitable organization focused on the long-term persistence of the ORCID system.

- ORCID will be governed by representatives from a broad cross-section of stakeholders, the majority of whom are not-for-profit, and will strive for maximal transparency by publicly posting summaries of all board meetings and annual financial reports.

Distinguish Yourself in Three Easy Steps

1. *Register*: Get your unique ORCID identifier Register now! Registration takes 30 seconds.

2. *Add Your Info*: Enhance your ORCID record with your professional information and link to your other identifiers (such as *Scopus* or ResearcherID or LinkedIn).

3. *Use Your ORCID ID*: Include your ORCID identifier on your Webpage, when you submit publications, apply for grants, and in any research workflow to ensure you get credit for your work.

Source: http://orcid.org/about/

3.3 ARTICLE LEVEL METRICS (ALTMETRICS)

Outputs or impacts of scientific research are periodically measured worldwide with different parameters, where a variant number of different tools and techniques are used. The Journal Impact Factor (JIF), H-Index and a number of variations of these two citation-based metrics are used commonly for evaluating impacts of journals and their contributing authors and institutions. However, many funders, research administrators, scientific communities and other stakeholders felt these indicators as inadequate, inappropriate and skewed due to various reasons. The San Francisco Declaration on Research Assessment (DORA) publicly declared a statement on 16th December 2012 supporting altmetrics or alternative metrics also widely known as article level metrics), which is a clear transition from the citation-based indicators such as JIF and H-index to measuring impacts beyond citations of a particular piece of research work. DORA got considerable support from the funding bodies, publishers, research institutions, and scientific communities as altmetrics is focused on capturing the increasing variety of online references to a scholar's work. Altmetrics offers a different view of the influence of that work. In the editorial of the *Bulletin of the American Society for Information Science and Technology*, April-May 2013 issue in a special section on altmetrics, the Guest Editor identifies: "Altmetrics offer four potential advantages:

- A more nuanced understanding of impact, showing us which scholarly products are read, discussed, saved and recommended as well as cited.

- Often more timely data, showing evidence of impact in days instead of years.

- A window on the impact of web-native scholarly products like datasets, software, blog posts, videos and more.

- Indications of impacts on diverse audiences including scholars but also practitioners, clinicians, educators and the general public." (Piwowar, 2013)

Thus, an altmetric score of a scholar's work encompasses not only citation count but also number of times it is viewed, saved, shared, discussed, tagged, highlighted in news, and other such counts in academic social media and online networks. It also involves normalization of some counts based on subject area of an article. Figure 34 elaborates enumeration of an altmetric score from different sources. Figure 35 shows altmetric score of one of the highest rating articles, which is amongst top 1% in generating global attention of researchers, practitioners, journalists and bloggers communities. This paper ranks second in *Science* magazine, compared to all papers published therein. Figure 35 also shows detail counts of social media that talked about this paper. This way an altmetric score can help in measuring impact of a scholarly work to researchers' communities. Text Box 3 shows target audience, or who care about an altmetric score.

The DORA as well as *Altmetrics Manifesto* indicate two major providers of altmetric score, namely Altmetric.com and ImpactStory.org. Many others are

now under development stage, whereas some are in experimental or testing stages. Other important ones are namely PlumAnalytics.com, ScienceCard.org, PeerEvaluation.org, ResearchScorecard.com, and ReaderMeter.org. Many individual journal publishers are also engaged in development of in-house article level metrics (ALM) tools, which they will integrate into their online journals in near future. A leading online journal publisher – PLOS (Public Library of Science) has widely publicized its interests in article level metrics. PLOS has developed an Application Programming Interface (API) (http://api.plos.org) and other online tools for generating article level metrics for each published article. Article level measurement using tools from Altmetric.com and ImpactStory.org is described in the following Section.
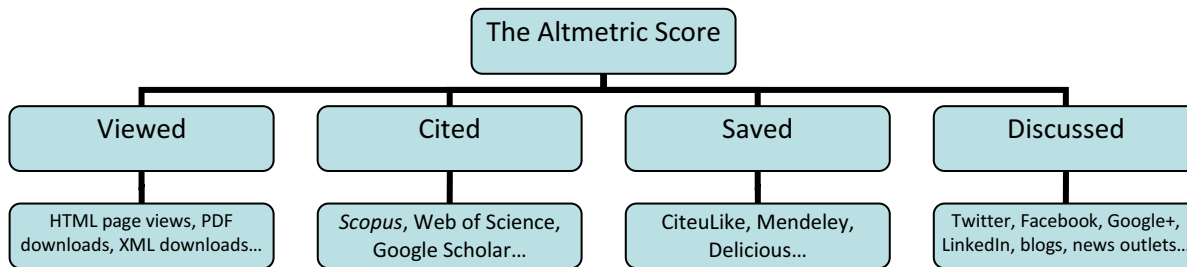

Figure 34: Deriving an Altmetric Score

Figure 35: Altmetric Score of one of the Highest Rating Articles (amongst top 1%)

Text Box 3: Target Users of Altmetric Score

Whom is Altmetric for?

For Researchers

Complement your reading by instantly visualising a paper's online attention. Discover new scholarly articles in hundreds of disciplines, while monitoring your personal research impact in academia and beyond.

For Publishers

Showcase research impact to your authors and readers in a beautiful new way. Monitor, search and measure all of the conversations about your journal's articles, as well as those published by your competitors.

For Librarians & Repository Managers

Add value to your libraries and institutional repositories. Track article level metrics for your institution's research outputs, and show faculty, staff and students a richer picture of their online research impact.

3.3.1 Measuring Altmetrics using Altmetric.com

The Altmetric.com is the leading provider of article level metrics data. This website, registered by Altmetric LLP, offers many tools for web integration of altmetric data that help individual researchers, authors, publishers and institutions in instantly obtaining overall altmetric score of published articles. Articles published in online journals having unique digital object identifier (DOIs) are only considered to obtain an altmetric score for each article. Major online journal publishers have been found using tools provided by this website.

Some of the available tools are described below:

AltmetricExplorer: It is a powerful and intuitive web application that helps to see all of the attention surrounding papers of an e-journal. This helps online journal publishers in generating article level metrics from a journal's webpage (e.g., HTML page of an article). AltmetricExplorer can be integrated into journal's website. It instantly generates an altmetric score for each article aggregating counts from different Web 2.0 enabled online resources and more particularly from the social media platforms and online news media. Text Box 4 tells us how the altmetric score is calculated.

Altmetric it!: Altmetric bookmarklet, called Altmetric it!, is a simple browser tool that lets you instantly get article level metrics for any recent paper. It is a kind of browser plugin that can be integrated into your web browser Chrome, Firefox or Safari. Its installation is very easy and free to any researcher or academic. You just open this page www.altmetric.com/bookmarklet.php, grab <Altmetric it!> box, and drag it to your bookmarks bar in your browser. Whenever you visit a scholarly document having a DOI through your web browser, click on <Altmetric it> icon at bookmarks bar, then you will get

article level metrics with a colourful altmetric donut signifying ALM score of that particular paper and little more details of this score. You will also have an option to see more details of this score and citing social media.

Altmetric API: It is an application programming interface that enables you to enrich your pages with article level metrics data. It helps system to system interaction and obtaining ALM data from different data sources as indicated in Figure 34. Altmetric.com also offers an Altmetric WordPress plugin that helps web programmers and bloggers in embedding an altmetric badge to highlight an altmetric score.

Altmetric Badge: It is a ready-to-use embeddable badge for your article pages that let you showcase impact in a beautiful way. This tool generates small donut shaped multicolour, multilayer visualisations to quickly convey information about each article, with summary of score from different data sources. Figure 36 shows an Altmetric badge depicting how an article is being outreached and appraised through social media. However, this altmetric score does not include download statistics of the said article.
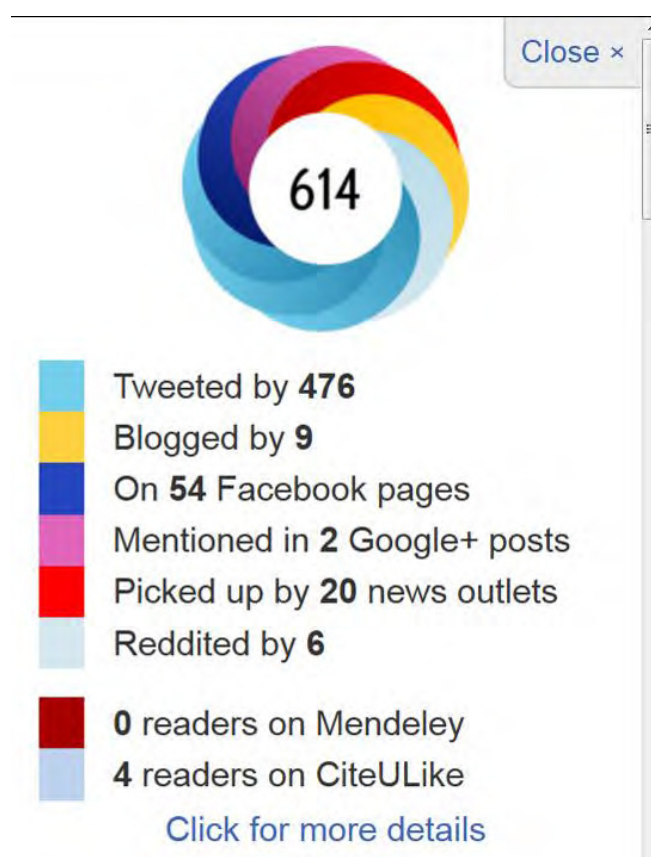

Figure 36: An Altmetric Badge

Text Box 4: Understanding Altmetric Score, as obtained through Altmetric.com

How is the Altmetric score calculated?

