

# Structure and Functions of Citation Index

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## Abstract

The article explains the concept of citation, citation index and the process of citation indexing in the present environment. Various components of the citation index such as citation index and its sub-parts (anonymous and patent cited index), source index, permuterm subject index, corporate index along with its sub-parts (geographic and organization index) and journal citation report are explained in brief. Further the structure, working, arrangement of these components of citation index are explained in detail with necessary and self explanatory sample entries which gives a clear idea about all these aspects. Citing and cited half-life are calculated and derived for a journal to understand the functioning and value of half-life of a journal. Functions of citation index are discussed to understand the various applications of research indicators and research trends in the subjects.

**Keywords:** Citation Index, Source Index, Permuterm Subject Index, Corporate Index, Half-Life, Journal Citation Report

## 1. Introduction

Usage of research work of researcher always pays importance and value to the author and also to the work. Work in the form of article, patents and notes in the subject get its impact when it got cited in the literature of importance. Trace the citations in different publications involves constant perusal, which is rather difficult for an author. The mapping of citations in a subject and also in allied subjects is really very intricate work and the whole idea emerged as early as tool to visualize citation relationships and understand the meaning of a cited reference search in web of knowledge. The creation of reliable source in the area of science was carried by Eugene Garfield in the year 1964. The First publication of Science Citation Index published by ISI in 5 volumes [7]. Citation index later on started analysing relation between various components of citations such as its source of publication, authorship, author affiliations and places. The Journal Citation Reports included various indicators of research importance and later on it became tool for research output evaluation of a researcher and institution.

The international tool Citation Index by ISI now stated as authentic source of research evaluation. Though the coverage of Citation Index is international and exhaustive, even though research of some countries especially published in their national languages. Many countries made their efforts to create their own Citation Index and established their citation analysis centre as Bibliometric, Scientometric and Informetric centres.

When the era of information digitization escalates fast and emerging as Web Access information reshape the Citation Index into Web of Science. The Google Scholar and Scopus are also tracing the citations and related works in the subject. Web of Science is developed by ISI (Web of Knowledge) in the year 1900. Web of Science has a base of Citation Index of ISI, where one can have different

access options to get total citations of a research work and also various research indicators. Now the trend is progressive countries developing their country citation index both in printed as well as in web based system. There are three types of Citation indexes which includes Science Citation Index (SCI), Social Science Citation Index (SSCI) and Arts & Humanities Citation Index (A&HCI). The understanding of structure and functions of Citation Index helps in designing and creation of citation mapping, impact of research and research trends in the subjects.

## **2. Structure of Citation Index**

The layout of citation index includes various approaches which researchers need to find out the literature and its impact. It has different index components such as Citation, Source, Subject, organization and geographic distributions of literature in the research field. The most analytical approach in the literature includes the journal citation reports giving details about impact factor of publications in its various formats. Citation components are discussed as follows:

### **2.1 Citation Index**

Provides access to the network of the articles in the general form. It alphabetically lists the names of all the first authors whose works were cited during the period covered, and tells when and where those works were originally published. Citation index basically consists of authored cited items, anonymous cited items and patents cited [9].

#### **2.1.1 Citation Index (Author)**

Cited Articles are arranged by Author surname alphabetically and first author of a cited item appears only once in the citation index. Other bibliographic information of a cited item includes Year, Journal Title Abbreviation, Vol, and Start Page followed by bibliographic information of citing item includes the Source Author name, Journal Title, Vol, Page, Year and Code type of the Source item (Review, Note, Letter, Editorial, Meeting etc). Where two or more cited items are listed without interruption by any citing source item it means that they were each cited by the author(s) of the citing source item(s) that follow.

**Citation Sample (Author)**

<b>Abrahams E (Cited Author)</b> -----						
---						
<b>54</b>	<b>PHYS REV</b>	<b>95</b>	<b>839</b>			
(Yr	Journal Title	Vol	Start Page)			
	GOODNICK	SM	PHYS REV B	37	2578	88
	(Citing Author		Journal Abbreviation	Vol	Page	Year)
<b>68</b>	<b>PHYS LETT A</b>	<b>27</b>	<b>117</b>			
	QUADER	KF	PHYS REV B	N	38	1977
	(Citing Author		Jr Abbr	Code	Vol	Page
						88
<b>71</b>	<b>PHYSICA</b>	<b>55</b>	<b>230</b>			
	MARKIEWI	RS	PHYS REV B	37	9336	88
	SHINOZAK	B	J L TEMP PH	73	267	88
<b>88</b>	<b>PHYSICA C 153</b>	<b>1622</b>				
	FULDE	P	PHYSICA C	153	1769	88

**2.1.2 Citation Index (Anonymous)**

At the end covers works which is not having Personal Author (Anonymous), arranged alphabetically by the Journal Titles abbreviation of the Cited Publications and then chronologically. Within each year, cited items are arranged in order of volume and page. Citing items appears beneath the anonymous cited item and are arranged alphabetically by citing author. A unique abbreviation of a cited publication appears only once at the head of the list of reference citations. The reference item includes cited publication, volume, page and year [3].

