

**BIBLIOMETRIC LAWS AND APPLICATION IN LIBRARY AND INFORMATION
SCIENCE**

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Abstract

This study was carried out to explore the bibliometric laws and application in library and information science. The study discussed the application of bibliometrics and how they are applied in Library and Information Science. The paper revealed that there are basically four laws of bibliometrics (Lotka's, Bradford's, Zipf's and Subramanyam's law), Bibliometric is used for different applications such as evaluation and analysis of documents (books, theses, dissertations and journals both print and online forms). It is also relevant for collection development, in the selection of best library materials and to guide the library work. Similarly, the study revealed that literature reviews play an essential role in academic research to gather existing knowledge and in examine the state of any existing field. However, researchers in various disciplines continue to rely on bibliometrics as systematic investigation of the literature. It is therefore recommended that the insights provided in this study are useful for researchers particularly library and information science professionals. The study concluded that, there is a need to encourage young scholars in the field of library and information science particularly in Nigeria to explore more research in bibliometrics.

Keywords: Bibliometrics, Lotka's law, Bradford;s law, Zipf's law, Application, Library and Information Science

Introduction

The area of information theory known as bibliometrics makes an effort to mathematically and statistically analyze the characteristics and patterns of recorded knowledge. Pritchard (1969) coined the word "bibliometrics" to refer to all research projects that aim to measure the written communication process. He described bibliometrics as the use of statistical and mathematical methods to analyze books and other forms of written communication. The use of statistics to characterize the patterns of publication within a specific area or body of literature, bibliometric analysis used in measuring the patterns of all types of recorded information and their creators. Potentially under-researched areas in a discipline are "bibliometric analysis methodology, which evolved as one of the most extensively used methodologies to analyze the quality, credibility, and influence of the literary work" (Ellegaard & Wallin 2005). Wallin further asserts that bibliometric analysis is a useful tool for spotting potential research gaps in a field.

Among the importance of bibliometric analysis includes comparison of the productivity and impact of research carried out in various places and areas can be made using bibliometrics data. It also use a descriptive method of counting and evaluating the many facts of written communication to throw light on the process of written communication as well as the nature and course of growth. Similarly, it offers details on the composition of knowledge and its dissemination. However, bibliometrics may includes studying the relationship within a literature (citation studies) or describing literature. These descriptions concentrate on recurring patterns involving writers, monographs, journals, or subject and language. Researchers can characterize the relationship between two or more authors or works, as well as the effect of a single writer, using bibliometric methods of evaluation. The field of study known as "bibliometrics" applies

quantitative analysis and statistics to publications like journal articles and the citation counts that go along with them.

Concept of Bibliometrics and Bibliometrics Laws

Bellis (2009) defines bibliometrics as a technique for quantitatively evaluating the literature in the fields of science and technology. Essentially, bibliometrics is the quantitative examination of publications to identify particular types of phenomena. The application of statistical and numerical methods for the measurement of quantitative and qualitative data for books, journals, and other published communication medium is what is implied by the term "bibliometrics". Pritchard in 1969 was the first person to use the term bibliometrics, according to Lundberg (2006). The development of bibliometrics was sparked by the need for a reasonably rapid, simple, and affordable peer review substitute for assessing research performance (Russel and Rousseau 2010). The primary tool of science, quantitative analysis, is turned inside out by bibliometrics. This strategy for study evaluation is really just counting. Bibliometrics is, in essence, a research methodology used in the field of Library and Information Science. It uses statistics and quantitative analysis to describe publication trends within a specific topic or body of literature.