The Altmetric score is a general measure of the attention that an article, book or dataset has received online. It reflects:

- **The quantity of attention received** - in general the more people talking about an article the higher the score.
- **The quality of that attention** - a news story counts for more than a Facebook post. Attention from a researcher counts more than attention from an automated Twitter bot.

The Altmetric score is useful to rank articles based on attention - it can't tell you anything about the quality of the article itself, though reading the linked discussions might. It is important to know that the score is based on the kinds of attention that Altmetric tracks (specifically links to or saves of scholarly articles, books and datasets) and to be mindful of potential limitations. You should also bear in mind that different subject areas usually aren't directly comparable: a popular physics paper may have a far lower Altmetric score than an average genetics paper. We don't use reader counts from Mendeley or CiteULike in the score calculation.

Steps taken to Calculate the Score

Collect mentions: We aggregate the different pieces of content (tweets, news stories, blog posts, Facebook wall posts, Stack Exchange threads... we call them all posts) mentioning each article. Intuitively, some forms of attention are of a 'higher quality' than others. If you ask scientists if they'd rather have somebody tweet about their article or write a piece in the New York Times about it then they'll choose the latter most of the time. So all else being equal each type of content will contribute a different base score to the article's total. For example, a tweet may be worth 1 and a blog post 5. In practice these scores are usually modified by subsequent steps in the scoring algorithm. *Practical example*: a news story in the NYT will, by default, contribute more to an article's final score than a single tweet.

Collect & analyse profiles: We fetch the profile of the user who created each post whenever possible. We also scan the Altmetric database for the items those users have already mentioned. We look at how often the user links out to scholarly content, if they're biased towards any one publisher or journal and what type of people follow or are friends with them. All this information is used to produce a weighting that influences how much each post contributes to the final score. *Practical example*: posts from an automated journal TOC (that posts new papers to Facebook as they are published) will contribute very little to the article's final score. Posts from a doctor who links to articles once or twice a week and is followed by other doctors will score relatively highly.

Search other datasets: For some types of attention like blogs and the mainstream media it doesn't make sense to look at post author profiles. In these cases we typically try to measure influence by looking at how much attention the source of attention gets on different social media sites. *Practical example*: more people tweet or repost BBC News science stories than science articles in Le Figaro - so posts from the BBC News site contribute more to the article's final score than posts written by Le Figaro.

Produce Final score

We total the contributions made by post after applying any relevant modifiers.

Source: http://support.altmetric.com/knowledgebase/articles/83337-how-is-the-altmetric-score-calculated-

3.3.2   Measuring Altmetrics using ImpactStory.org

The ImpactStory.org is another leading provider of article level metrics data. This website offers registered users creating their impact profile on the web, revealing diverse impacts of their articles, books, presentations, datasets and software. This is a collaborative not-for-profit open source project supported by the U.S. National Science Foundation, Alfred P. Sloan Foundation and Open Society Foundation. ImpactStory.org helps in creating author's profile and adding publication list through importing bibliographic records from different sources such as *Scopus* database, ORCID.org, Google Scholar Citations, SlideShare and many others.

A researcher can create a profile for free in this website to know how many times his/her work has been downloaded, bookmarked, and blogged. Text Box 5 depicts how researchers, research groups, funders and repositories can be benefited from this website. A researcher can also generate code to embed ImpactStory profile into his institutional CV and research blog.

Figure 37 shows homepage of ImpactStory website, which gives link to profile creation page by clicking on <Make my impact profile> to "share the full story of your research impact". Figure 38 shows a sample profile, where articles are categorised as <highly saved>, <highly discussed>, <highly cited>, <saved>, <discussed>, <cited>, and <viewed>. When you click on the title of a paper you will get a detailed ALM score indicating counts from different data sources.

Text Box 5: Target Audience of ImpactStory.org Altmetrics

Whom is it for?

- **Researchers:** who want to know how many times their work has been downloaded, bookmarked, and blogged.

- **Research Groups:** who want to look at the broad impact of their work and see who has demonstrated interest.

- **Funders:** who want to see what sort of impact they may be missing when only considering citations to papers.

- **Repositories:** who want to report on how their research products are being discussed

- **All of Us:** who believe that people should be rewarded when their work (no matter what the format) makes a positive impact (no matter what the venue). Aggregating evidence of impact will facilitate appropriate rewards, thereby encouraging additional openness of useful forms of research output.
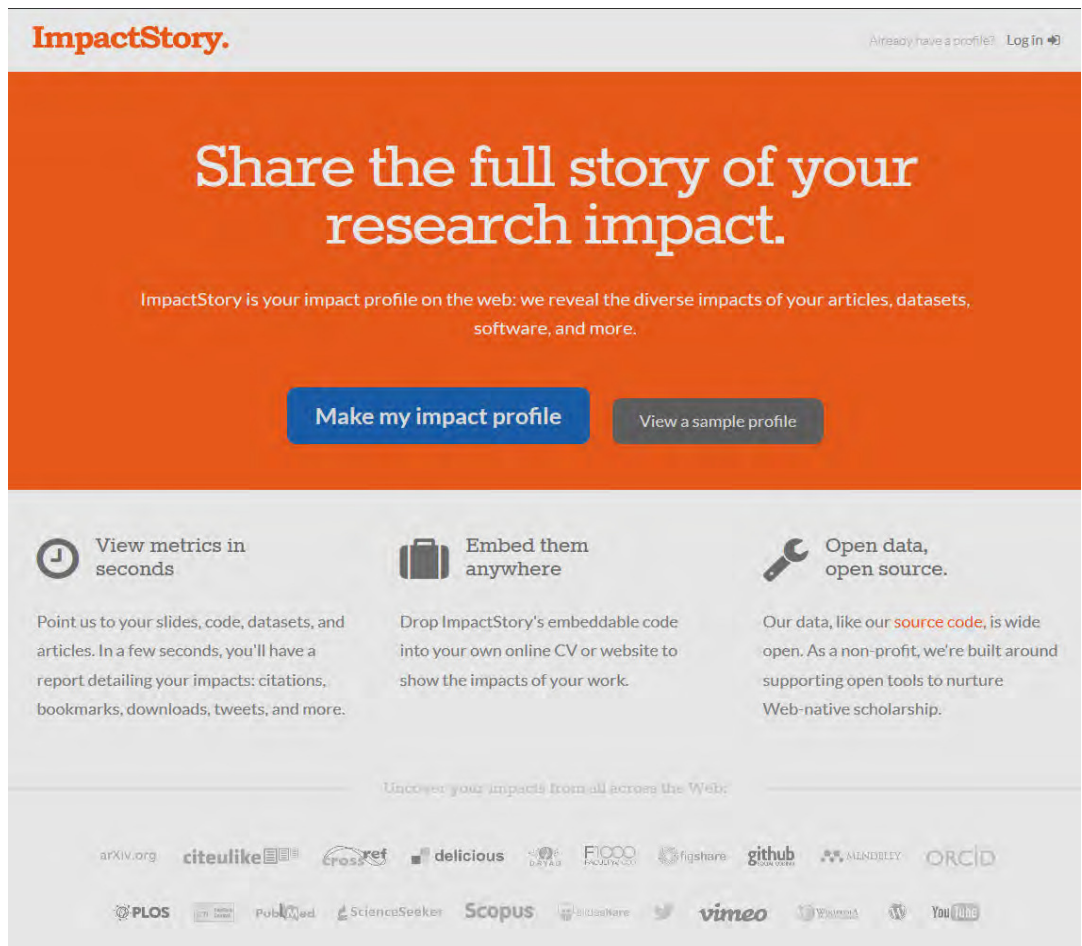
Source: Impactstory.org/faq

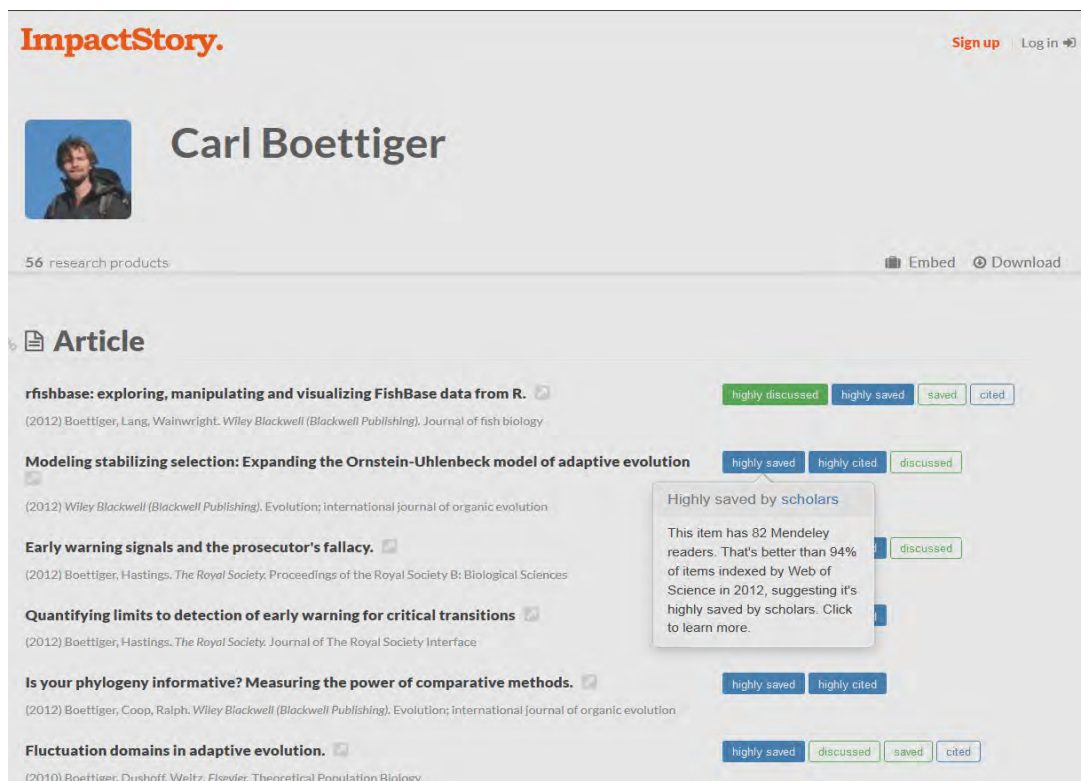**Figure 37: Home Page of ImpactStory.org**

Figure 38: A Sample Profile in ImpactStory.org

3.3.3 Article Level Metrics for Online Journals

The concept of article level metrics (ALM) or altmetrics is greatly supported by online journals and more particularly biomedical and open access journals. The new age online journals, as mentioned in Table 18, have been providing article level metrics for each published work. For deriving an ALM score, these journals use different widely available altmetric tools such as AltmetricExplorer and ImpactStory, and aggregate counts in different aspects of article's influence or usage, such as viewed, cited, saved and discussed as shown in Figure 34. Now-a-days these online and open access journals also provide social bookmarking tools in HTML page of every article to facilitate users to instantly share or discuss about that particular article.

