Cancer Research Literature, 2009-2013: An Obsolescence Study

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Abstract:

The research study focuses on obsolescence of research literature in CA: A Cancer Journal for Clinicians is analyzed. Based on the analysis, we propose a method that can be used to estimate the risk of obsolescence research literature. The data based on citations appended to the papers published in CA: A Cancer Journal for Clinicians which is being published from 2009 to 2013 for a period of 5 years collected. The method uses demand data as main information source, and can therefore be applied without the use of an expert's opinion. We will give numerical values for the risk of obsolescence obtained with the method, and the effects of these values on inventory control will be examined. It's found that value of the mean is 25.98 and the variance 24.57. The percentage of error is 7.27. The percentage error is insignificant; hence the distribution pattern of citation follows a negative exponential of the distribution. Finally it is evident that some material in libraries becomes out of date as time progresses.

Keywords: Obsolescence; CA: A Cancer Journal for Clinicians; Half-life.

Introduction:

Cancer is the general name for a group of more than 100 diseases. Even though there are many kinds of cancer, all cancers start because abnormal cells grow out of control. Untreated cancers can cause serious illness and death (ACS, 2016). The growth in our knowledge of cancer biology has led to remarkable progress in cancer prevention, early detection, and treatment. Scientists have learned more about cancer in the last 2 decades than had been learned in all the centuries preceding. This doesn't change the fact, however, that all scientific knowledge is based on the knowledge already acquired by the hard work and discovery of our predecessors – and we know that there's still a lot more to learn (ACS, 2016).

Obsolescence is the state of being which occurs an object, service, or practice is no long time wanted even though it may still be in good working order. Obsolescence frequently occurs because a replacement has become available that has, in sum, more advantages than the inconvenience related to repurchasing the replacement obsolete refers to something that is already disused or discarded, or antiquated (Fowler HW & Fowler FG, 1995). How long does the information in research article remain current? How old can a document be before it is likely to be judged out of date? In the bibliometric, obsolescence studies attempt to answer these questions by measuring the amount of "usage" that a document receives after it is published (Silly Jo Cunningham & David Bocok, 1995).

The Oxford English Dictionary defines the adjective 'obsolete' as 'no longer used or practiced; outmoded, out of date', or 'worn away, effaced, eroded; worn out, dilapidated; atrophied', and the noun 'obsolescence' as 'the process or fact of becoming obsolete or outdated, or of falling into disuse', or more specifically 'the process whereby or state at which machinery, consumer goods, etc., become obsolete as a result of technological advances, changes in demand, etc. (OED, 2010).

Objectives of the Study:

- To know the literature of cancer clinicians;
- To chronological distribution of journal citations;
- To calculation of obsolescence rate and in order to get the accurate results;
- To test the exponentiality of citation frequency and
- To determine the half-life of journal citations

Methodology:

'CA: A Cancer Journal for Clinicians' journal has used for obsolescence study and related data has been retrieved from Wiley Online Library, Wiley. The data based on citations appended to the papers published in CA: A Cancer Journal for Clinicians which is being published from 2009 to 2013 for a period of 5 years collected from online. All the issues of the journal from 2009-2013 were examined; the data relating to all the references appended to the articles during the period have been collected and tabulated. For calculation of obsolescence rate and in order to get the accurate results we used the graphical method as suggested by

Ravichandra Rao and meera. The study expose the critical discusses on graphical technique of measuring obsolescence that obviate numerical calculation and graphical technique, apart from the fact that it saves much calculation, is that the plotted point demonstrate any deviation from the expected linearity.

