

# AN INTRODUCTION TO INDEXING AND PEER-REVIEW PROCESS

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## ABSTRACT

*This article provides an introduction to the idea of indexing: the concept, practice, and history behind it. It traces how the idea of indexing shaped up through history and has come to be one of the determining factors in research publication. It then moves forward to explain various indexing agencies like Scopus, Web of Science, etc., and how they developed, what is their database and what kind of database they hold and how they aid knowledge dissemination in different ways. This is followed by the different indexing parameters that every researcher should know to find and filter a quality journal for his/her research publication. Indexing parameters like impact factor, h-index, few others are touched upon along with the description of the methods used to calculate these parameters. The last part is about the different peer-review process followed by journals to provide quality information to the public.*

**Key Words:** *Indexing, Indexing agency, Indexing Parameter, Peer-review, history of indexing, impact factor, h-index, google scholar, review methods, single-blind, double-blind, triple-blind.*

## 1. THE IDEA OF INDEXING: HISTORY, CONCEPT, AND PRACTICE

Indexing is the art of organizing published literature from journals and other publications so that knowledge dissemination becomes hassle-free for scholars. Indexing refers to identifying or pointing to something. To index also means to explore and to expose. Indexing and abstracting are very crucial for ready reference services. These ready reference services are made available through various databases. [6]

The idea of indexing is to point to something, which serves as a kind of indicator that directs you to information. An index is traditionally a list displaying the subject and the page, or a list that presents the abstract of the information. It doesn't restrict itself to that, it can also be a collection of information on a computer or just a set of keywords or even hyperlinks that take you to where the actual information is available. An index primarily saves time and makes knowledge accessible for scholars, researchers, and academicians.

Indexing began in the pre-printing era, with the discovery of the printing press indexing has advanced and taken great leaps with tech assistance. Earlier, in hand-written indexing there used to be errors in writing, pagination, etc., and it differed a lot; no two manuscripts were identical. After the Concordances, the value of indexing scaled up. Concordances are an alphabetical list of the words in a text or texts, especially biblical ones, usually with the citations of the passages or within the context displayed. Every single instance is recorded.

### 1.1 History of Indexing

As mentioned before, before the invention of the printing press, indexing options were limited. With hand-written books, two copies of the same book posed a lot of discrepancies in the content, pagination, etc. In spite of these drawbacks, several types of indexes prevailed before printing. Indexes were a list of terms or phrases, concordances to the Bible, subjects like Law, Ethics, etc.

Printed book indexes were introduced and developed only in the 1460s. First printed Bible concordance was published in the year 1544. Following that many concordances were published and Alexander Cruden's *Complete Concordance to the Holy Scripture* published in the year 1737 is still in print. The next milestone in indexing was Samuel Johnson's *A Dictionary of the English Language*, the first index to the English Language published in the year 1755. [7]

In 1877, the Index Society was formed to codify index in London. They aimed to create 'a general index of universal literature'. This society continued to function until 1890, after which a lot of women entered the field of indexing. Then the Society of Indexers was found in 1957 in Britain. In parallel to this, William Frederick

Poole began his index to Periodical Literature in the United States. In 1848, while still being a student he published his 154-page index to periodical literature. This is considered as a precursor to modern indexing. During the same time, Paul Otlet began *Universal Bibliographic Repertory - a Universal index of all knowledge*. He predicted the era of the internet.

### 1.2 Types of Indexing

Indexing requires some special combination of skills. They are expected to organize, analyze and arrange information for easy access. They should also possess the ability to express complex ideas in a nutshell. There are different types of indexing and all these aims at making information and demands different skills from the indexers.

- Bibliographic and database indexing
- Genealogical indexing
- Geographical indexing
- Book indexing
- Legal indexing
- Periodical and newspaper indexing
- Pictorial indexing
- Subject gateways
- Website and metadata indexing [6]

*Citation Indexing*: It is the index of citations that helps us understand that there is a presence of another work in that particular work. For Eg. New Testament cites the Old Testament. These show the linkage between current work and prior work in the same field or from different fields.