Table 18: Indicative List of Journals Providing Article Metrics for Every Online Article

Name of Journal	Web Address	Article Metrics Tool Used
BMJ Open (& other BMJ journals)	http://bmjopen.bmj.com	AltmetricExplorer
eLIFE	http://elife.elifesciences.org	AltmetricExplorer
Nature Communications	www.nature.com/ncomms/	AltmetricExplorer
PeerJ	http://peerj.com	ImpactStory
PLOS One (& other PLOS journals)	www.plosone.org	AltmetricExplorer

The PLOS (Public Library of Science) is one of the pioneering publishers that introduced article level metrics for its open access journals. PLOS article metrics derive from different data sources as indicated in Figure 39. It includes counts with respect to usage, views, downloads, citations, social bookmarking, blogs, media coverage and comments.
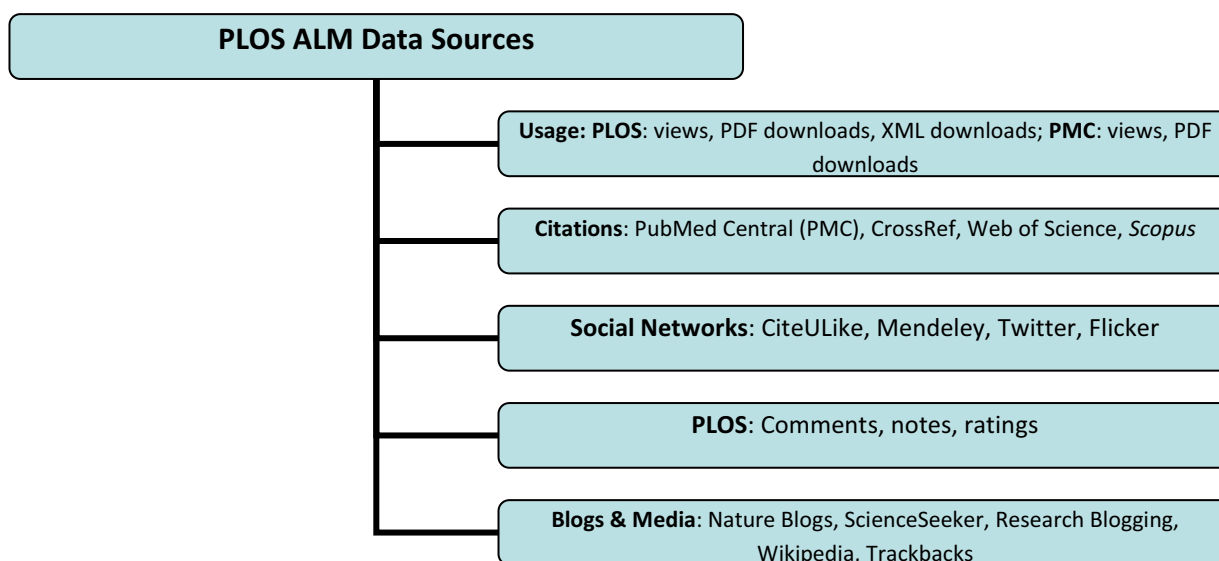

Figure 39: Data Sources for PLOS Article Level Metrics

Figure 40 provides first level of article metrics of an open access article published in PLOS One journal, depicting number of times it is viewed, shared and saved. While click on <Metrics> tab in this page, the second level of article metrics of the same paper will appear as shown in Figure 41 that gives detailed information of article share or usage with their respective data sources. PLoS publishes a regular report covering a wide range of metrics covering all of it journals. This is easy to download as a .csv file.

As indicated in Table 18, many other online journals are also actively considering inclusion of article metrics features in their article page. For this inclusion they are mostly adding the available tool AltmetricExplorer and embedding the Altmetric badge in article metrics page of every article. Figure 42 shows article metrics as available with *Nature Communications* online journal. Here an Altmetric badge is embedded. On the other hand, a few journals now embed ImpactStory-based article metrics. As ImpactStory.org provides open source solution to article metrics, its usage amongst online journals is expected to rise.

Text Box 6: Understanding PLOS Article Level Metrics

PLOS Article Level Metrics

Purpose: ALMs provide a suite of established metrics that measure the overall performance and reach of published research articles.

For Whom

- **Researchers**: Maximize the impact of your research.
- **Publishers**: Enhance publication value through real time views of reach and influence.
- **Institutions**: Capture researcher impact for hiring, tenure, and promotion decisions.
- **Funders**: Track the performance and impact of research funding.

Article Level Metrics measure the dissemination and reach of published research articles. Traditionally, the impact of research articles has been measured by the ~~publication~~ journal. But a more informative view is one that examines the overall performance and reach of the articles themselves. Article-Level Metrics are a comprehensive set of impact indicators that enable numerous ways to assess and navigate research most relevant to the field itself, including:

- usage
- citations
- social bookmarking and dissemination activity
- media and blog coverage
- discussion activity and ratings

Article-Level Metrics are available, upon publication, for every article published by PLOS. Researchers can stay up-to-date with their published work and share information about the impact of their publications with collaborators, funders, institutions, and the research community at large. These metrics are also a powerful way to navigate and discover others' work. Metrics can be customized to address the needs of researchers, publishers, institutional decision-makers, or funders.

Source: http://article-level-metrics.plos.org/alm-info/

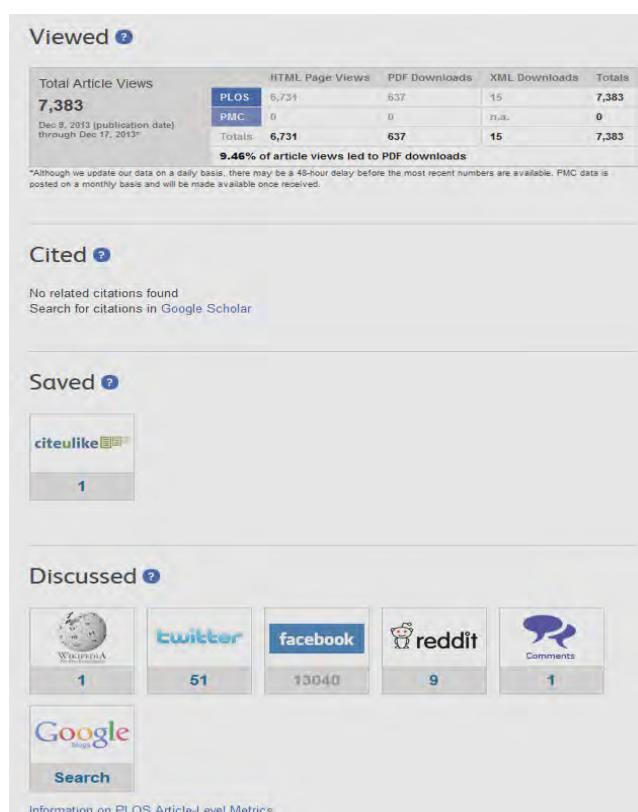**Figure 40: First Level Article Metrics of a Paper in PLOS One Journal**

Figure 41: Second Level Article Metrics of the Same Paper in PLOS One
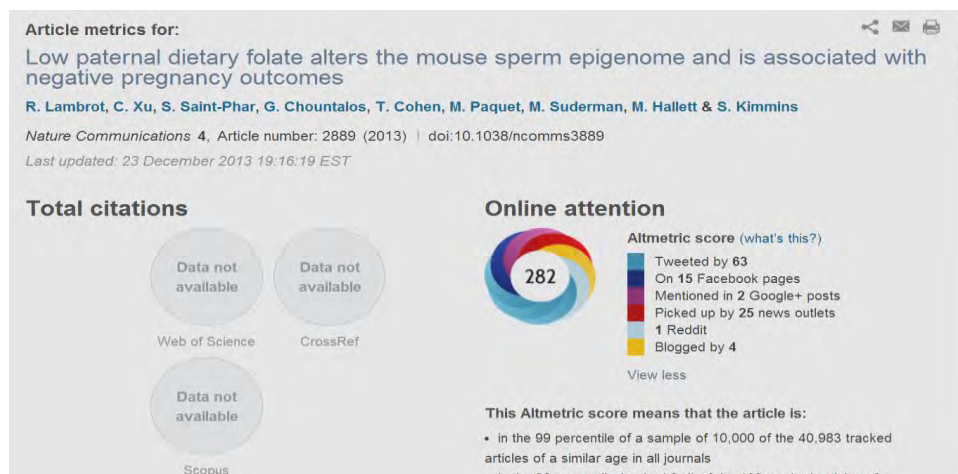

**Figure 42: Article Metrics of a Paper in Nature Communications,
integrating an Altmetric Badge**

3.4 ACADEMIC SOCIAL NETWORKS

As we saw in earlier sections, researchers in the twenty-first century are very keen to maintain online researchers' profiles, social networking, transnational networking through online forums, and peer-to-peer collaborations. While a plenty of general purpose social networking sites are globally available, some online social networks are meant for academics and researchers. Academic social networks facilitate creation of online groups for discussion based on particular research interests. Table 19 provides an indicative list of social networking websites that facilitate networking of academics and researchers. While ResearchGate[39] and Academia.edu[40] facilitate user-to-user interactions through e-groups, getCITED.org[41] and SSRN[42] don't have such web 2.0 feature. Further details of these academic social networks are available in the following Sections.