**Sample Anonymous**

<b>ACI J</b>	<b>v83</b>	<b>1986</b>	<b>(Journal Abbreviation</b>		<b>Vol</b>	<b>Year)</b>
VIPULANA	C	CEM CONCR R	18	265	88	
(Citing Author		Journal Abbreviation	Vol	Page	Year)	

### 2.1.3 Citation Index (Patent Citation Index)

When a patent is cited in a source item the information is arranged in altered manner i.e. Patents are arranged chronologically with cited patent number in place of author's last name followed by Year, Inventor, Reference Application (Key Term), and issuing Country.

#### Sample Patent Citation

##### 512 231 (Reference Patent Number)

<b>1976</b> (Cited reference year)	<b>CHECHURA</b> reference inventor	<b>AA</b> reference application	<b>USSR</b> reference country)					
	GHILDYAL (Citing Author	NP Journal	ADV APPL MI Abbreviation	R Code	33 Vol	173 Page	88 Year)	

### 2.2 Source Index

It is comparable to the traditional author index. It gives an alphabetical listing of all authors and all papers published during the period covered by the Index. The Source Index is the best suited when the user knows the name of the author who published material important to user field of interest. It contains bibliographic information arranged under primary author's name which includes last word of the name of citing author of current year and also cited author of current year. Source items are arranged in alphabetic order by journal title abbreviation and then are stored in journal title by year and volume. Citing author/ cited author of current year has details of his paper such as Co- Authors, Language code of article (two letters) other than English, Journal Title of Article, Type of Article (Review, Letter, Note, Discussion, Meeting Abstract), Volume, Issue, pages (Start to End), Year, Total Number of References provided at the end of Article and Accession Number of the Journal. Citing Author (Author for Reprint/Contact) affiliation is listed with completed address. Source Index provides a complete bibliographic description of each article listed.

See Reference is also given, Where Source Item Author is appearing as second or next author, and entry is given in First Author name. First Author in source index also list second and other authors with full bibliographic details.

#### Sample Source Index

##### FULDE P (first source author)

· CURRENT THEORIES OF THE HIGH-TC SUPERCONDUCTING MATERIALS (article title)  
**P4101 (Journal Accession number)**

**PHYSICA C**                      **153(JUN):1769-177488**    **47R (number of references)**  
 (source journal)                      **(Vol Issue Pages Year)**

MAX PLANCK INST FESTKORPERFORSCH, D-7000 STUTTGART 80, FED REP GER (author's address)

**ABRAHAMS E (cross referenced secondary author)**

- CHARGE-TRANSFER IN THE HUBBARD-MODEL AND CU-O SUPERCONDUCTIVITY  
**P4101**

**PHYSICA C**                      **153(JUN):1622-162488**    **24R**

RUTGERS STATE UNIV. SERIN PHYS LAB, POB 849, PISCATAWAY, NJ 08854, USA

See JAGANNATH <sup>A</sup>                      PHYS REV B    37    436    88  
**(first source author)**

See QUADER                      KF    PHYS REV B    38    1977    88

**JAGANNATHAN**                      **A**

**ABRAHAMS E STEPHEN MJ (co-authors) – MAGNETIC EXCHANGE IN DISORDERED METALS**  
**L5894**

**PHYS REV B**                      **37(1):436-441**    **88**    **19R**

RUTGERS STATE UNIV. SERIN PHYS LAB, PISCATAWAY, NJ 08854, USA

### 2.3 Corporate Index

This index enables the user to get the information of authors' published work by their corporate, academic affiliation or by country. It also gives the information of the research done by particular organisation, institute or country. The Corporate Index is divided into three sections: - Location search, which gives the information on the basis of the location selected by the user, second is Country search that can be used to get the achievement and to know about the journals and papers developed by different countries across the world and Organisation search, which display the information of the organisation selected by the user. [2].