The laws of bibliometrics were employed to evaluate intellectual and scientific articles. For example, researchers can apply bibliometrics to acquire a general picture of their field of study and the linkages to related fields. The management and evaluation of research both often use bibliometrics. There are basically four types of bibliometric laws, namely Lotka's Law (which describes the frequency of author publications in a given field), Bradford's Law (which serves as a general guideline for librarians in determining the number of core journals in any

given field), Zipf's Law, is one of the main areas of bibliometric research concern (which predicts the frequency of words within a text) and Subramanyam's law (the degree of author collaboration). The laws would provide guidelines for how to apply bibliometrics in research for a librarian or student of library and information science.

i. Lotka's law of Scientific Productivity

From 1924 to 1933, Alfred J. Lotka, a mathematician, oversaw the mathematical research department of the Statistical Bureau of the Metropolitan Life Insurance Company. This period in 1926 saw the creation of the seminal piece that would later become known as Lotka's law, or "Author production" law. This legislation deals with how productivity is distributed across the scientific community. It demonstrates that there are significant production differences among scientists, as indicated by the quantity of publications, for instance. The frequency of publications by an author in a certain topic is described by Lotka's law. It was stated that those who made two contributions made up roughly one-fourth of those who made one, that those who made three contributions made up roughly one night, etc, The proportion of all contributors who make a single contribution is approximately higher and the number making "n" contributions is approximately $1/n^2$ of those making one. Few people have the ability to compose multiple articles. Only a small number of people attempt to write more than one piece, and as time goes on, the number of writers' falls.

ii. Bradford's Law of Scattering

This Bradford's law states that journals in a subject can be separated into three equal groups, each with around one-third of the article, so that the first group has a core of a small

number of journals, the second group has more journals, and the third zone has the majority of journals. The law establishes a ratio of 1: n: n² for the number of journals in each group.

Bradford's law of scatter is used to library administration as a rule of thumb for choosing journals. This strategy is particularly helpful in choosing journals, especially for interdisciplinary subjects like instrumentation, environment, science, and nutrition, among others. Purchasing all of the journals cited in a study is more expensive than subscribing to a few essential journals. This law lacks mathematical precision and is also an approximation. Bradford developed his law after reviewing 359 geophysical journals' worth of bibliographies. The following three groups were formed from them. (These should be seen as group data failing in the 501–600 range. As a result, it is a rough estimate. Even the law acknowledges it to be "approximately 1/3" The correct values for Expected Number (1:n:n²) were $10 \times 6 = 60$ and $10 \times 6 = 347$. However, as previously noted, the law is only used as a good approximation and is not statistically correct.

iii. Zipf's Law

According to this law, the likelihood that words or other things would appear starts out high and then decreases. The frequency of words in a text can frequently be predicted using Zipf's law. The words and, the, a, an, on, of, are always present in communication. etc. occur frequently in a text, whereas "measurable" is uncommon; as a result, these frequently occurring terms are removed from discussions of Zipf's law since, for example, CDS/ISIS is aware that such words are in the "stop words" file. Using the indexing technique, such a file is produced in CDS/ISIS. The relationship is described by the equation $r/f=k$,

Where r denotes word rank,

f denotes frequency, and

k denotes constant

Machine indexing makes extensive use of the Zipfian distribution of words and matching distribution of probability of occurrence. Even though Zipf's law is not statistically perfect, indexers find it to be quite helpful. There are more ideas that are essential to bibliometrics in addition to these laws. These include Immediacy Index (II), which measures the number of citations a journal has received this year compared to the number of articles it has published.

II= Number of citations a journal receives in the current

Number of articles published that year

The ratio of articles received in 2022 to those published in 2022 is the Immediacy Index for 2022.

Half-Life Reference The citation curve's half-life is an indicator of how quickly it is eroding.

Impact factor is a numerical indicator of how frequently an average article published in a certain scientific publication has been cited over the course of a year or other specified time.

Impact Factor (IF) has a significant, though debatable, impact on how scientific research that has been published is viewed or assessed. It measures the magnitude of the citation curve relative to the first and second years after publication.

IF = Total number of articles cited in two previous year

Total number of articles published in those same years

Impact Factor (IF) for 2022 therefore refers to citations made in 2022 to papers published in 2020 and 2021. Impact factor is affected by a number of variables.