Table 19: Major Academic Social Networks

	ResearchGate.net	Academia.edu	getCITED.org	SSRN.com
Target Group	Researchers	Academics: researchers, students	Researchers	Researchers, Authors
Subject Coverage	All	All	All	Social Sciences, Humanities and Law
Founded in	2008	2008	2004	1994
Mission	To give science back to the people who make it happen and to help researchers build reputation and accelerate scientific progress.	To accelerate the world's research; to make science faster and more open.	To make records of scholarly work publicly available.	To provide rapid worldwide distribution of research to authors and their readers and to facilitate communication among them at the lowest possible cost.
Web 2.0 Interactivity	Yes	Yes	No	No

3.4.1 ResearchGate.net

The ResearchGate.Net is one of the most prominent professional networks for scientists and researchers. Established in 2008, it is a social media space for researchers to make their research visible to global researchers' communities. Any researcher from any subject area can freely create researcher's profile and

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[39] http://www.researchgate.net/
[40] http://www.academia.edu/
[41] http://www.getcited.org/
[42] http://www.ssrn.com/en/

upload their published, unpublished, working papers and research datasets for worldwide dissemination. The researcher here has options to upload full-text contents, or to provide only bibliographic details. He/she can also add details of his/her completed and ongoing research projects for further discussions, dialogues and collaborations with network members. Figure 44 indicates basic functions of this online network. Figure 43 shows homepage of ResearchGate website.

As a registered member in this online platform, you can read the latest publications in your field shared by other fellow researchers; discuss your work with other specialists; and collaborate with colleagues located in the same country or other countries around the world. A researcher's profile provides statistics related to his/her research works, such as number of papers available, total publication views, total full-text downloads, total dataset downloads, total full-text requests, citations. Your profile also indicates number of *Followers* you have and number of researchers you are *Following*, and *Top Co-authors*.

ResearchGate generates *RG Score* for every registered researcher. The RG Score is a metric that measures scientific reputation based on how all of your research is received by your peers. It is a mix of indicators based on statistics related to your publications, questions, answers and followers. RG Score is a derived in combination of publications (their views, downloads & citations), questions & answers (interactions with other members) and number of followers. In Figure 45, a member's RG Score is shown as 40.73, while he authored 358 publications with 777 citations and 529.24 impact points.
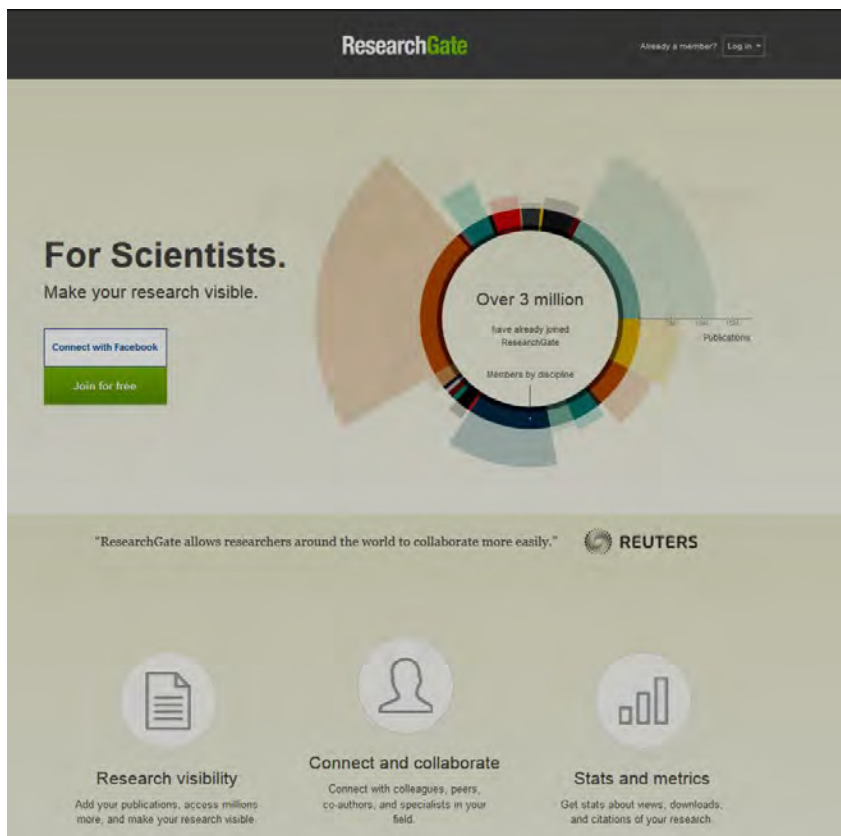

Figure 43: Homepage of ResearchGate.net
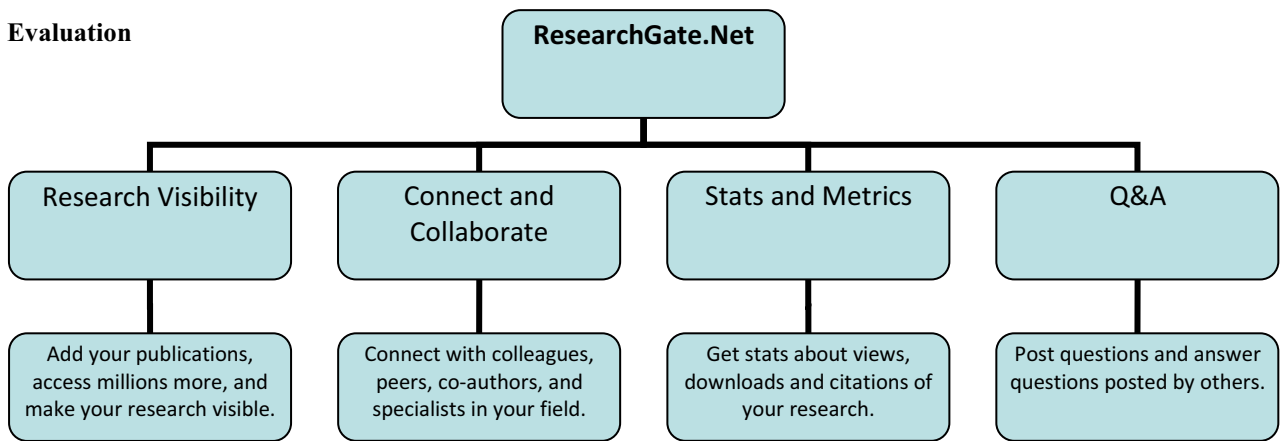
Figure 44: Basic Functions of ResearchGate.Net
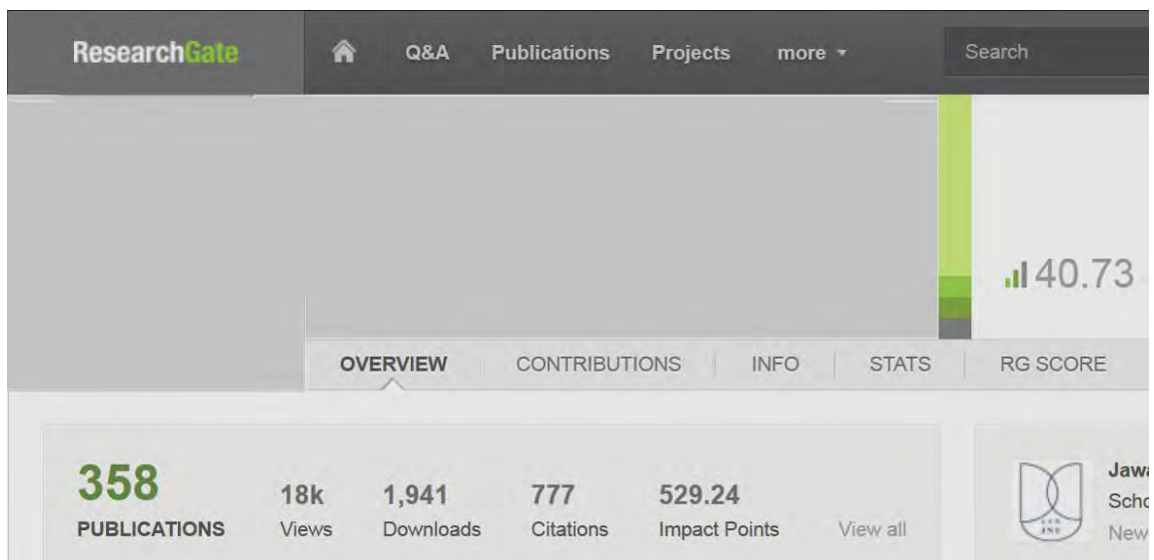
Figure 45: Showing RG Score of a Profile in ResearchGate.net

3.4.2   Academia.edu

The Academia.edu is one of the largest social networking websites for academics. Established in 2008, it is a social media space for academics and researchers to make their academic works visible to global communities of academicians and researchers. Any student, a researcher or a faculty member from any subject area, affiliated to a higher educational institution or a university, can freely create a profile and upload his/her published or unpublished papers, conference presentations and research datasets for worldwide dissemination. The researcher here has options to upload full-text contents, or to provide only bibliographic details. He/she can seek academic collaborations, professional advice and feedbacks from fellow network members. One may follow a number of researchers and peers. Many of the persons one *Following* are either his/her mentors, fellow researchers, colleagues, peers, supervisors, teachers, collaborators and co-authors. Higher number of Followers indicates that researcher's research works get considerable attention to researchers in his/her domain and adding value to the volumes of current research literature.