In Geographic section (Location and Country index) source items are arranged alphabetically by location (country and city) of the author's Organisation. Source item includes the name of Author, Journal, Volume, Page and Year. For US, name of states are given instead of country. States of the



not know earlier authors or relevant papers on a subject, then word or phrase commonly used in the titles of articles related to the search subject can be used to get information of all the authors who have used these words in their article. The searcher can, after finding the name of the author, use the Source Index or Citation Index to have full information of the authors and articles, volume and page. The Subject Index allows users to:- retrieve information on articles in his/her subject area even if the user only has one or two words to initiate the search;- identify authors publishing in his/her subject area;- locate articles on other subject areas related to his/her search topic.

Sample Permuterm Subject Index:

**HUBBARD-MODEL (Primary Term)**  
  !SINGH A (author)

**ALGORITHM-!** IMADA M  
  ! MORGENST I

**(Co- Terms)**           **ANTIFERROM!**WEI GZ

**BAND**—————! MEI CJ  
  —————! ZOTOS X

**BASIS**—————! FANTONI S

**CHARGE-TRA** ! ABRAHAMS E

## 2.5 Journal Citation Reports (JCR)

The JCR is unique source of citation data on journals which provides a new set of quantitative tools for ranking, evaluating, categorizing and comparing journals. JCR provides information about the largest, most frequently used hottest journals with high impact factor. It is difficult to find the mass of quantitative data that the JCR provides each year [4]. JCR offers the objective evidence of the optimum makeup of general and special journal collections (selecting and deselecting) as it gives good indication of a journal's overall use, it provides a starting point for true cost-benefit analysis in allocating acquisition funds.

JCR consists of six data listings which are named as Journal Rankings; Source Data Listing; Half -Life Listing; Subject Category Listings; Citing Journal Listing and Cited Journal Listing.

### 2.5.1 Journals Rankings

It consists of seven sections. First section is an alphabetical (abbreviated Journal Title) list of journals that are processed as source journals for the citation index. The next five sections consist of journals

ranked by Times Cited for All Years (2010), by Impact Factor, by Immediacy index, by Source Items published in Current Year and ranking by number of citations to previous two years articles in the references of Current Year Citation Index source journals.

**2.5.11 Section 1 – Journals in Alphabetical Order**

Journals are arranged alphabetically by abbreviated title. First column contains sequence number, second column contains journal title. The next four columns under the main heading citations in current year (e.g.1988 given below) to—contains total number of times the journal was cited by an individual citation index source items during 1988, portion of total citations accounted for by articles the journal published in previous year (e.g. 1987 given below), portion of total citations accounted for by articles the journal published in second previous year (e.g. 1986 given below) and sum of citations in both previous years (e.g.1987+1986). The next three columns under the main heading of source items gives the number of source items published by journal in previous year (i.e.1987), in second previous year (i.e. 1986) and in both years. The column contains the Impact Factor which is the ratio of citations (all journals current year citations of previous year and second previous year items published in journal X) to citable items (total number of source items published in previous year and second previous year by journal X) published. The next column shows the citations in current year and other column is of Immediacy Index (ratio of Current Year Citations to Current Year Source Items).

Sample for Journals in Alphabetical Order

SEQ	Journal Title	←CITATIONS IN 1988 TO →			←SOURCE ITEMS→			IMPACT FACTOR	CITATIONS IN 1988 to 1988 ITEMS	SOURCE ITEMS IN 1988	IMMEDIACY INDEX	
		All Years	1987	1986	87-86	1987	1986					87-86
62	ACTA HORTIC	795	32	154	186	0	0	0	---	---	---	
63	ACTA HYDROH-HYDROB	86	27	14	41	70	67	137	0.299	2	57	0.035

**Note:** In Journals Ranking, as section one contains the alphabetical listing of the cited journals with journal title abbreviation whereas from section 2-6, cited journals are arranged in descending numerical order of indicators in various columns as follow:

**2.5.12 Section 2- Journals Ranked by Times Cited in the Year (1988)**

Journals arranged by descending order of total citations of all the volumes of the journal so far received till the year (1988). The other information includes Impact Factor (Ratio of Citations to Citable items published) and Immediacy Index (Ratio of Current Year Citations to Current year Source items).

Sample for Journals in Ranked by Times Cited in the Year (1988)

RANK	Journal Title	←CITATIONS IN 1988 TO →				← SOURCE ITEMS →			IMPACT FACTOR	CITATIONS IN 1988 to 1988 ITEMS	SOURCE ITEMS IN 1988	SOURCE -ACY INDEX
		All Years	1987	1986	87-86	1987	1986	87-86				
1	JBiol Chem 172726	15482	19150	34632		2697	2638	5335	6.491	2966	2981	0.995
1465	Acta HortiC 795	32	154	186	0	0	0	0	---	---	---	---
3549	Acta Hydroch- Hydrob 86	27	14	41	70	67	137	0.299	2	57	0.035	

### 2. 5.13 Section 3- Journals Ranked by Impact Factor

Journals arranged according to descending order of Impact Factor. The highest impact factor is 48.313 followed by 29.412, 25.408, 24.212, 24.000 basically review type journals than 23.913 of Cell. The other information includes Immediacy Index.

