RANGANATHAN TO ALTMETRICS

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ABSTRACT

{*Ranganathan began his professional career as a mathematician then turned librarian. His most notable contributions to the field were his five laws of library science and Colon Classification. The development of metrics from Librametry to Almetrics is discussed. It also deals with resources used for measuring all tools of metrics. The evaluative tools necessary evils for Library and Information Profession to measure the communicated research literature is being viewed.*}

Keywords: *Librametry, Scientometrics, Google scholar*

1. INTRODUCTION

Ranganathan began his professional career as a mathematician and then turned librarian. His most notable contributions to the field were his five laws of library science and Colon Classification. He is considered to be the father of Library Science in India .He was a university librarian and professor of library science at Banaras Hindu University (1945–47) and professor of library science at the University of Delhi (1947–55). The last appointment made him director of the first Indian school of librarianship to offer higher degrees. He was president of the Indian Library Association from 1944 to 1953. In 1957 he was elected an honorary member of the International Federation for Information and Documentation (FID) and was made a vice-president for life of the Library Association of Great Britain. Ranganathan's final major achievement was the establishment of the Documentation Research Training Centre (DRTC) as a department and research centre in the Indian

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Statistical Institute in Bangalore in 1962, where he served as honorary director for five years. In 1965, the Indian government honoured him for his contributions to the field with a rare title of "National Research Professor".

2. LIBRAMETRY

In 1948 at the Aslib's conference in Lamington Spa, Ranganathan introduced the term Librametry for the first time. He suggested developing librametry on the lines of biometry, econometry, and psychometry (1949) His suggestions were avidly welcomed at the conference by Bernal and others. The term Librametrics has two roots: **Libra** and **Metry**. The word 'Libra**'** connotes 'library' and 'metrics**'** means measurement. Further, as the librarian of the Madras University Library, he practiced various librametric techniques way back in 1925, in order to solve day today library problems and to streamline the day-to-day library activities, services for their clientele and also for the betterment of library professional as a whole.

The library book selection, acquisition, accessioning, classification, cataloguing, stack arrangement, publicity, reference service, circulation activities can be measured. The library reader's book use behaviour can be quantifiable. The library staff-their satisfaction, dissatisfaction-also can be measured. Even we can include library accounting, budgeting and manpower planning. Ranganathan (1969) in his paper presented in the DRTC 7th Annual Seminar (1969) suggested a few examples of statistics to library science. Based on his experience and the experiments carried out at the Documentation Research and Training Centre outlined the applications for Librametrics:

1. Determination of the strength of library staff;
2. Disposition of library staff for circulation work during different library hours;
3. Disposition of library staff for reference service during different library hours
4. Organization of library system; Establishing the distinction between "service library" and "dormitory library";
5. Design of library building, fittings, and furniture;
6. Book selection;
7. Absolute syntax and facet syntax in relation to classification;
8. Length of class number; and
9. Variation in style in writing catalogue entries.

3. BIBLIOMETRICS

The term bibliometrics was first coined by Pritchard (1969) in 1969 in preference to existing terminology 'statistical bibliography'. The word "Bibliometrics" has two roots: **'biblio'** and '**metrics.** The term 'biblio' is derived from the combination of Latin and Greek word 'biblion' equivalent to Bylos, meaning book, paper which in turn was derived from the word Bylos, a city of Phenonicia, a noted city for export trade in paper. The word 'metrics', on the other hand, indicates the science of meter, i.e., measurement and is derived either from Latin or Greek word 'metricus' or 'metricos' respectively, each managing measurement. This term was coined for the first time by Alan Pritchard. He used the term to describe all 'studies which seek to quantify the process of written communication'. Fairthorne (1969) also defined it as 'the quantitative treatment of the properties of recorded discourse and behaviour pertaining to it.'