Figure 46 indicates basic functions of this social networking website. Figure 47 shows homepage of Academia.edu website, indicating growing strength of members' community. The website facilitates searching people, research interests and universities from its search interface. Figure 48 shows a profile in Academia.Edu with profile statistics, such as, profile views, document views, number of uploaded papers, number of followers, and number of people she is following.
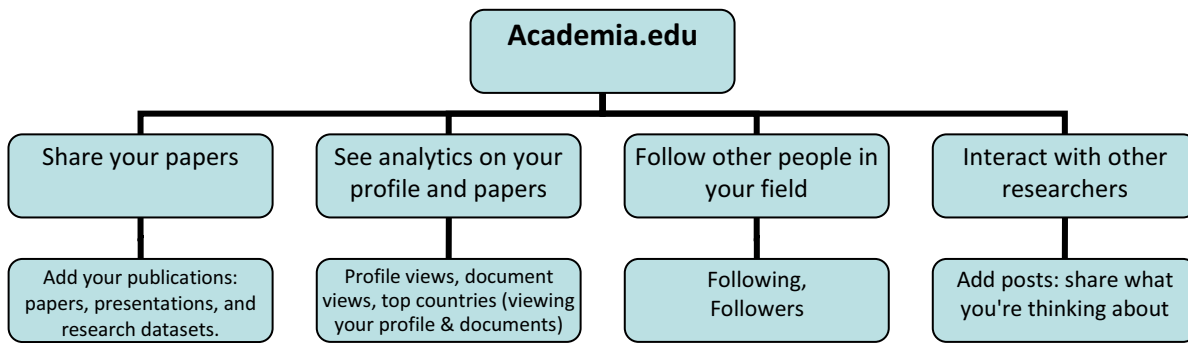
Figure 46: Basic Functions of Academia.Edu
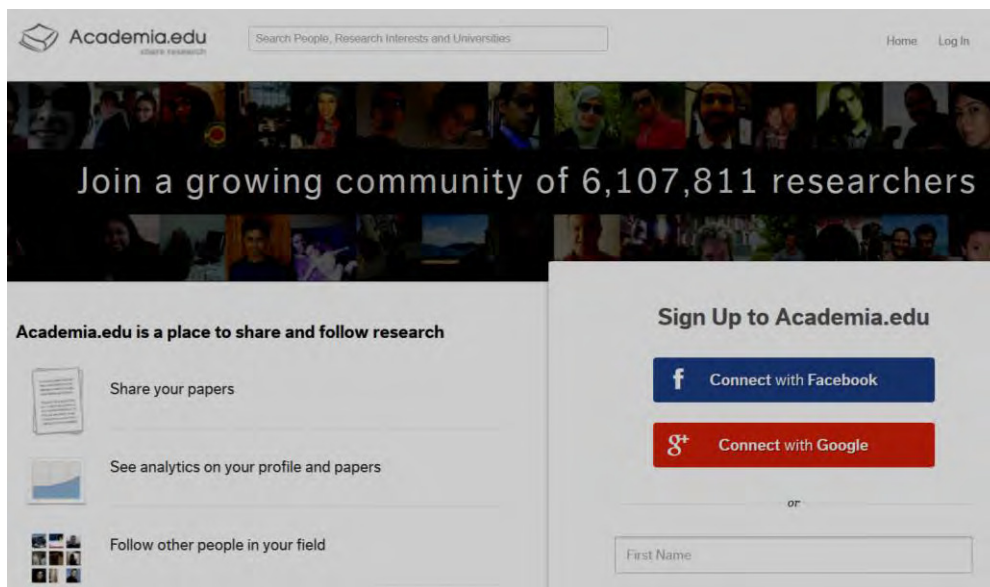
Figure 47: Homepage of Academia.edu
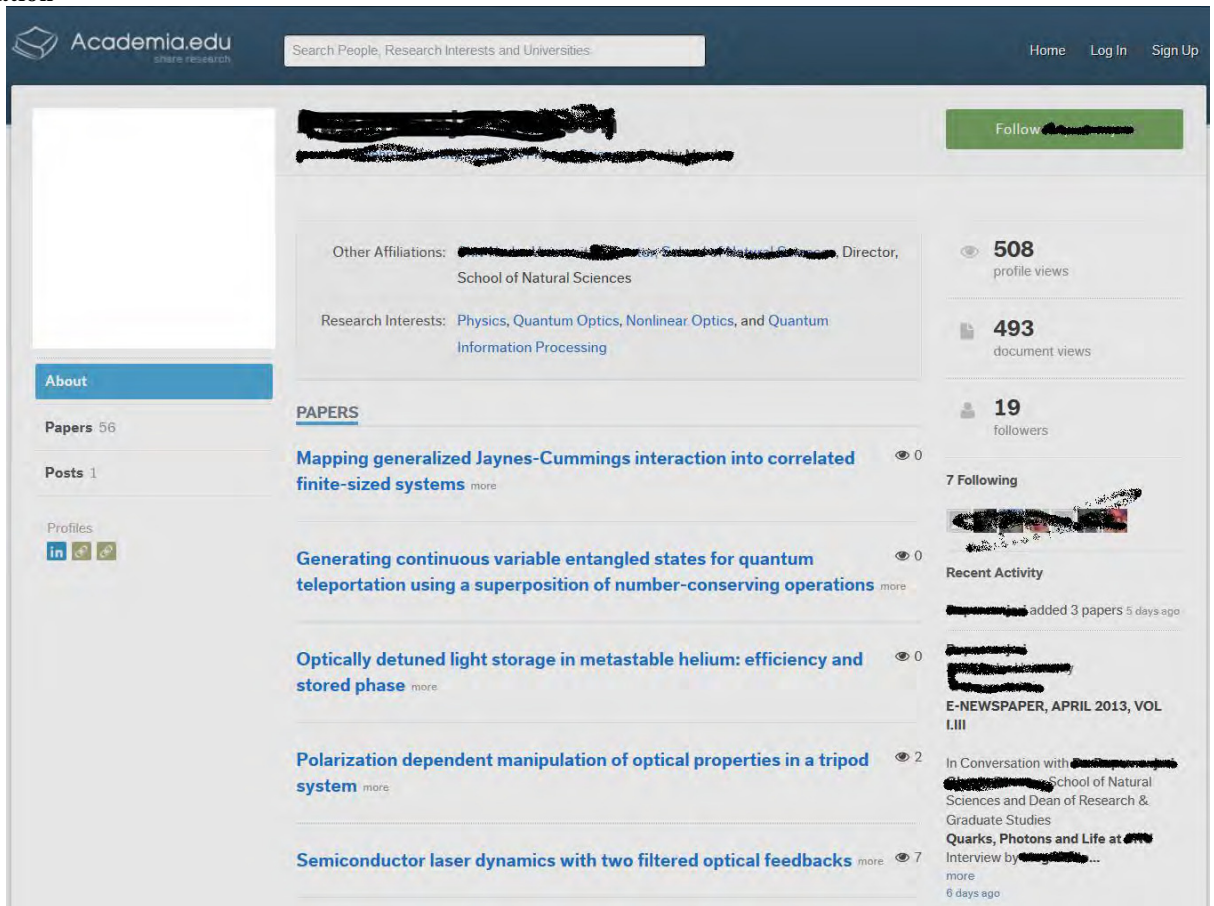
Figure 48: A Profile in Academia.Edu with Profile Statistics

3.4.3   getCITED.org

The getCITED.org is registration-based website facilitating academic communities in sharing bibliographic information on published and unpublished academic papers and other documents. Established in 2005, it has become a social space for academics and researchers to make their academic works visible to global communities of academicians and researchers. Any researcher or a faculty member from any subject area, affiliated to a higher educational institution, research institution or university, can freely create a profile and upload his/her list of publications. A registered user can add bibliographic details of his/her published or unpublished papers, books, book chapters, theses, dissertations, conference presentations, reports and other documents for increasing their worldwide visibility. However, this site does not have facility of uploading full-text contents.

Figure 49 shows homepage of getCITED.org website, indicating basic statistics of available contents. This page also indicates that only a registered member can update information not only for his/her own profile, but also for his/her institutions or known colleagues. The website facilitates searching publications, institutions, people and faculties from its basic search interface. Figure 50 shows a researcher's profile in getCITED.org with profile statistics,

such as, number of publications in each category, citation rank, researcher's rank, number of citations, number of views of his/her profile.

This website performs more as a repository of bibliographic contents than an academic social network. This platform does not facilitate social networking with other members of and sharing knowledge products within the academic communities.

Figure 49: Homepage of getCITED.org

Figure 50: A Profile in getCITED.org with Profile Statistics

3.4.4   Social Science Research Network (SSRN)

The Social Science Research Network (SSRN.com) is a document repository for worldwide dissemination of social science information. It comprises about 22 specialized research networks in many of the specialized domains of social sciences, humanities and law. Individuals, institutions, publishers and scientific societies can share their publications and other academic contents for global dissemination through a single gateway. This website was launched in 1993 and is presently owned by the Social Science Electronic Publishing Inc., based in the United States. Its individual and institutional members spread around the world have made this website one of the top-ranking digital repositories with significant amount of open access contents. The SSRN website secured fifth position in the 13th edition of the world Ranking Web of Repositories (http://repositories.webometrics.info/en/world), which was announced in July 2013.