Sample for Journals Ranked by Impact Factor

RANK	Journal Title	←CITATIONS IN 1988 TO →				← SOURCE ITEMS →			IMPACT FACTOR	CITATIONS IN 1988 to 1988 ITEMS	SOURCE ITEMS IN 1988	SOURCE -ACY INDEX
		All Years	1987	1986	87-86	1987	1986	87-86				
1	ANNU REV BIOCHEM 13298		1469	1768	3237	29	38	67	48.313	102	30	3.400
64	JBiol Chem 172726		15482	19150	34632	2697	2638	5335	6.491	2966	2981	0.995
2913	Acta Hydroch- Hydrob 86	27	14	41	70	67	137	0.299	2	57	0.035	
4233	Acta HortiC	795	32	154	186	0	0	0	---	0	---	---

### 2.5.14 Section 4- Journals Ranked by Immediacy Index

Journals are arranged in descending order of Immediacy Index. Immediacy Index is calculated by dividing Current Year Citations (1988) by Current Year Source Items (1988). Other Information includes Impact Factors with Citations and Source Items.

Sample for Journals Ranked by Immediacy Index

RANK	Journal Title	←CITATIONS IN 1988 TO →						←SOURCE ITEMS→			IMPACT FACTOR	CITATIONS IN 1988 to 1988 ITEMS	SOURCE ITEMS IN 1988	SOURCE -ACY INDEX
		All Years	1987	1986	87-86	1987	1986	87-86						
1	LANCET	67723	6293	7535	13828	464	491	955	14.480	2203	474	4.648		
8	ANNUREV BIOCHEM	13298	1469	1768	3237	29	38	67	48.313	101	30	3.400		
83	JBIOL CHEM	172726	15482	19150	34632	2697	2638	5335	6.491	2966	2981	0.995		
386	ACTA HYDROCH 86 HYDROB	27	14	41	70	67	137	0.299	2	2	57	0.035		
4020	ACTA HORTIC	795	32	154	186	0	0	0	--	--	0	--		

### 2.5.15 Section 5- Journals Ranked by Source Items

Journals are arranged by descending order of Current Year Source Items (1988). Other Information includes Impact Factor and Immediacy Index.

Sample for Journals Ranked by Source Items

RANK	Journal Title	←CITATIONS IN 1988 TO →						←SOURCE ITEMS→			IMPACT FACTOR	CITATIONS IN 1988 to 1988 ITEMS	SOURCE ITEMS IN 1988	SOURCE -ACY INDEX
		All Years	1987	1986	87-86	1987	1986	87-86						
1	FASEB J	15690	2383	1924	4307	9479	8769	18248	0.236	485	9353	0.052		
4	JBIOL CHEM	172726	15482	19150	34632	2697	2638	5335	6.491	2966	2981	0.995		
137	LANCET	67723	6293	7535	13828	464	491	955	14.480	2203	474	4.648		
2256	ACTA HYDR 86 HYDROB	27	14	41	70	67	137	0.299	2	2	57	0.035		
3189	ANNUREV 30 3.400 BIOCHEM	13298	1469	1768	3237	29	38	67	48.313	101	30	3.400		
4020	ACTA HORTIC	795	32	154	186	0	0	0	--	--	0	--		

### 2.5.16 Section 6- Journals Ranked by Times 1986 and 1987 Items were Cited in 1988

Journals are arranged in descending order of total citations in Year 1988. Other Information includes Impact Factor and Immediacy Index.

Sample for Journals Ranked by Times 1986 and 1987 Items were Cited in 1988

RANK IMMEDI	Journal Title	←CITATIONS IN 1988 TO →						←SOURCE ITEMS→			IMPACT FACTOR	CITATIONS IN 1988 to 1988 ITEMS	SOURCE -ACTY INDEX
		All Years	1987	1986	87-86	1987	1986	87-86					
1	P NATL ACAD SCI USA	16441	13364	39805	1915	2043	3968	10.032	2756	2037	1.353		
3	J BIOL CHEM	15487	19150	34632	2697	2638	5335	6.491	2966	2981	0.995		
11	LANCET	67723	6293	7535	13828	464	491	965	14.480	474	4.648		
58	FASEB J	15690	1383	1924	4307	9479	8709	18248	0.136	485	9.353	0.052	
82	ANNU REV	13298	1469	1768	3237	29	38	67	48.313	102	30	3.400	
1181	ACTA HORTIC	795	32	154	186	0	0	0	--	0	--	--	
1626	ACTA HYDR HYDRCS	86	27	14	41	70	67	137	0.299	2	57	0.035	