Bibliometric studies include studies of the growth of the literature in some subject, how much literature is contributed by various individuals, groups, or organisations or countries; how much exists in various

languages; how the literature on some subject is scattered (e.g., over documentary types, language journals); and how quickly the literature on some subject becomes out-of-date (Studies of obsolescence). Another important group of bibliometric studies relates to what sources author cite. Day-by-day this study is attaining sophistication and complexity, having national, international and inter disciplinary character. The backbone of Bibliometrics lies in its sound theoretical foundation most effectively laid by some pioneers like

Lotka (1926)

Bradford (1934)

Zipf (1949)

Duck J de Sola Price (1963)

Bookstein (1976)

Mandelbrot (1952)

Brookes (1968,1969a,1969b,1970,1990)

Garifield (1976a, 1976b)

Egghe (1990)

and many others, and their techniques are capable of throwing light on various complicated problems faced by information scientists to quantify the process of written communication.

4. SCIENTOMETRICS

In the 1960s, particularly in Eastern Europe, the term "scientometrics" was used to denote "measurement of informatics process." The term informatics was then widely used to mean "documentation / information handling activities;" obviously, there is not much difference between bibliometrics of the West and the scientometrics of the East Europe. The term Scientometrics originated as a Russian term for the application of quantitative methods to the history of science, which

studies the quantative aspects of science. It was suggested by Dolrov and Kormoni (1969), often used with same meaning as the bibliometrics to mean 'the application of quantitative methods to history of science'. This term came into prominence with the founding of the journal named 'Scientometrics' by T. Braun in 1977, originally published in Hungary and currently from Amsterdam, The Netherlands. Scientometrics used to mean communication process in science including socio-cultural aspects, and appears to be almost synonymous with science of science with more stress on its quantitative aspects. It is also used as a generic term for a system of knowledge, which endeavours to study the scientific (and technological) system by using a variety of approaches within the area of science and technology studies.

Scientometrics is concerned with the quantitative features and characteristics of science and scientific research. Emphasis is placed on investigations in which the development and mechanism of science are studied by statistical mathematical methods. Scientometrics is now considered as a part of the sociology of science and is applied to science policy making. Thus Scientometrics involves studies in:

1. Sociology of Science,
2. History of science,
3. Growth of literature
4. Behaviour of Scientists,
5. Science Indicators.

5. INFORMETRICS

Information, in its most restricted technical sense, is a sequence of symbol sequence that can be interpreted as a message. The English word was apparently derived from the Latin stem (*information*-) of the nominative (*information*): this noun is in its turn derived from the verb

"inormare" (to inform) in the sense of "to give form to the mind", "to discipline", "instruct", "teach":. Metrics means measuring. Informetrics is the study of quantitative aspects of information. This includes the production, dissemination and use of all forms of information, regardless of its form or origin.According to Brookes (1990) the word 'Informetrics' was first proposed by Otto Nacke of West Germany in 1979**.** Informetrics is the study of quantitative aspects of information. This includes the production, dissemination and use of all forms of information, regardless of its form or origin. As such, informetrics encompasses the fields of which studies quantitative aspects of science. It is mostly concerned with development of models to explain and identify the various characteristics of the literature. It also discusses scientific productivity, collaborative research, etc.

6. WEBOMETRICS

The science of webometrics (also cybermetrics) tries to measure the World Wide Web to get knowledge about the number and types of hyperlinks, structure of the World Wide Web and usage patterns. According to Björneborn and Ingwersen (2004), the definition of webometrics is "the study of the quantitative aspects of the construction and use of information resources, structures and technologies on the Web drawing on bibliometric and informetric approaches." The term *webometrics* was first coined by Almind and Ingwersen (1997). A second definition of webometrics has also been introduced, "the study of web-based content with primarily quantitative methods for social science research goals using techniques that are not specific to one field of study" (1997), which emphasizes the development of applied methods for use in the wider social sciences. The purpose of this alternative definition was to help publicize appropriate methods outside of the information science discipline rather than to replace the original definition within information science.

7. CYBERMETRICS

Cybermetrics is one of the recently emerged fields in the line of metric studies. It has gained much popularity since the mid-1990 with the advent of Information Technology. As it is mainly concerned with the computer-science-based approaches, it has superseded all other metric studies in this Internet Era. Cybermetrics is proposed as a generic term for "The study of the quantitative aspects of the construction and use of information resources, structures and technologies on the whole Internet drawing on bibliometric and informetric approaches." Cybermetrics thus encompasses statistical studies of discussion groups, mailing lists, and other computer – mediated communication on the internet, including the www. Besides covering all computer-mediated communication by using internet applications, this definition of cybermetrics also covers quantitative measures of the internet backbone technology, topology and traffic. The breadth of coverage of cybermetrics implies large overlaps with proliferating computer-science-based approaches in analyses of web contents, link structures, and web usage and web technologies. The Webometrics which studies are the quantitative aspects of the World Wide Web.The Cybermetrics which is similar to webometrics; but broadens its scope; which include namely the electronic resources. Research of all network-based communications by using Informetric or other quantitative measures is called Webometrics.