SSRN has a unique "Partners in Publishing" program and it works with over 1,800 scientific journals and research institutions. These partners provide information on forthcoming papers and permission to have their work posted to SSRN. SSRN aggregates working papers from many leading institutions and think tanks. Each registered individual member is free to upload his/her published papers and other academic contents and disseminate to global researchers communities. Full-text contents submitted by an author for global dissemination can be of either open access or out of any copyright restriction. However, an author's briefcase or workspace usually displays papers in four categories: (i) Publicly available papers, (ii) In process papers, (iii) Privately available papers, and (iv) Inactive papers. Only papers in category (i) are available in the SSRN eLibrary. The papers of eLibrary are searchable from SSRN portal and by external search engines.

Figure 51 displays how SSRN portal organizes contents based of ranking of top papers, authors and institutions. These top ranking profiles also include citation metrics and download statistics. Figure 52 shows homepage of SSRN portal, which also facilitates navigating research contents through specialized research networks, top papers, top authors and top organizations. Figure 53 shows top 30,000 authors with citation metrics and other indicators. Indicators include: author-level Eigenfactor score, number of papers per author, total downloads per paper per author, total citations per paper per author, number of downloads in last twelve months, etc.

Figure 51: Display of Top Papers, Authors & Institutions with Citation Metrics in SSRN Portal

Figure 52: Homepage of SSRN Portal

Figure 53: Display of Top 30,000 Authors with Citation Metrics in SSRN Portal

3.4.5   Other Important Social Networks useful for Authors and Researchers

While article level metrics count social bookmarking and social sharing of scholarly works through social media platforms, many of the conventional social networking websites receive special attention from the authors, researchers and academics. Table 20 provides an indicative list of social networking websites which are frequently used by researchers. Facebook is the most popular social network. Major journal publishers, journals, scholarly societies, institutions, organizations and online service providers all have their respective community page in Facebook to outreach their activities and services to global communities. Twitter is a social networking platform mostly used for microblogging of information. LinkedIn is a social platform for professional networking. Slideshare is the world's largest online community to share and upload presentations online. Here Individuals or organizations can upload and share PowerPoint, PDF, or OpenOffice presentations as well as video presentations. Besides presentations, SlideShare also supports documents, PDF, videos and webinars. Figshare is a social platform for sharing open datasets, figures and tables. Figshare allows researchers to publish all of their data in a citable, searchable and sharable manner. All data is persistently stored online in Figshare under the most liberal Creative Commons licensing policy**.**

All these general purpose social networking platforms supplement use of specialized social networking websites for researchers and academics, viz. ResearchGate.net and Adademia.edu. So, when you publish a scholarly paper, sharing information about availability of your paper through general purpose social networks as well as academic social networks will ensure its global visibility, higher usage, download, citation and help in improving its altmetrics score.

Table 20: Important Social Networks useful for Authors and Researchers

	Facebook	**Twitter**	**Google+**	**LinkedIn**	**SlideShare**	**FigShare**
Target Group	Any citizen	Any citizen	Any citizen	Professionals	Researchers; Professionals	Researchers
Founded	2004	2006	2011	2003	2006	2011
Mission	To give people the power to share and make the world more open and connected.	To give everyone the power to create and share ideas and information instantly, without barriers.	To bring the nuance and richness of real-life sharing to the web, and making all of Google better by including people, their relationships and their interests.	Connect the world's professionals to make them more productive and successful.	The world's largest community to share and upload presentations online.	Publish all of your research outputs!
Type of Social Media	General purpose.	General purpose.	General purpose.	Professional	Format specific	Format specific
Acceptable Formats	-	-	-	-	Presentations	Datasets, Figures and Tables

3.5 REGIONAL JOURNAL NETWORKS WITH BIBLIOMETRIC INDICATORS

3.5.1 SciELO – Scientific Electronic Library Online (SciELO.org)

The Scientific Electronic Library Online, popularly known as SciELO, is a programme of the São Paulo Research Foundation (FAPESP) launched in 1998, for the cooperative publishing of open access journals on the Internet. SciELO initially received technical support from the Latin America and Caribbean Center on Health Sciences Information (BIREME/PAHO/WHO). Since 2002, the Project is also supported by the Brazilian National Council for Scientific and Technological Development (CNPq). Since its launching, the SciELO publishing model was progressively adopted by national research institutions of Ibero-American countries and South Africa comprising the SciELO Network. Now it hosts peer-reviewed scientific literature originated from Latin America, Spain, Portugal and South Africa. SciELO is one of the earliest initiatives in the global South to provide open access to scientific literature. The SciELO.br website secured first position in category of Top Portals in 13th edition of the Ranking Web of Repositories.

Members in the SciELO Network, responsible for content creation and aggregation in its portal SciELO.org, are drawn from 16 countries, i.e. Argentina, Brazil, Chile, Colombia, Costa Rica, Cuba, Spain, Mexico, Peru, Portugal, South Africa, Venezuela, Bolivia, Paraguay, Uruguay and West Indies. As in December 2013, SciELO hosts about 1145 journals in all major disciplines of science, social sciences and humanities.

SciELO produces a large amount of valuable scientific contents generated and published by journals from emerging regions, such as Latin America, the Caribbean and South Africa. SciELO's multilingual global portal helps in making its resources visible and accessible globally.

Very, recently the SciELO has entered into a collaboration agreement with Thomson Reuters to develop a new product titled 'SciELO Citation Index', based on resources available with SciELO portal. SciELO Citation Index will be part of Thomson Reuters' Web of Knowledge database and available from 2014. SciELO will continually publish and host open access journals and its full-text contents will be linked from the SciELO Citation Index.

SciELO maintains a few bibliometric indicators based on citation indicators and other metrics. When integrated with SciELO Citation Index, their indicators will be enriched and will be very useful for more analytical evaluation of research originated from the Latin America.
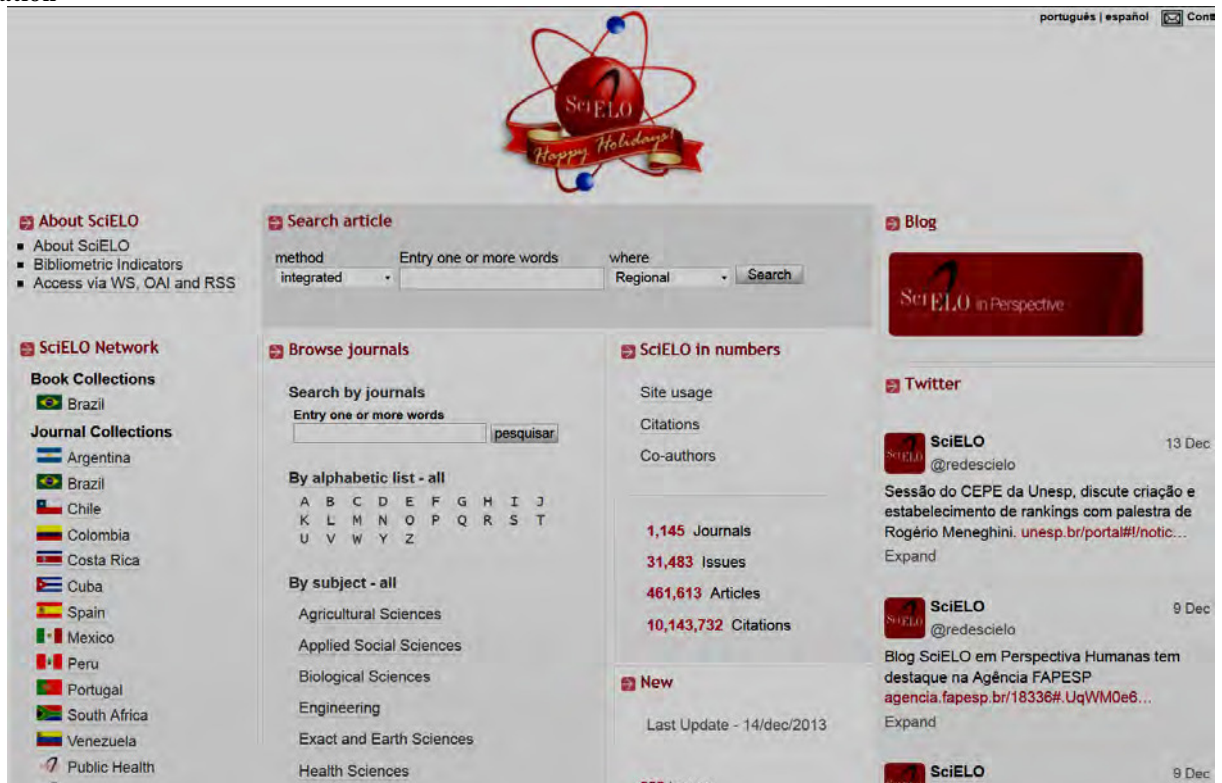
**Figure 54: Homepage of SciELO.org Portal providing Open Access to
Scientific Literature**

3.5.2 Redalyc.org

The Redalyc.org is an online multidisciplinary scientific information system
and open access platform for sharing scientific literature published from the
Latin America and the Caribbean, Spain and Portugal. It is also a network of
scientific journals from the Ibero-American group of nations. The motto of this
online platform is "*Open access to the world scientific production in Ibero-
American journals*". Its slogan is "*Science that is not seen does not exist*" to
outreach scientific literature published in journals in this region to worldwide
scientific communities. This slogan comes out to deal with the poor
representation of scientists and their scientific contributions from this region in
mainstream scientific databases and citation indexes. The Redalyc project
started in October 2002 and presently hosted by Universidad Autónoma del
Estado de México (UAEM).