### 2.6 Source Data Listing

Journals are arranged alphabetically in column 1 along with Non-Review Articles in column 2 and Review Articles in the Journals in column 3 as Source Items. Other information contained under main heading of column 2 includes total number of non-review articles published (source items) in the journal in current year and total references contained in these articles and ratio of References to Source Items in non-review articles. Further other information contained under main heading of column 3 includes total number of review articles published (source items) in the journal in current year and total references contained in these articles and ratio of References to Source Items in review articles. The last column contains heading named as combined total non-review and review articles. This heading contains total number of articles (review and non-review) published in the journal in current year, total number of references contained in these articles and average number of references per article in current year [3].

Sample for Source Data Listing

REVIEW- JOURNAL NAME	← NON-REVIEW ARTICLES →			← REVIEW ARTICLES →			←COMBINED TOTAL NON- AND REVIEW→		
	SOURCE ITEMS(S)	REFERENCE ITEMS(R)	RATIO R/S	SOURCE ITEMS(S)	REFERENCE ITEMS(R)	RATIO R/S	SOURCE ITEMS(S)	REFERENCE ITEMS(R)	RATIO R/S
ANNU REV BIOCHEM	0	0	0	30	6442	214.7	30	6442	214.7
FASEB J	77	2128	27.6	39	1735	44.4	116	3863	33.3
J BIOL CHEM	2953	112237	38.0	28	1403	50.1	2981	113640	38.1
LANCET	473	9613	20.3	1	56	56.0	474	9646	20.3
P NATL ACAD SCI USA	14	900	37.5	0	0	.0	54	959	17.7

## 2.7 Journal Half-Life Listing

The number of Journal publication years going back from the current year which account for 50% of the total citations received by the cited journal in the current year. Let us understand the concept by taking an example and calculating the half life (Citing and Cited both) of a journal.

e.g. Let us first calculate the Citing Half Life of a Journal named as Acustica

>10.0 Acustica 0.96, 3.47, 8.93, 14.10, 18.68, 23.92, 29.17, 33.82, 38.47, 42.31

Citing Journals are arranged alphabetically along with number of times the journal was cited in the current year from cited journals started with individual 1988 back to 1979 ( Past Ten Years) and also cited earlier to 1979 (Rest) and Total Cited (1988->1979->). The Citing Half-Life of the journal is also given as prefix to the Journal.

Calculating Citing Half-Life of the Journal-

Citing Journal	Total	1988	87	86	85	84	83	82	81	80	79	Rest
Acustica	1354	13	34	74	70	62	71	71	63	63	52	781

Cumulative Citations {13- 47-121-191-253-324-395-458-521-573} = **573**

Total Citations (1354) is equal to 100%

Tenth Year (1979) Cumulative Citations (573) will be % =  $(100/1354) \times 573$

$$= 42.31\%$$

Nineth Year (1980) Cumulative Citation (521) will be % =  $(100/1354) \times 521$

$$= 38.47\%$$

Likewise, we can calculate cumulative citation % for all other years.

From the above calculation,

For Past Ten Years Cumulative % of Citations are {0.96-3.47-8.93-14.10-18.68-23.92-29.17-33.82-38.47- 42.31}

Therefore, When the Citation reaches Half i.e. 50% or more that year is considered as Half-Life Year, in this case it has not reached even in tenth year (42.31) therefore this Journal (Acustica) has Citing Half-Life >10 (Greater than Ten).

Now, let us calculate the Cited Half Life of a Journal named as Acustica as followed:

>10.0 Acustica 1.82, 4.30, 11.91, 17.38, 22.84, 24.83, 28.97, 35.59, 40.22, 42.38

Cited Journals are arranged alphabetically along with number of times the journal was citing in the current year from citing journals started with individual 1988 to 1979 (Ten Years) and also citing earlier to 1979 (Rest) and Total Cited (1988->1979->). The Cited Half-Life of the journal is also given as prefix to the Journal.

Method of Calculating Cited Half-Life of the Journal-

Cited Journal	Total	1988	87	86	85	84	83	82	81	80	79	Rest
Acustica	<b>604</b>	11	15	46	33	33	12	25	40	28	13	<b>348</b>

Cum. Citations for Ten Years {11-26-72-105-138-150-175-215-243-256} = **256**

Total Citations (604) is equal to 100%

Tenth Year (1979) Cumulative Citations (256) will be % =  $(100/604) \times 256$   
= 42.38%

Ninth Year (1980) Cumulative Citations (243) will be % =  $(100/604) \times 243$   
= 40.22%

Likewise, we can calculate cumulative citation % for all other years.