*Legal Citation*: It is the mother of all the citation indexes. It gives a list of all the authorities citing a particular case, statute or other legal authority. One of the most used is Shepherd's (Garfield)citation, which helps one know if any case has been overturned, questioned or cited by later cases. This began as a publication of a series of indexes in different jurisdictions by Frank Shepherd in 1873.

Father Roberto Busa is known as the father of Computational Linguistics. He wanted to make an index by compiling all of St.Thomas Aquinas's work. He approached IBM and proposed them to fund the project. This project went on for 30 years and the index ran for a volume of 56 books with approximately 70,000 pages.

Eugene Garfield, inspired by Pharmacologist - Historian Chauncey Leake conducted a thorough analysis of review articles and their cited references. He did this to track the discoveries and medical procedures to record it in journals. He founded the Institute of Scientific Information (ISI) in 1960. He also explains the connection between reference and citation in research. In a speech given on Citations of Indexing at the Far Eastern State University, he talked about the connection between reference and citation. He said that reference imply that an author has found a particular theory, method, method or datum useful in some way. Citation, on the other hand, is more like an 'intellectual debt', an explicit link between their current research and prior work. [3]

### 1.3 Purpose of Indexing

An index helps a researcher to track information easily. The index gives keywords or abstract that helps the reader to map the content, concept, and cross-reference the available information. It also helps in faster learning and acknowledgment of the information available and also to comprehend the prominence of the subject or author and also the interconnections.

### 1.4 Benefits of Indexing

- They help in comprehending data
- Map or organize the information
- It can increase the visibility and quality of one's publication.
- Knowledge dissemination on a wide scale.

## 2. INDEXING AGENCIES

Indexing Agencies help you optimize your search and also help you locate your information in a specific domain. Their main focus would be quality and easy access.

The following are a few Indexing Agencies that are known for quality work and help researchers in navigating information.

Scopus is the world's largest science journal indexing agency. They began as ISI Web of Science and later in 2016 they changed their name to Clarivate Analytics. It was first found by Eugene Garfield and they started as a small citation database now they have more than 1.7 billion cited references across over 159 million records. They have a multidisciplinary platform that connects regional, specialty, data and patent indexes. Their indexing includes citations of scholarly books, research articles, peer-reviewed journals, editorials, etc. The Journal Impact Factor (JIF) is released every year and it has the rankings of all the journals available in the database. They have several databases for multidisciplinary domains from agriculture to dance and theater. It provides authors profile and long term trend analysis, and h-index before 1996 publications.

Scopus was founded by Elsevier in the year 2004. They have been into indexing and citation since 1880 with around 3000 journals. It has around 40,503 journals, books, and proceedings in the database. If a journal is indexed in Scopus once then it is indexed forever. They also have a multidisciplinary collaborative platform that indexes abstracts and citations from a wide range of peer-reviewed articles. It provides the profile of the author and analysis of the ongoing trend, citation indexing and average per year citations. In addition to these things, it also provides authors, titles, keywords, abstracts, periodical titles, address of the authors and publication years. [1]

Ulrich's Periodicals Directory was a multidisciplinary indexing database that indexed magazines, journals and serial publication throughout the world. This directory was published in print version from 1932. It was taken over by ProQuest in the year 2019. More than 246,000 regular and irregularly publications and serial publications are indexed here. They have more than 4,970 new publications. Serial publications are available online, in print and microform. They have international coverage and their area of focus was English – Language publications. They derived the followed information from publishers themselves which was in turn validated by the journal.

- ISSN
- Title and previous titles
- Starting date, place of publication, and the name of the publisher
- Cost, availability of electronic versions, subscription terms, and approximate circulation as estimated by the publisher
- Subject information, searchable as subject terms or approximate Dewey Classification, special features, and indexing information
- Indications of whether the publication is available on open access
- Indication of whether the publication is peer-reviewed, which is taken to include professional magazines with equivalent editorial control of quality. [2]

OCLC or Online Computer Library Centre is run by an American non-profit organization. Their major focus is to make information cost-free and accessible to the public. It was founded in the Ohio College Library Centre in 1972. OCLC along with the other library operating systems provided the OPAC (Online Public Access Catalogue). OCLC primarily focuses on providing, abstract, bibliographic information and full-text access to information to information seekers. OCLC has been conducting a lot of research for the library community and they publish their findings along with the other publications, journal articles, and newsletters in their website.