Presently this portal provides open access to contents from 885 scientific
journals published in 15 Ibero-American countries, namely, Argentina, Brazil,
Chile, Colombia, Costa Rica, Cuba, Ecuador, Spain, Mexico, Peru, Portugal,
Puerto Rico, Dominican Republic, Uruguay and Venezuela. This portal fully
embraces open access and its material is released under a Creative Commons
license and is free to download. Majority of the full-text papers, available with
this portal, are written in either Spanish or Portuguese language. This portal
also provides abstracts of papers in English, Spanish and Portuguese
languages. The subjects' coverage of this portal, as on 12th December 2012, is

shown in Table 21. The portal also hosts a special collection named CLACSO (http://clacso.redalyc.org), supported by the Latin American Council of Social Sciences, covering full-text contents of 63 journals in social sciences, arts and humanities disciplines.

The portal generates certain bibliometric indicators and usage statistics that measure citations and usage of archived papers in this platform. This portal has different searching and navigation options for easy retrieval of archived documents from its databases.

Table 21: Subjects' Coverage in Redalyc.Org Portal

Subject Areas	Number of Journals
Social Sciences	518
Sciences	251
Arts and Humanities	99
Multidisciplinary	17
Total	**885**
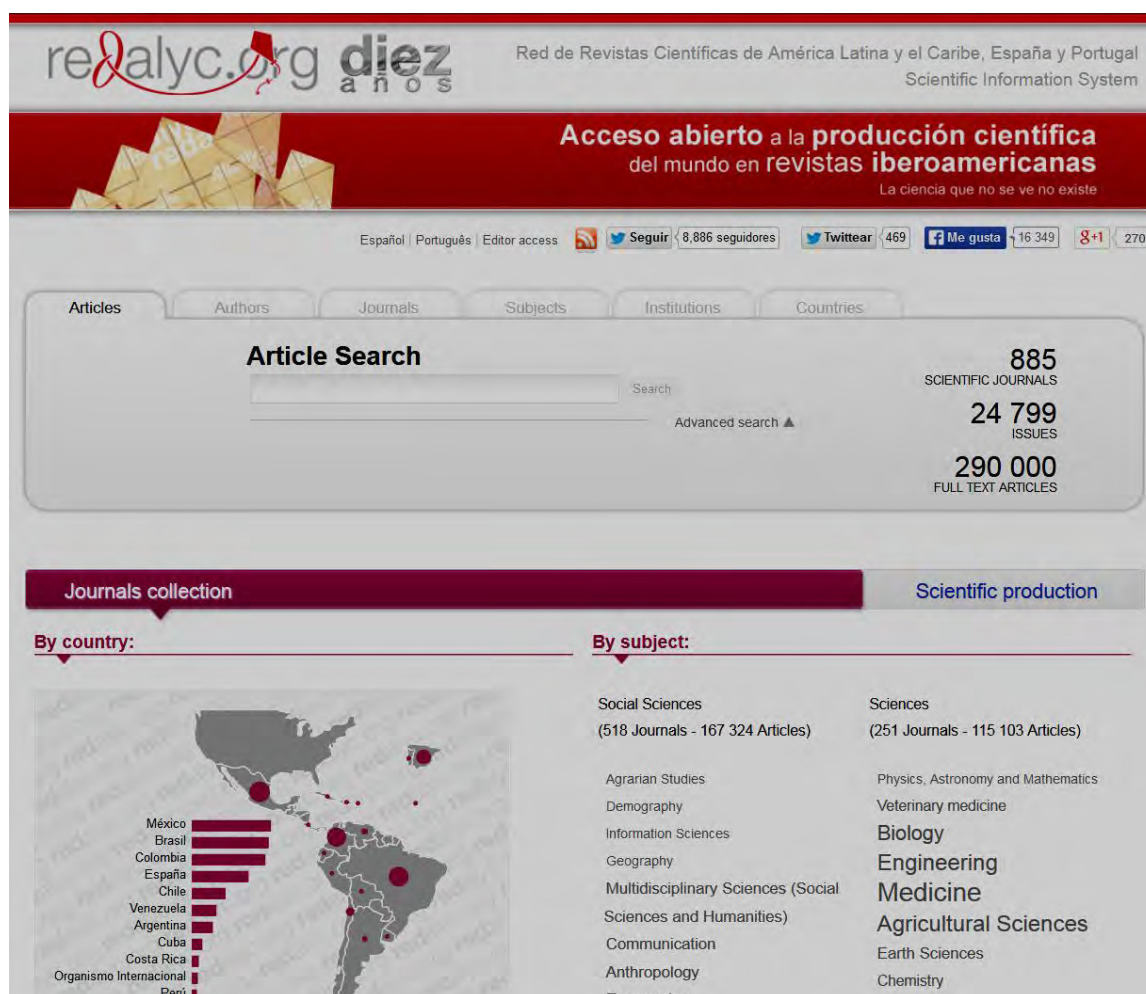
Figure 55: Homepage of Redalyc.org Scientific Information System

3.6   LET US SUM UP

In this Unit, you have learned use of different websites for creating researcher's unique identifiers and researcher's profile that help in disseminating your scholarly works to worldwide communities. Researchers can interact, collaborate, share and seek professional advice from peer-group members through academic social networking websites. More you share in social media and social bookmarking websites about your recently published works, more likely you will get higher citations and higher counts in article level metrics of your papers.

Many online journal publishers are providing article metrics along with article page of every published article. This helps authors to know social impact or social acceptance of that particular paper. Other researchers also can identify highly popular or highly downloaded papers in a journal.

The emergence of article level metrics or altmetrics has been taken seriously by science publishers, research academies, scientific societies and research funding agencies. However, open access journals and online journals published from developing countries are yet to provide article level metrics in the journals' respective article page. This sector is expected to grow in higher pace. On the other hand, we also have observed that papers contributed by scientists from the developed nations have much higher altmetric score than papers contributed by scientists from the developing nations. This is due to lower presence of scientists from developing nations in social media space. The science blogging and social bookmarking by researchers located in developing countries and their social media presence are also expected to grow in this decade.

3.7   CHECK YOUR PROGRESS

1) What is the regional focus of SciELO database?
   i)   Africa
   ii) North America
   iii) Asia and Oceania
   iv) Ibero America

2) What is the regional focus of SciELO database?
   i)   North America
   ii) Africa
   iii) Latin America
   iv) Europe

3) Which company did introduce ResearcherID?
   i)   Institute for Scientific Information
   ii) Thomson Reuters
   iii) Elsevier
   v)   Springer

4) Which count is not included in an altmetric score?
   i) Facebook/Twitter share
   ii) PDF downloads
   iii) Mendeley save
   v) *Scopus* citations

5) Where do you find papers indicating 'highly saved'?
   i) Academia.Edu
   ii) ResearchGate.net
   iii) ORCID.org
   vi) ImpactStory.org

ONLINE VIDEO TUTORIALS

There are a number of video tutorials available on topics discussed in this Unit. Some of the tutorials were developed by the organizations responsible for the respective products or services, while some others were developed by reputed scientists and libraries. Now, you learn more about how these products can be used for measurement of articles and contributors.

- *Alternate Routes: Journal Metrics Revisited* **Video**[43]

- *Altmetric for librarians* **Video**[44]

- *Altmetric It: find the discussions around scientific papers* **Video**[45]

- *Article level metrics for publishers by Altmetric* **Video**[46]

- *Article-Level Metrics at PLOS & Beyond* **Video**[47]

- *How to use the SSRN (Social Science Research Network)* **Video**[48]

- *Open Researcher Contributor ID (ORCID)* **Video**[49]

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[43] http://www.youtube.com/watch?v=B7WRbybStps
[44] http://www.youtube.com/watch?v=RzVxoUx9tfc
[45] http://www.youtube.com/watch?v=_Alsg7AyrhM
[46] http://www.youtube.com/watch?v=XE8hDetxEt0
[47] http://vimeo.com/40871077
[48] http://www.youtube.com/watch?v=HUWrcszyDQM
[49] http://www.youtube.com/watch?v=fqXQnHz2OYE

ANSWERS TO CHECK YOUR PROGRESS

UNIT 1

      6-(a) i,
      6-(b) i,
      6-(c) ii,
      6-(d) iii,
      6-(2) iv.

UNIT 2

      6-(a) ii,
      6-(b) i,
      6-(c) i,
      6-(d) iii,
      6-(ej) ii.

UNIT 3

      (1) iv,
      (2) iii,
      (3) ii,
      (4) ii,
      (5) iv.

UNIT 4

      (1) i,
      (2) iii,
      (3) ii,
      (4) i,
      (5) iii.