From the above calculation,

For Past Ten Years Cumulative % of Citations are {1.82, 4.30, 11.91, 17.38, 22.84, 24.83, 28.97, 35.59, 40.22, 42.38}

Therefore, When the Citation reaches Half i.e. 50% or more that year is considered as Half-Life Year, in this case it has not reached even in tenth year (42.38) therefore this Journal (Acustica) has Cited Half-Life >10 (Greater than Ten).

Further, the half-life listing is divided into three parts: Cumulative Chronological Distribution of Citations from Citing Journals, Cumulative Chronological Distribution of Citations from Cited Journals and Journals Ranked by Cited Half-Life whose structures are discussed below.

### **2.7.1 Section 1- Cumulative Chronological Distribution of Citations from Citing Journals**

Citing Journals are arranged alphabetically prefix with Citing Half-Life. Other information includes cumulative percentage of citations received from current year journals to articles published during current year to past ten years.

Sample for Cumulative Chronological Distribution of Citations from Citing Journals

**1988 Chronological Distribution of Citations from Citing Journals**

**Cumulative % of Citations from 1988 Journals to Articles Published During Years Indicated**

CITING LIFE	CITING JOURNAL	1988	87	86	85	84	83	82	81	80	79	HALF-
4.3	ANNU REV	0.46	16.31	32.30	45.98	56.77	65.23	71.93	77.47	81.31	84.19	BIOCHEM
3.2	FASEB J	3.69	29.63	47.59	59.14	66.95	72.80	77.54	81.30		83.62	85.57
5.0	JBIOL CHEM	2.27	14.17	27.70	39.48	49.22	57.55	64.68	70.03	74.61	78.50	
3.6	LANCET	13.34	31.19	43.95	53.47	60.80	66.86	71.35	75.10		78.28	80.89
>10.0	PNATACAD	1.03	3.44	8.61	11.93	15.38	18.25	23.18	27.43	31.22	35.24	SCI PHILA

In the above sample citing journals are alphabetically arranged and shows the cumulative percentage of citations given by citing journal in 1988 to articles published during each year going back to 1979. Each column right to the journal title shows the publication year from 1988 back to 1977 and under each year percentage of citations given by citing journals to articles published during those past ten years is given.

**2.7.2 Section 2- Cumulative Chronological Distribution of Citations from Cited Journals**

Cited Journals are arranged alphabetically prefix with Cited Half-Life. Other information includes cumulative percentage of citations received from current year journals to articles published during current year to previous year.

Sample for Cumulative Chronological Distribution of Citations from Cited Journals

**1988 Chronological Distribution Of Citations From Cited Journals**

**Cumulative % Of Citations From 1988 Journals To Articles Published During Years Indicated**

CITING JOURNAL	CITING	1988	87	86	85	84	83	82	81	80	79	HALF-LIFE
5.4	ANNU REV	0.76	11.81	25.10	37.56	46.04	54.52	61.17	69.56	75.78	81.92	BIOCHEM
5.0	FASEB J	3.09	18.27	30.54	41.66	49.47	56.45	61.95	69.56	70.58		73.96
6.2	JBIOL CHEM	1.71	10.68	21.76	31.79	40.40	47.89	55.17	60.41	64.63	68.59	
5.9	LANCET	3.25	12.54	23.67	34.24	42.80	50.46	56.42	62.14	66.19		69.78
>10.0	P NAT ACAD	1.21	2.03	5.69	11.38	13.00	13.41	15.03	15.44	17.47	18.70	SCI PHILA

In the above sample, cited journals are alphabetically arranged and show the cumulative percentage of citations given by cited journal in 1988 to articles published during each year going back to 1979. Each column right to the journal title shows the publication year from 1988 back to 1977 and under each year percentage of citations given by cited journals to articles published during those past ten years is given.

### 2.7.3 Section 3- Journals Ranked by Cited Half-Life

Journals are ranked in ascending order of Cited Half-Life.

Sample Entry for Journals Ranked by Cited Half-Life:

#### 1988 JOURNALS RANKED BY CITED HALF-LIFE

RANK	JOURNAL TITLE	CITED HALF-LIFE
1	NEURON	.5
2	PHYSICA C	.6
3	SCIENTIST	.7
956	FASEB J	5.0
1135	ANNU REV BIOCHEM	5.4
1418	LANCET	5.9
1572	J BIO CHEM	6.2
2863	P NAT ACAD SCI PHILA	>10.0

## 2.8 Subject Category Listing

It enables the users to analyze the journal citation data within specific subject categories. It helps to make a distinction between the overall rank of a journal and its rank within the subject category. It contains two sections Journals by Category Ranked by Impact Factor and another is Journal Category Listing.

