MAINTENANCE OF PERIODICALS COLLECTION: A STATISTICAL CASE STUDY

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Results of a study carried out to ascertain the active life of periodicals in structural engineering after taking into consideration the aging factor, obsolescence factor, half life, mean life and utility factor on the basis of citations in periodicals are presented in this paper. The periodical, 'Journal of the Structural Division' of the American Society of Civil Engineers, New York, 1974 has been taken for the study. The paper concludes that the periodicals in structural engineering lose their utility value after 8 years (approx.) of their publication.

INTRODUCTION

Periodical is a generally accepted term that denotes a publication of which each volume is made up of distinct and independent contributions, not forming a continuous exposition normally by two or more personal authors and normally the specific subjects and the authors of the contributions in successive volumes also being in general, different, but all the subjects falling within one and the same region of knowledge, contemplated to be brought within its purview. It is not usually released complete as a volume but only in fascicules or numbers, as they are called. It essentially expounds the knowledge and does not repeat the same kind of information, usually in the same pattern, in each of its volumes just bringing the information up-to-date from volume to volume [11].

The importance of the periodical publications increases as the necessity for going deep, pinpointed and uptodate knowledge increases. These publications are the life and blood of a research scholar. The library staff has multifocal problems in maintaining these publications. The users may require at one instance a very old periodical and on the other hand a recent one. The laws of Library Science call for the satisfaction of the users, and side by side a caution to keep the library collection under control.

In both the cases (contradictory to each other apparently)the library has to frame such a policy that may justify each of the addition or deletion (withdrawal or rejection). Apart from the space requirements for the accumulated collection that goes on increasing every year, the library has to justify for the expenditures on preparatory expenses (binding, treating it against insects, damp, or fire), maintenances(dusting, handling, etc.). In case a reproduction is suggested, the reproduction cost and handling expenses are to be justified. Meeting out the demand of the majority of the users the library has to come at certain decisions to frame the library maintenance policy. The statistical principles may be applied to solve this problem and help in reaching certain agreeable decisions. Bradford's Law of Dispersion has been applied by Brooks and others in various subject fields to ascertain the maximum life of a periodical being used actively in a library [1-10]

SCOPE AND OBJECTIVE

The study was aimed at suggesting a way for the maintenance of periodicals in structural engineering on the basis of their active life that was calculated after ascertaining aging factor, obsolescence factor, half life, mean life and utility factors on the basis of citations in periodicals. The study is helpful in maintaining the periodicals (back volumes) to a period of their active use economically. After the active life the back volume may be weeded out for a least loss to their potential users.

METHODOLOGY

The most helpful method in the determination of the life of a document, periodicals in particular, is the analysis of its citations over a span of time. The analysis is done using the statistical method of collection of data and applying distribution pattern as devised by Brooks and Line [1,8]. The methodology used here for the analysis is similar to the studies already carried out by Ravichandra Rao in the field of Radio Engineering and Sociology [9, 10].

SOURCE

The data for the analysis have been collected from the periodical 'Journal of the Structural Division, American Society of Civil Engineers, Vol. 100, 1974'.

ANALYSIS

The field of Engineering, that too Structural Engineering, is a fast growing subject and was recognised during the late 19th century as a basic discipline, and hence most of the authors came into the field during 1900-1930s. Their basic works are often referred to, but as it is growing at a fast rate and new theories are formed updating the old obsolete theories, the study here reveals that there are very little chances to refer far back.

PATTERN OF DISTRIBUTION

The data collected for the study revealed that the citations were referred back upto 1930.

Frequency Polygon: Actual frequency polygon has been drawn to show the citation number at a glance (See Fig. 1).

Semi-logarithmic Curve: The logarithmic curve was drawn using the cumulative frequencies of citations (See Fig. 2).

Data: The data on years, citations and cumulative frequencies are given in Table 1.

ANNUAL AGING FACTOR

The annual aging factor (a) has been calculated graphically using the procedure suggested by Brooks [4, 5]. Figure 2 gives the semilogarithmic curve for the data, 1930 to 1974 for Journal of the Structural Division, American Society of Civil Engineers, Vol. 100, 1974. The straight line AB drawn parallel to the linearity of the plotted graph is the semilogarithmic graph of $T(t) = at$. $T(t)$ is the citation tail - that is, the cumulative frequency of the articles cited to the tth year.

where $t = 1$, $T(1) = a$

The annual aging factor can be estimated from this relation where 'a' is the annual aging factor and 't' is the period in years.