GLOSSARY OF TERMS

Term	Definition
Altmetrics	Altmetrics is a new metrics proposed as an alternative to the widely used journal impact factor and personal citation indices such as h-index. The term altmetrics was proposed in 2010, as a generalization of article level metrics, and has its roots in the twitter #altmetrics hashtag.
Article Influence Score (AI)	It determines the average influence of a journal's articles over the first five years after publication. It is calculated by dividing a journal's Eigenfactor score by the number of articles in the journal, normalized as a fraction of all articles in all publications. The mean AI is 1.00. A score greater than 1.00 indicates that each article in the journal has above-average influence. A score less than 1.00 indicates that each article in the

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[58] http://vimeo.com/49328590

		journal has below-average influence. (Source: Thomsonreuters.com)
	arXiv	It is an e-print service in the fields of physics, mathematics, computer science, quantitative biology, quantitative finance and statistics.
	Author Self-citation	Author self-citation occurs when an author cites his own work published earlier or going to be published in future.
	Bibliographic coupling	It is a measure that uses citation analysis to establish a similarity relationship between documents. It links two papers that cite the same article, so that if papers A and B both cite paper C, they may be said to be related, even though they don't directly cite each other. The more papers they both cite, the stronger their relationship is.
	Book Citation Index	It allows users to search seamlessly across books, journals and conference proceedings to find the information most relevant to their work within one platform. It details the citations received by a book. (Source: Thomsonreuters.com)
	Bookmarklet	It is a small software application stored as a bookmark in a web browser, which typically allows a user to interact with the currently loaded web page in some way.
	Chinese Science Citation Database	It contains important research and citation data from China, including research trends, top authors, institutions, journals, and more. (Source: Thomsonreuters.com)
	Citation	It is a reference to a text or part of a text identifying the document in which it may be found.
	Citation Index	It is a bibliographic tool in print or electronic format that lists all referenced or cited source items published in a given time span.
	Citation Network	It is a one-way or two-way network analysing relationship between citing and cited references or authors.
	Citations Count	It is a simple method of counting total citations received by an earlier published article, with data obtained from a citation database.
	Cited Half Life	It is the number of years, going back from the current year, that account for 50% of the total citations received by the cited journal in the current year.
	Cited Half-Life (of a journal)	It is the number of years, going back from the current year, that account for 50% of the total citations received by the cited journal in the current year. ISI developed this calculation to provide an indicator as to the long-term value of source items in a single journal publication. It may be noted that the cited half life of

	the literature of a speciality is different from the cited half life of a journal. (Source: Thomsonreuters.com)
Cites per Document (2 years)	Average citations per document in a 2 year period. It is computed considering the number of citations received by a journal in the current year to the documents published in the two previous years, i.e., citations received in year X to documents published in years X-1 and X-2. (Source: Scimagojr.com)
CiteULike	It is a free service to help you to store, organise and share the scholarly papers you are reading.
CiteULike	It is a free service to help you to store, organise and share the scholarly papers you are reading.
Citing Half-Life	It is the number of journal publication years , going back from the current year that account for 50% of the total citations given by the citing journal in the current year.
Citing Half-Life of a Journal	The number of journal publication years, going back from the current year, that account for 50% of the total citations given by the citing journal in the current year. ISI developed this calculation to provide an indicator of the subtle changes in scope of a publication over the course of time. (Source: Thomsonreuters.com)
Co-citation coupling	It is a method used to establish a subject similarity between two documents. If papers A and B are both cited by paper C, they may be said to be related to one another, even though they don't directly cite each other. The more papers cite A and B, the stronger their relationship is.
Co-citation network	It is a network analysing instances of co-citation coupling.
Conference Proceedings Citation Index	It helps researchers access the published literature from the most significant conferences, symposia, seminars, and more. (Source: Thomsonreuters.com)
Crossref	It is an official Digital Object Identifier (DOI) Registration Agency of the International DOI Foundation.
Data Citation Index (DCI)	It provides digital research that is discoverable, citable and linked to primary research literature. You can discover datasets from multiple repositories in one place. (Source: Thomsonreuters.com)
Delicious	It is an online social bookmarking service. Its website address is Delicious.com.
Desktop application	It is an application software that runs stand alone in a desktop or laptop computer.
Dryad	It is an international repository of data underlying peer-reviewed articles in the basic and applied biology. Its website address is http://datadryad.org.
Eigenfactor Score	Its calculation is based on the number of times articles

Research Evaluation Metrics	(EF)	from the journal published in the past five years have been cited in the *JCR* year, but it also considers which journals have contributed these citations so that highly cited journals will influence the network more than lesser cited journals. References from one article in a journal to another article from the same journal are removed, so that Eigenfactor scores are not influenced by journal self-citation. (Source: Thomsonreuters.com)
	Free software	It is a computer software that is available free of charge, however, its source code may or may not be made available.
	g-index	An index to quantify an individual's scientific research output, proposed by Leo Egghe. (Source: Harzing.com/pop.htm)
	Github	It is a social, online repository for open source software.
	h5-index	h5-index is the h-index for articles published in the last 5 complete years. It is the largest number h such that h articles published in 2008-2012 have at least h citations each. (Source: Scholar.google.com)
	h5-median	h5-median for a publication is the median number of citations for the articles that make up its h5-index. (Source: Scholar.google.com)
	hc-index	Contemporary h-index or hc-index adds an age-related weighting to each cited article, giving (by default; this depends on the parametrization) less weight to older articles. (Source: Harzing.com/pophelp/metrics.htm)
	h-index	h-index, proposed by J.E. Hirsch, is the largest number h such that h publications have at least h citations. The second column has the "recent" version of this metric which is the largest number h such that h publications have at least h new citations in the last 5 years. (Source: Scholar.google.com)
	i10-index	i10-index is the number of publications with at least 10 citations. The second column has the "recent" version of this metric which is the number of publications that have received at least 10 new citations in the last 5 years. (Source: Scholar.google.com)
	Immediacy Index (JII)	The average number of times that an article published in a specific year within a specific journal is cited over the course of that same year. This index, published in the *Journal Citation Reports*, is one developed by ISI as an indicator of the speed with which citations to a specific journal appear in the published literature. Such information is useful in determining which journals are publishing in emerging areas of research. (Source: Thomsonreuters.com)
	International	Document ratio (in percent) whose affiliation includes

Collaboration (%)	more than one country address. (Source: Scimagojr.com)
Journal Citation Reports (*JCR*)	*JCR* offers a systematic, objective means to critically evaluate the world's leading journals, with quantifiable, statistical information based on citation data. (Source: Thomsonreuters.com)
Journal Immediacy Index	It is the average number of times articles published in a journal in a specific year are cited within the same year.
Journal Impact Factor (JIF)	The number of current citations to articles published in a specific journal in a two year period divided by the total number of articles published in the same journal in the corresponding two year period. ISI stresses that a journal's impact factor is a meaningful indicator only when considered in the context of similar journals covering a single field of investigation or subject discipline. (Source: Thomsonreuters.com)
Journal self-citation	It is an instance in which an article published in a journal has cited a previously published article in that same journal.
Mendeley	It is a research management tool for desktop and web.
Open source software	It is computer software with its source code made available and licensed with the permissions or rights to study, change and distribute the software to anyone and for any purpose.
Plug-in	It is a software component that adds a specific feature to an existing software application.
PubMed	It comprises more than 21 million citations of biomedical literature.
RG Score	The RG Score is a metric that measures scientific reputation based on how all of your research is received by your peers.
RIS File	The RIS file format is a tagged format for expressing bibliographic citations. RIS File is a plain text file that can contain multiple references. RIS files can be exported from reference software such as EndNote and Reference Manager. Each reference is composed of a variable number of fields; and each field is preceded by a six-character label or "tag." Some tags are specific only to certain reference types. Each tag must be in a specific format, and certain other rules apply to all tags.
SciELO Citation Index	It lets researchers around the world discover new insights from research emanating from Latin America, Spain, Portugal, the Caribbean and South Africa while making connections to the broader research landscape for a more complete global picture. (Source: Thomsonreuters.com)

Research Evaluation Metrics	Scienceseeker.org	It refers to science news from science newsmakers. It offers science news aggregation service.
	SCImago Journal Rank (SJR)	SJR is a prestige metric based on the idea that 'all citations are not created equal'. (Source: JournalMetrics.com)
	Scopus	It is the world's largest abstract and citation database of peer-reviewed literature.
	Self-citation	It can an instance in which an article published in a journal has cited a previously published article in that same journal, or it can be an instance in which an author cites his own work published earlier or forthcoming.
	SJR (SCImago Journal Rank) indicator	It expresses the average number of weighted citations received in the selected year by the documents published in the selected journal in the three previous years, i.e., weighted citations received in year X to documents published in the journal in years X-1, X-2 and X-3. (Source: Scimagojr.com)
	Source Normalized Impact per Paper (SNIP)	SNIP measures contextual citation impact by weighting citations based on the total number of citations in a subject field. (Source: JournalMetrics.com)
	Web of Science® (*WoS*)	*WoS* provides quick, powerful access to authoritative content from the highest impact journals worldwide, including Open Access journals, in the sciences, social sciences, arts and humanities. (Source: Thomsonreuters.com)

LIST OF ABBREVIATIONS

A&HCI	Arts & Humanities Citation Index
AI	Article Influence score
ALM	Article Level Metrics
API	Application Programming Interface
CE	Cost Effectiveness score
DOI	Digital Object Identifier
DORA	San Francisco Declaration on Research Assessment
EF	Eigenfactor score
GB	Gigabytes
HC-Index	Contemporary H-Index
H-Index	Hirsch Index
HSS	Humanities and Social Sciences
HTML	Hypertext Markup Language
ICI	Indian Citation Index

ISI	Institute for Scientific Information
JCI	Journal Current Index
JCR	Journal Citation Reports
JIF	Journal Impact Factor
JII	Journal Immediacy Index
MB	Megabytes
OA	Open Access
ORCID	Open Researcher and Contributor ID
PDF	Portable Document Format
PLOS	Public Library of Science
PLOS ALM	PLOS Article Level Metrics.
PMC	PubMed Central
RII	Journal Research Impact Indicator
RIS	Research Information Systems, Inc.
SCI	Science Citation Index
SciELO	Scientific Electronic Library Online
SJR	SCImago Journal Rank
SNIP	Source Normalized Impact per Paper
SSCI	Social Science Citation Index
SSRN	Social Science Research Network
STM	Science, Technology and Medicine
WoK	Web of Knowledge
WoS	Web of Science
XML	Extensible Markup Language

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