Google Scholar is a web search engine that indexes abstract and full-text information on scholarly articles and research from different domains. Google Scholar was launched in November 2004, though the size of the database is not revealed it is estimated to have about 160 million documents indexed as of May 2014. They provide the user with a variety of scholarly material online ranging from journal articles to research papers, dissertations, conference proceedings, technical reports, etc. It is easy to access impact factors, h-index, i10index, etc., are also determined by Google scholar.

ABDC or Australian Business Deans Council is an academic community guided by business deans in Australia. It has a quality journal list in domains like Economics, Management, Business Development, etc. The next one is Crossref, it generates Digital Object Identification. It also deals with content registration, reference linking, citation, similarity check, and funder registry.

There are also other indexing agencies such as Index Copernicus, BASE, and MIAR, etc.

### 3. INDEXING PARAMETERS

To understand a journal's standing and quality there are certain parameters used to decide that and those are called indexing parameters. Bibliometrics and Scientometrics are used for the measurement of all aspects related to publication and reading of books and documents.

These are some of the indexing parameters:

Impact Factor is the measure of the number of citation of a particular article in a year. This stands as a value for measuring the quality of the article and how much it has contributed to the academic community. It is also one of the strongest aspects that determines the rank of a journal and this can be calculated only after two years of establishment of the journal.

How to calculate Impact Factor?

The first important aspect is that the journal should have been publishing articles for a minimum of three continuous years.

$D$  = No. of articles indexed in the year 2016 and 2017

$N$  = No. of citations of  $D$  in the year 2018

So,  $N/D$  = Impact factor of the year 2018 [5]

This is how the impact factor for any journal is calculated. It is either calculated for two years or five years. The higher the impact factor the journal has, the higher its quality. It is very useful in finding an objective measure of quality. Impact Factors reflect the changing status of a journal in a particular discipline as it is calculated every once in two years and is updated. It takes into account two major criteria: the number of journals a particular article has and the number of citation each article of that journal has. So, even a journal which has published very few articles might have the chance of having very high citations and hence ensures quality.

Though the impact factor is a quality parameter, it also has certain drawbacks. For example, it cannot be used as a standard of comparison between different disciplines. It depends on the subject area, the impact factor of one journal might be high in one discipline and low in another. It also cannot be used to gauge the success of individual research paper. It does not give the impact number for the journals that have less than 3 years of existence. [9]

Eigenfactor Score is similar to that of the impact factor. Its score weighs each reference to a scholastic measure of the number of time researchers spend reading the journal. It also avoids self-citation.

h-index was created by John.E Hirsh, a physicist, who along with his colleagues started ranking the author and journal using this indexing parameter. H-index is calculated based on the number of papers published by the author and the number of times each of those papers was cited. For example, if an author has published 3 papers and all three papers were cited three times each, then the author's h-index is 3.

It encompasses the measure of the quantity of the work by a researcher and also its impact in that particular field of study within a single number. Makes it easy for the researchers to understand both hence not making it a single-aspect criterion and it covers different aspects such as citations, the total number of highly cited paper, etc. It also allows one to gauge the academic output accurately and becomes an influencing factor in terms of honors and awards.

h-index cannot be used to compare researchers from two different disciplines, it might work well for comparing two researchers of the same discipline but there are inter-disciplinary differences. It is also dependent on each researcher's career duration because the longer the duration the higher the number of citations.

Papers with high citation numbers are very important to calculate the h-index value, but there is a disadvantage in that. Once the papers are listed as top h papers, the number of citations they receive after that is not taken into account. There is also a high risk of researchers indulging in a whole lot of self-citation to increase their h-index. Sometimes it becomes the only determinant of a researcher's value and other aspects are side-lined.

CiteScore is a journal metrics introduced by Elsevier. The major aim is to find out the impact of a journal or article in a particular field of study. It has an extensive range of peer-reviewed literature from across 50,000 journals. The calculation is very simple and easy to do and is very clear and accessible. Access to CiteScore metrics is free of cost, they don't charge users for their access to the cite score. It is updated every month, unlike the other metrics that are updated annually or once in 3 or 5 years. The CiteScore tracker displays the CiteScore of the journals every month.