The relationship between citationship tail and year is given by

$T(t) = a^t$ when $t = 0$ $T(0) = 1$
$t = 1$ $T(1) = a$

the value of 'a' determined from the graph, in Fig. 2, is

$T(1) = a = 0.89$

Now for $t = 20$, $T(20) = a^{20}$

From Fig. 2 the value of $T(20) = .066$, so

$$a^{20} = .066$$
$$\log a = 1/20 \log .066$$

This gives Annual aging factor (a) = 0.873 (i)

OBSOLESCENCE FACTOR

The obsolescence factor (α) has been calculated following the procedure suggested by Line [8] from the relation

$$\alpha = (0.5)\, 1/m \qquad \text{(ii)}$$

where 'm' is the mean life

MEAN LIFE

The mean life (m) of the distribution can be obtained from the annual aging factor (a) using the following relationship

$$1/m = \log_e 1/a$$
$$1/m = \log_e 1/0.873$$
$$= \log_e 1.45 = 0.1354$$
$$m = 7.407$$

Substituting the value of the 'm' in Eq. (ii) we get

$$\alpha = (0.5)\, 1/7.4$$
$$\text{Log}_\alpha = 1/7.4 \quad \log (.5)$$
$$= \frac{\bar{1}.6990}{7.4}$$
$$= \bar{1}.9593$$
$$\alpha = .91$$

HALF LIFE

Line [8] has defined half life (h) and it can be determined from the graph such that the relation $a^h = 1/2$ will hold good.

$\therefore$ From Equation (i) $(0.873)^h = 0.5$

$$h = \frac{\log 0.5}{\log 0.873} = \frac{\bar{1}.6990}{\bar{1}.9410}$$
$$= \frac{(-.301)}{(-.059)} = \frac{301}{59}$$
$$= 5.1 \qquad \text{(v)}$$