### 2.8.1 Section 1- Journals by Category Ranked by Impact Factor

Source journals by Subject Category are arranged alphabetically in accordance with descending impact factor along with Cited Half-Life.

Sample Entry

RANK	TITLE	IMPACT FACTOR	CITED HALF-LIFE
ACOUSTICS			
1	ULTRASOUND MED BIOL	2.117	4.2
2	HEARING RES	1.948	4.0
.			
.			
AEROSPACE ENGINEERING & TECHNOLOGY			
1	AIAA J	0.461	9.9
2	J SPACECRAFT ROCKETS	0.359	5.8
3	IEEE T AERO ELEC SYS	0.331	8.3
.			
.			
And so on...			

### 2.8.2 Section 2- Journal Category Listing

Source Journals are arranged alphabetically along with their corresponding subject category.

Sample Entry

JOURNAL TITLE & CATEGORY

ACTA HYDROCH HYDROB

MARINE & FRESHWATER BIOLOGY

J BIOL CHEM

BIOCHEMISTRY & MOLECULAR BIOLOGY

LANCET

MEDICINE, GENERAL & INTERNAL

### 2.9 Citing Journal Listing

Here one can find what journals a particular journal has cited, and a distribution by year of the publication dates of the cited material. Citing journals are arranged alphabetically followed by Cited Journals in descending order of their citations along with their Impact Factors. Citations for past ten years are listed along with citing and cited journals.

Sample Entry

IF	CITING JOURNAL CITED JOURNAL	NUMBER OF TIMES THIS YEAR WAS CITED IN 1988											
		TOTAL	1988	87	86	85	84	83	82	81	80	79	REST
.26	ACUSTICA	1354	13	34	74	70	62	71	71	63	63	62	781
	1.18 J ACOUST SOC AM	228	0	2	11	11	6	8	8	13	11	9	149
	.26 ACUSTICA	167	10	10	16	13	13	2	9	9	11	4	70
	.58 J SOUND VIB	30	0	0	3	1	1	2	1	4	0	0	18
	3.58 J CHEM PHYS	21	0	0	0	0	0	0	0	0	0	0	21
	.11 INDIAN J PURE AP PHY	20	0	0	0	0	2	3	2	2	1	5	10
	3.13 J PHYS CHEM-US	18	0	0	0	1	1	0	0	0	1	0	15
	IEEE T SON ULTRA SOUND	15	0		0	0	0	1	0	3	0	0	3
	ACOUSTICS LETT	14	0	0	3	1	3	2	0	0	3	1	1
	J ACOUST SOC INDIA	13	0	1	0	1	1	0	1	3	1	1	4
	1.03 J CHEM THERMODYN	12	0	1	2	0	1	1	0	0	0	0	7
	ALL OTHER (502)	682	3	18	34	41	26	49	40	24	23	29	395

## 2.10 Cited Journal Listing

Here one can find what journals have cited a particular journal, and a distribution by year of the publication dates of the cited material. Cited Journals are arranged alphabetically followed by Citing Journals in descending order of their citations along with their Impact Factors. Citations for last ten years are listed along with cited and citing journals.

Sample Entry

IF	CITED JOURNAL CITING JOURNAL	TOTAL	NUMBER OF TIMES THIS YEAR WAS CITED IN 1988										REST
			1988	87	86	85	84	83	82	81	80	79	
.26	ACUSTICA	604	11	15	46	33	33	12	25	40	28	13	348
	.26 ACUSTICA	167	10	10	16	13	13	2	9	9	11	4	70
	1.18 J ACOUST SOC AM	145	0	0	8	8	7	2	6	16	5	2	91
	.58 J SOUND VIB	40	0	2	3	0	1	1	2	3	4	1	23
	ALL OTHER (98)	150	1	1	9	7	9	5	6	5	6	2	99

## 3. Functions of Citation Index

**3.1 To determine the Latest Areas of Research in the Field:** Citation index helps to detect emerging knowledge domains also known as research fronts, by analyzing the citation network of scientific publications. Knowledge domains are detected through bibliometric indicators which are time-based indicators, immediacy index [10].

**3.2 To know Authtor Ranking in a Subject:** Citation index provides various indicators to evaluate the standing/ranking of individual scientists/author (in terms of publications), institutions/ departments (quantification of production). Authors are ranked based on their publications to know about high impact authors. Other rankings are also widely used i.e. number of publications, weighted or not by the impact factor, by the number of authors, or by the number of citations.