1. The journal's topic.
2. The kind of journal (Letters, full papers, revises) there may be a better impact factor if there are more complete publications.
3. The typical number of authors per paper
4. Journal size
5. The measurement window's size (2 & 5 year)

How Bibliometric Laws are Applied in Library and Information Science

Aina (2013) notes that librarians have widely applied bibliometrics laws in journal selection, collection development, weeding and serials de-subscription. All of these actions are taken to reduce expenses while simultaneously giving users the most pertinent and valuable information. Bibliometrics are used to analyze vast amounts of bibliographic data using mathematical, statistical, and computer techniques Harve Rostaing (2003). The correlations, trends, and models that describe the development and creation of science and technology advances are found using bibliometrics.

When developing a library collection, databases, or information services, librarians will struggle to decide which content to include, in these situations, bibliometrics can offer a method for locating the core of a regional collection in such domains. Bibliometrics is an extremely valuable tool for planning the distribution of information even though librarians typically do not incorporate it into their daily work. The lack of bibliometric use can be attributed to a number of

factors. The results of bibliometric studies present a simplified view of a complex reality and must take into consideration numerous aspects in order to be effective in practice.

However, application of bibliometric laws and techniques offer chances to explain the content, organization, and progression of research as bibliometrics is becoming more significant as a foundation for the development of collection in research libraries. The rationale is that the discipline-based approach of organizing knowledge is getting out of date because scientists today organize themselves largely in networks.

The vast number of published articles that are accessible through networks provides excellent opportunities for bibliometrics application within the context of librarianship. Various bibliographic databases log hundreds of references to books from nearly every topic area every day. The study of science and scientists, information management, librarianship, the history of science, including science policy, and other aspects of the social sciences and scientists are only a few of the fields where bibliometrics' methodologies are widely applied.

The citation data also generates a list of highly referenced journals or books that can be used to decide whether to keep the library's collection or remove it. Bibliometric analysis can identify subject relationships that helps in recommending journal articles in a certain library that are pertinent to a given discipline.

Application of bibliometric is used to recognize users of various subjects, determine authorship and its patterns in texts on numerous topics, forecast past, present, and future publishing trends, to construct experimental models connecting or omitting the current ones. In determining the impact of a certain author, connections between authors, specifically

connections between authors and their works. A connection is made when one author quotes another.

It can also be used in identifying core periodicals in various disciplines create a precise need-based acquisition policy with the budgetary resources available thereby adopting a precise weeding and stacking policy and study scientific literature obsolescence and dispersion (clustering, coupling, etc.). Forecast the output of publishers, specific writers, businesses, nations, or an entire discipline. In understanding the web, webmetrics or cybermetrics has recently become a new development area in bibliometrics. Webmetrics is the use of bibliometric methods to analyze the connections between various websites on the Internet.

Numerous scientific disciplines have employed bibliometric analyses, for instance, Kamran et al. (2020) used a bibliometric study method to investigate block chain and the Internet of Things. A bibliometric technique was used by Miot et al. (2020) to analyze publications on Dermatology from 2009 to 2019. A bibliometric approach was used by El Mohadab et al. (2020) to map the COVID-19. They examined a number of variables, including the quantity of publications, the quantity of citations, and the geographical distribution of publishing. For their article on forty years of applied mathematical modeling, Verma et al. (2021) employed a bibliometric approach. The aim of their research was to identify the top writers, subjects, universities, and countries in that area.

CONCLUSION

Librarians now view bibliometric as a crucial component of the scholarly communication process. By developing their bibliometric analysis skills, librarians can gain knowledge that will

enable them to demonstrate their scholarly accomplishments and process. However, bibliometrics is increasingly being used by academic and research libraries to assess the evolution of their collection as a tool to assess the caliber of the collections housed in research or academic libraries is bibliometrics. When creating library collections, databases, or information services, librarians may find it challenging to decide which content to include, particularly when there is limited agreement among scientists about how to define the topic. When this occurs, bibliometrics can offer a method for locating the core of a local collection in those fields. It can even help librarians assess the value of their stock.

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