The field of cybermetrics exceeds the boundaries of bibliometrics, because some activities in cyberspace normally are not recorded, but communicated synchronously as in chat rooms. Cybermetric studies of such activities still fit in the generic field of Informetrics as the study of the quantitative aspects of information "in any form" and 'in any social group" as stated by Tague-Sutcliffe (1992). The inclusion of webometrics expands the field of bibliometrics, as webometrics inevitably will contribute to further methodological developments of web-specific approaches. As ideas rooted in bibliometrics, scientometrics and

Informetrics contributed to the emergence of webometrics, ideas in webometrics might also contribute to the development of these all embracing fields.

8. ALTMETRICS

Altmetric was founded by Euan Adie in 2011 and he is the founder of data Science Company Altmetrics.com.It is an "alternative-metrics" tool for existed traditional metrics tools. This new method has evolved, as scholarly communication related to online resources. (Romer and Borchardt, 2012).

Altmetrics published five years ago, described an academic publishing landscape in which the volume of literature was exploding, and the three traditional filters used to help researchers gauge the relative importance of individual papers in their fields ;peer review, citation counting, and a journal's average citations per article; were failing to keep up. Scholars were moving their work onto the web, and alternative, article-level metrics drawn from online reference managers Zotero and Mendeley, scholarly social bookmarking services such as CiteULike, or even page-views of blogs and "likes" or comments on mainstream social media sites such as Facebook and Twitter could be used to track the impact of new research in real time, wrote Impactstory cofounder Jason Priem; Wikimedia Foundation head of research Dario Taraborelli; Paul Groth, then-researcher VU University Amsterdam; and Cameron Neylon, then–senior scientist at the Science and Technology Facilities Council. Could these new metrics be just as relevant as peer review and citations when judging the impact and influence of new research?

With altmetrics, we can crowd source peer review, they proposed. "Instead of waiting months for two opinions, an article's impact might be assessed by thousands of conversations and bookmarks in a week."

Since then, the pace of academic publishing has continued to increase, and altmetrics haven't managed to supplant the importance of citation-based metrics or disrupt the traditional peer-review process at leading journals. However, the field has steadily grown and gained legitimacy. Some academic libraries have begun using altmetrics to support evaluation and collection development decisions. Others have developed programming and consultation services to help faculty, researchers, and graduate students use altmetrics data to craft narratives around their work in Promotion and Tenure (P&T) dossiers, demonstrate early interest in research to funding bodies, or simply enhance their online presence and connect with other researchers online.Both the workshops and the libguides are designed to help researchers understand altmetrics in context with traditional bibliometrics, such as Impact Factor, as well as other relatively new, citation-based metrics such as Eigenfactor Score, h-index, and g-index.

8.1. Altmetrics with existing filters of peer-review

To avoid the delay in peer reviewing of articles, altmetrics, can make use of crowd source peer-review. Instead of waiting months and years for two opinions, an article's impact might be assessed by thousands of conversations and bookmarks in a week. In the short term, this is likely to supplement traditional peer-review, perhaps augmenting rapid review in journals likePLoSONE,BMC Research Notes, orBMJ Open. In the future, it will help greater participation and better systems for identifying experts.

8.2. General resources

Google Scholar Citations. This free Google service allows authors to create profiles that manage, calculate, and track citation data such as h-index and i10-index (i.e., number of articles with at least ten citations). Using a statistical model based on author and article metadata to identify relevant citations, the service offers the option of automatically adding new articles to users' public or private profiles. Google also recently launched a related service, Google Scholar

Metrics, that gauges the "visibility and influence" of articles and publications from 2007 to 2011, based on Google Scholarcitation data. *Access:*http://scholar.google.com/intl/en/scholar/citations.html.