CiteScore takes everything into account: articles, conference papers, letters, and editorials. This might cause a little dilution in the quality. It also seems to favour journals that are under the publication of the house and doesn't include journals that are not indexed in Scopus or Web of Science. As a result, Journals with different documents like reviews and editorials seem to get a low CiteScore than the ones who don't include that.

m-index though almost similar to that of the h-index takes into consideration the period of the academic career of the author.

If  $N$  = No. of years since the author first published the paper

Then  $m$ -index =  $h/N$  ( $h$  being the  $h$ -index of the author)

$g$ -index is a variant of  $h$ -index.  $g$ -index takes into account the increase in the citation of the most cited paper as well. To calculate  $g$ -index,  $g$  is the highest rank and the top  $g$  paper has at least  $g^2$  citations.

$i10$ index refers to the number of articles that are cited at least 10 times.

$h5$ index of an article refers to the number of citations of the number of published articles in 5 years. For example, if the  $h5$ -index is 4, then in the last 5 years 4 articles published have been cited at least 4 times each.

SCImago Journal Rank (SJR) ranks Journals. This is a scientific measure of scholarly journals that takes into account the number of citations and the quality of the journals in which the citations are made. SJR is a numeric value that depicts the number of weighted citations received in a particular year with the previous three years. The higher the value the greater the journal prestige. This value can be of great use in journal comparison in the evaluation process.

Citing Half-life counts all the journal citations in a particular year and determines the median article publication date. An article can be cited many times, sometimes in the very year, it was published or maybe even after decades. So citing half-life shows the articles cited from that particular journal before the particular year and after that particular year.

These are a few parameters a research scholar must take into account when he or she is sending an article to a journal. A journal's prestige, quality of the article published, impact factor, authors'  $h$ -index everything needs to be taken into consideration.

#### 4. REVIEW METHODS

Deborah in her article talks about the efficiency of the journal review process. It mostly depends on the time taken for the journal to review and publish an article from the date of the article being received. Peer-review is very critical when it comes to publishing. There are different review methods that each journal follows to review the articles sent to them. They usually follow this to prevent bias and plagiarism. The most commonly followed peer-review process is double-blind, the journal also follows single-blind, triple-blind and open review process. [8]

Single Blind Review method is the one where the reviewer's identity remains anonymous to the author, but the author's identity is disclosed to the reviewer. Every reviewing process has its own merits and demerits. The author need not worry about the reviewer's area of expertise and will not be influenced by the critical attitude of the reviewer since the identity of the reviewer is not disclosed to the author. Though the author does not know the reviewer, the author's identity is revealed to the reviewer which will, in turn, result in bias of any kind or the reviewer might opt to be overly critical about the article since his/her identity is not revealed.

In a Double-Blind Review process, the identity of the author and the reviewer is kept from each other. This is done with a primary focus of encouraging unbiased review process. [4] The author is supposed to submit a manuscript that doesn't reveal his/her identity in any way. If the author has a concern against a particular person reviewing their work, then they can let the editorial board know about it through their conflict of interest. Most of the journals follow the Double-Blind process to have a healthy peer-review environment and provide the space required for knowledge dissemination.

In Triple Blind Review Process, neither the author nor the reviewer or the editors knows each other. Everybody's identity is concealed from the other to encourage an unbiased peer-review process. This type of review is rarely used because to conceal the identity of the author, reviewer and the editors includes very complex logistics. [4]

The last one is the Open Review Process where the author and the reviewer know each other. This review process is opted by a very few journals and are is considered to be a very open process. Here the reviewer and the author even discuss the manuscript together and work together in the comments. The names of the reviewers are also published along with the authors in the article or the journal.

## CONCLUSION

The publication is the final step in the process of research and indexing is very crucial and primary aspect in publishing articles and research work. This helps a researcher filter and find a good journal among the number of predatory journals and send the work to be validated, reviewed and published. The better the knowledge of a researcher about this, the better is his/her chance of producing a quality work that will benefit his/her research, discipline and the community.

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