**3.3 To find out Journal Ranking :** Citation analysis provides information about the development of a journal over time. Through citation analysis, citation index helps to know about what articles, themes, and topics were being published, cited, or ignored and also offers unique insight into the direction of not only a particular journal, but also the discipline in which it exists and provides data on historical trends, immediacy index, cited half-life of journals etc. for study [8].

**3.4 To determine the Institutional Ranking:** Citation index helps in finding highest impact of the Institute in a Group of Institutions, and also the high impact institutions in a field at International Level. Finding Research Output Index of an Organisation.

**3.5 To know Author Affiliation:** Citation index also provides the affiliations of the authors contributing in International Journals.

**3.6 To determine Types of Citations:** Citation analysis helps to know the Journal Impact Factor (JIF), Author Self- Citation (ASC) i.e. number of times an author cites herself / himself, and Journal Self-Citation (JSC) i.e. number of times the journal cites itself, which forms a portion of total citations. Various citation indexes provide quantitative indicators for publications in English language, so those scientific journals in different countries that publish in national languages have less chance to be evaluated based on bibliometric indicator and impact of a certain research is determined by the frequency of citations it receives as impact factor. Journals with high impact factors demonstrate research findings with high impact in a scientific area. Impact factor as a quantitative tool assessed the quality of a journal through citations to articles. Out of total citations to a journal, a portion belongs to self-citation. Self-citation is treated in two ways which includes journal self citation and author self-citation. It provides Journal ranking based on citation data and also evaluate their relative importance [5].

**3.7 To know the Total Citation of a Paper:** Citation index mention predecessors' works in scientific papers which is an obligatory norm for a scientific publication and it forms the basis for the scientometric citation index method. Citation Index is an interdisciplinary database that contains bibliographic data in natural and technical sciences, art and humanities and in social sciences. Its unique property is that it provides information not only about papers published in various periodicals, but also about citations of these papers i.e. it helps to find out how many times a papers have been cited [1].

#### 4. Conclusions

Citation Index is a complete solution to scientific literature search and at present it is available online with data search and has a wider acceptance through Web of Science. It is a bibliographic database which has a software package that calculates the impact factor of the selected journals. Online version enables searchers to locate recent articles which cite earlier published work and saves time and money by eliminating the need to acquire and search discipline-oriented indexes. Citation index for specific language is needed to be constructed. Evaluation of the work of any scientist and of the journals covering specific areas of science is possible through Citation Index by distilling the credits with the established norms. Citation index needs to be upgraded from time-to time by creating and designing it for specific subject using latest technology and manual efforts.

#### References

1. Berezkin V G, Sidorenko N A, and Arkhipov D B. (2007). How We Are Cited: Russian Analytical Chemistry in the Mirror of the Science Citation Index (1991–2004). *Journal of Analytical Chemistry*, 62(1), 90-99.
2. Bhushan Bharat and Banwari Lal. (1991). Indian Science Citation Index: a strategy. *Program*, 25(1), 59 – 67.

3. E. GARFIELD, 1988 Citation Index; an international interdisciplinary index to the literature of science, medicine, agriculture, technology and the behavioral sciences, Institute for Scientific Information, Philadelphia, 1988.
4. E. GARFIELD, 1993 SCI Journal Citation Reports; a bibliometric analysis of science journals in the ISI database, Institute for Scientific Information, Philadelphia, 1994.
5. Ghane M. R. Self-Citation in PJCR's Engineering Journals and their Significance in Determining Impact Factor during 2002-2006. *International Journal of Information Science and Management*. 21-37
6. Marchant Thierry. (2009). Score-Based Bibliometric Rankings of Authors. *Journal of the American Society for Information Science and Technology*, 60(6):1132–1137.
7. Norman Jeremy. From Cave Paintings to the Internet: A Chronological & Thematic Database on the History of Information and Media. Available at <http://www.historyofscience.com/G2I/timeline/index.php?id=1040> (accessed on 31/12/2010)
8. Smith Derek R. (2009). A 30-Year Citation Analysis of Bibliometric Trends at the Archives of Environmental Health, 1975–2004. *Archives of Environmental & Occupational Health*, 64(1), 43-54.
9. University of Texas Libraries. Using Citation Indexes. Available at <http://www.lib.utexas.edu/chem/info/citations.html> (accessed on 5/12/2010)
10. Yuya Naoki Shibata, Takeda Yoshiyuki Kajikawa, and Matsushima Katsumori. Comparative Study on Methods of Detecting Research Fronts Using Different Types of Citation. (2009). *Journal of the American Society for Information Science and Technology*, 60(3), 571–580.

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