SCImago Journal and Country Rank. SCImago is a free Web site that runs on Scopus data to calculate two metrics: SCImago Journal Rank (SJR) and Source Normalized Impact per Paper (SNIP), which compare directly to Web of Knowledge's Impact Factor. SJR is based on times cited, but also uses an algorithm similar to Google's PageRank to calculate article influence, which it uses to create rankings. Using SCImago's online interface, users can compare rankings of up to ten journals at a time, display top journals, and even display countries with influential journals in a discipline. *Access:*http://www.SCImagojr.com.

Scopus. Scopus is a subscription database known primarily as an alternative to Web of Knowledge, as it offers similar article, author, and journal-level metrics, but uses slightly different algorithms to calculate them. Metrics include standard options such as times cited and h-index, as well as original offerings like SJR and SNIP from SCImago. Scopus recently launched "Altmetric for Scopus," a third party application that runs within the sidebar of Scopus pages to track mentions of papers across social media sites, science blogs, media outlets, and reference managers. *Access:* http://www.scopus.com.

Web of Knowledge. This Thomson Reuters subscription database helped usher in modern bibliometrics with its introduction of the h-index in 1982. Web of Knowledge includes Web of Science, for article and author queries, and Journal Citation Reports, for journal queries. Its metrics include times cited, h-index, impact factor, Eigenfactor, and field-based journal rankings. While many of these metrics have been criticized for not fully representing scholarly value in certain disciplines, they are still considered the gold standard in traditional bibliometrics. *Access:* http://www.webofknowledge.com.

8.3. Resources to Altmetrics

Altmetrics.org. This free Web site is a central hub for information about the growing altmetrics movement, which it defines as "the creation and study of new metrics based on the Social Web for analyzing and informing scholarship." Cofounded by prominent figures in the world of bibliometrics, such as Jason Priem and Heather Piwowar, altmetrics. org maintains links to new online tools for calculating impact. Other prominent features include an altmetrics "manifesto" that argues how altmetrics can improve existing scholarly filters. *Access:* http://altmetrics.org.

Impact Story. Formerly known as Total Impact, Impact Story is a free open source tool designed to support URL-based publishing through the aggregation of online altmetrics. Users create collections of materials through online identifiers, such as Google Scholar Profiles, DOIs, and PubMed IDs. Impact Story uses more than a dozen APIs to search for metrics on these collected items, with sources ranging from popular social media to scholarly tools like Mendeley and PLoS. Items are subsequently assigned impact categories, such as generally/highly "saved," "cited," "recommended," or "discussed." This resource is most useful for researchers publishing in nontraditional venues or with scholarship too new to have accumulated traditional citations. Not a comprehensive source for tracing Web impact. *Access:*http://impactstory.it/.

PLoS Article Level Metrics. Public Library of Science (PLoS) has emerged as the leading open access journal repository, in part due to its high traditional impact factors. However, PLoS offers an alternative to traditional impact in the form of Article Level Metrics, which track the influence of individual PLoS articles, from times downloaded to mentions in social media and blogs *Access:* http://article-level-metrics.PLoS.org/.

Publish or Perish. Anne-Wil Harzing created Publish or Perish (PoP) to assist faculty looking for more diverse bibliometrics. PoP is a free, downloadable program that harvests data from Google Scholar based on author name. Users can manually remove records to refine the data, similar to what is now offered by Google Scholar Citations. PoP can also calculate numerous metrics, including alternatives to the h-index. However, because few people are familiar with non h-index calculations, it is up to users to explain such metrics to larger audiences. *Access:* http://www.harzing.com/pop.htm.

ReaderMeter. ReaderMeter is a free tool that "crowdsources" impact by processing readership data from Mendeley. Created by Dario Taraborelli of the Wikimedia Foundation, it contrasts with traditional bibliometric tools in its focus on readership, not citation. The site functions by compiling reports based on authors' names, which are subsequently processed through the Mendeley API. Each report highlights information such as an author's "HR-Index," "GR-Index," "Total Bookmarks," and "Top Publications by Readership." ReaderMeter has been by criticized some in the altmetrics community for drawing data exclusively from Mendeley.2 However, plans exist to integrate data from multiple reference management sites, such as CiteULike.*Access:* http://readermeter.org/.