Half life = 5.1 years

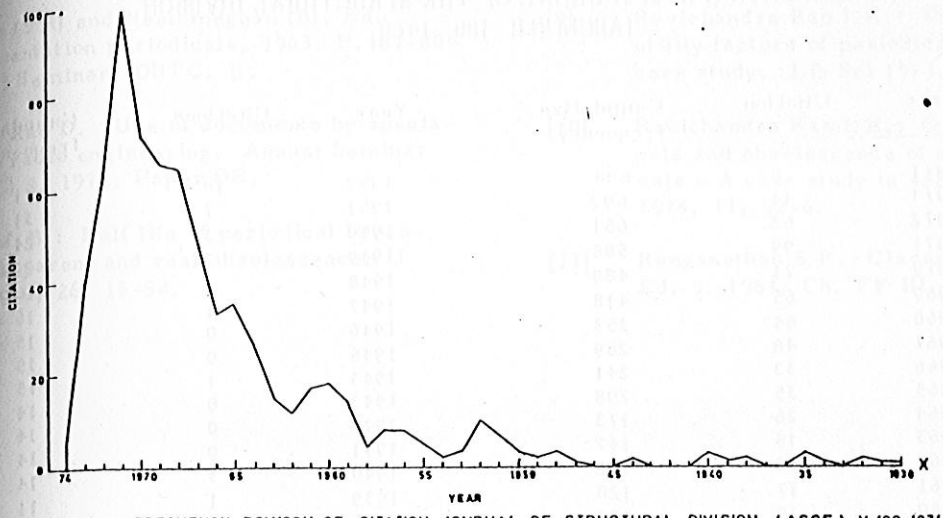

FIG. 1 FREQUENCY POLYGON OF CITATION JOURNAL OF STRUCTURAL DIVISION (ASCE) V 100,1974

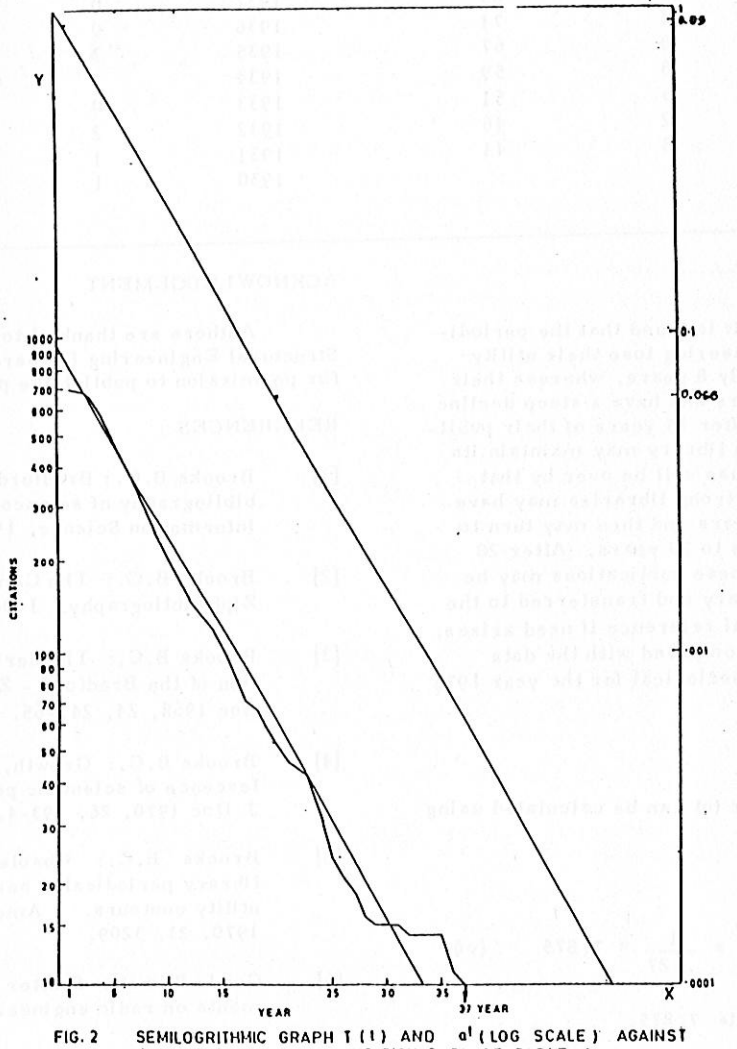

FIG. 2 SEMILOGRITHMIC GRAPH T(1) AND a^1 (LOG SCALE) AGAINST 1 (LINEAR SCALE) FOR CITATION DATA OF TABLE 1

CITATION DATA (FROM JOURNAL OF THE STRUCTURAL DIVISION (ASCE) (ST) 100, 1974)

Year	Citation	Cumulative frequency	Year	Citations	Cumulative frequency
1974	6	698	1952	10	41
1973	41	692	1951	7	31
1972	63	651	1950	3	24
1971	99	588	1949	2	21
1970	71	489	1948	3	10
1969	65	418	1947	1	16
1968	64	353	1946	0	15
1967	48	289	1945	0	15
1966	33	241	1944	1	15
1965	35	208	1943	0	14
1964	26	173	1942	0	14
1963	15	147	1941	0	14
1962	12	132	1940	3	14
1961	17	120	1939	1	11
1960	18	103	1938	2	10
1959	14	85	1937	0	8
1958	4	71	1936	0	8
1957	8	67	1935	3	8
1956	8	59	1934	1	5
1955	5	51	1933	0	4
1954	2	46	1932	2	4
1953	3	44	1931	1	2
			1930	1	1

CONCLUSIONS

From the study it is found that the periodicals on Structural Engineering lose their utility value after approximately 8 years, whereas their half life comes to 6 years and have a steep decline towards obsolescence after 15 years of their publication. Upto 15 years a library may maintain its bound volumes (90% of use will be over by that time). Economically, strong libraries may have bound volumes upto 8 years and then may turn to microform from 8 years to 20 years. After 20 years (after 97% use) these publications may be withdrawn from the library and transferred to the dormitory for occasional reference if need arises. The results have been compared with the data collected for the same periodical for the year 1976 and found correct.

UTILITY FACTOR

The utility factor (u) can be calculated using the relationship

$$u = \frac{1}{1 - a}$$

$$u = \frac{1}{1 - 0.873} = \frac{1}{.127} = 7.875 \qquad (vi)$$

So utility factor is 7.875.

ACKNOWLEDGEMENT

Authors are thankful to the Director, Structural Engineering Research Centre, Roorkee, for permission to publish the paper.

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