8.4. Scholarly Peer Networks

Academia.edu. Academia.edu is a free online paper-sharing platform that encourages academics to increase their visibility and monitor research within and across its scholarly network. With nearly 2 million profiles and 1.5 million uploaded papers, academia.edu has become a popular player in the world of online repositories. Impact metrics for the site are similar to those offered by many blogs, and include profile views, document views, and country-based page traffic. In another increasing trend for scholarly networks, the site also offers features geared toward social interaction, such as user statuses and an "ask a question" tool. *Access:* http://www.academia.edu/.

Mendeley. Mendeley is a relatively recent startup from the same company that created Last.fm. It combines a citation manager with a scholarly social network to create a comprehensive research portal. Researchers with profiles can chart views and downloads of their research through the portal, join groups, and view popular articles within their fields. Mendeley has gained particular traction in the sciences, from which most of its users hail. However, with the integration of Mendeley data into more altmetrics tools, it will likely become popular with other disciplines, too. Mendeley is free with for-cost storage upgrades and available both online and as a download.*Access:* http://www.mendeley.com.

Social Science Research Network (SSRN). SSRN is an online article repository, recently listed number one in the Web of World Repositories' rankings for 2012. It encompasses three key features: an database of more than 400,000 abstracts, a large electronic paper collection, and 20 specialized subject networks through which registered users can promote their work and connect to free abstracts and articles. Though praised for its ability to facilitate discovery of scholarship, SSRN has also been criticized for the strictness of its policies, which some see as stifling in comparison to emerging scholarly networks. Still, its site-specific metrics for "top papers," "top authors" and "top institutions" remain key to social science faculty.*Access:* http://www.ssrn.com.

VIVO. VIVO is a free, downloadable semantic Web application designed to facilitate research collaboration both within and between institutions. Originally developed at Cornell, it invites institutions to upload data related to faculty profiles, which it crawls in order to draw meaningful connections between researchers.

8.5 Blogs and Media

Citation Culture. This two-year-old blog is the creation of Paul Wouters, director of the Centre for Science and Technology Studies at Leiden University (LU). Authored by Wouter and a fellow LU professor, the blog

is dedicated to discussion of academic impact, from citation analysis to the broader evaluation of research across universities. Recent multipart posts have touched on topics, such as humanities bibliometrics and scholarly altmetrics. *Access:* http://citationculture.wordpress.com/.

Jason Priem's Web site. Jason Priem is a Ph.D. candidate at University of North Carolina-Chapel Hill's School of Information and Library Science and the cofounder of Impact Story. Priem has emerged as one of the strongest advocates for altmetrics, and a champion for library involvement. front. *Access:*http://jasonpriem.org/.

Scholarly Kitchen. Established by the Society for Scholarly Publishing, Scholarly Kitchen is a moderated blog that presents ideas on current topics of scholarly publishing and communication. Counting. *Access:*http://scholarlykitchen.sspnet.org/.

9. CONCLUSION

Dr.Ranganathan's contribution till today relevant to quantify LIS centres and services. Science Citation Index (SCI) founder Eugene Garfield first came up with the idea of journal impact factor of Journals (IF) in 1955 still it hold good. H-index by Hirsh for individual and and organizational measuring made tremendous impact on scientific productivity and qualitative evaluation. Today, techniques for measuring scholarly impact—traditionally known as Scientometrics/Informatics is well known for generating conflict and concern, particularly as tenure-track scholars reach beyond previously set boundaries of discipline, media, audience, and format. From the development of more academic specialties to the influence of blogs and social media, questions about the scope of scholarly impact abound, even as the pressure to measure such impact continues unabated or increases. Web-based alternatives, called Altmetrics making a mark , with interest in online venues for

scholarly communication on the rise, and the number of tools available for tracking online influence growing steadily, librarians are in a key position to take the lead in bolstering researchers' knowledge of current trends and concerns in the new art and science impact measurement. Whether you like these evaluative tools or not but these are the necessary evils for Library and Information Profession to measure the communicated research literature.

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