Review of Literature:

Many studies have been conducted on the obsolescence of literature in various subjects. Some of the recent studies are; Gupta (1984) analyzed the obsole-scence factors and patterns in periodical literature of exploration geophysics, and determined that the half-life was 9.4 years. S.L.Sangam (1989) analyzed the citations in doctoral theses in economics and found that the half-life of cited journals and books was 9.47 years and 15.7 years respectively. Gupta (1990). Literature and the density of citations to Physical Review articles were found to decrease exponentially with a half-life of 4.9 years. Mahendra & Deshmukh (1986) found that the obsolescence of library and information science literature based on the citations from articles published in Annals of Library Science & Documentation and found that the half-life was 8 and 12 years for journals and books respectively.

Year	Age X	No. of Citations f(X)	Cumulative xf (x)	Tail	Percentage of Citations Xf (X)	Cumulative % of Citations
2014	0	0	0	0	0	0
2013	1	14	14	133376	0.273	0.273
2012	2	150	164	133362	2.923	3.196
2011	3	218	382	133198	4.248	7.443
2010	4	423	805	132816	8.242	15.686
2009	5	588	1393	132011	11.458	27.143
2008	6	544	1937	130618	10.600	37.744
2007	7	504	2441	128681	9.821	47.564
2006	8	446	2887	126240	8.691	56.255
2005	9	387	3274	123353	7.541	63.796
2004	10	309	3583	120079	6.021	69.817
2003	11	289	3872	116496	5.631	75.448
2002	12	242	4114	112624	4.716	80.164
2001	13	192	4306	108510	3.741	83.905
2000	14	187	4493	104204	3.644	87.549
1999	15	116	4609	99711	2.260	89.809
1998	16	94	4703	95102	1.832	91.641
1997	17	74	4777	90399	1.442	93.083
1996	18	59	4836	85622	1.150	94.232
1995	19	41	4877	80786	0.799	95.031
1994	20	37	4914	75909	0.721	95.752
1993	21	37	4951	70995	0.721	96.473
1992	22	39	4990	66044	0.760	97.233
1991	23	27	5017	61054	0.526	97.759
1990	24	19	5036	56037	0.370	98.129
1989	25	22	5058	51001	0.429	98.558
1988	26	13	5071	45943	0.253	98.811
1987	27	10	5081	40872	0.195	99.006

1986	28	10	5091	35791	0.195	99.201
1985	29	9	5100	30700	0.175	99.376
1984	30	7	5107	25600	0.136	99.513
1983	31	9	5116	20493	0.175	99.688
1982	32	5	5121	15377	0.097	99.786
1981	33	3	5124	10256	0.058	99.844
1980	34	8	5132	5132	0.156	100.000
	N=35	5132	133376		100.000	

Table-1: Age wise distribution of citations

The above table shows that the analysis of citations. 5132 citations were retrieved by the CA: A Cancer Journal for Clinicians of 2014. Of all citations 2887 or 56.26 percent were received for the publications of cash 8 years; only 27.14 percent of citations were received for the publication of first 5 year; 89.80 percent for the 1.5 decades; 99.51 percent for the 3 decades and remaining 0.49 percent for the decade and older documents. It reveals that in Medicine, the researcher prefers the current information than retrospective.

Table- 2: Citation data of obsolescence estimated cumulative frequency percent

Year	Age of citation x	No of citations f	Xf (x)	$x^2f(x)$	Observed Cumulative % of Citation	Estimated	D
2014	0	0	0	0	0	0	0
2013	1	14	14	14	0.273	0.038	0.235
2012	2	150	300	600	3.196	0.074	3.122
2011	3	218	654	1962	7.443	0.109	7.335
2010	4	423	1692	6768	15.686	0.143	15.543
2009	5	588	2940	14700	27.143	0.175	26.968
2008	6	544	3264	19584	37.744	0.206	37.537
2007	7	504	3528	24696	47.564	0.236	47.328
2006	8	446	3568	28544	56.255	0.265	55.990

2005	9	387	3483	31347	63.796	0.293	63.503
2004	10	309	3090	30900	69.817	0.319	69.498
2003	11	289	3179	34969	75.448	0.345	75.103
2002	12	242	2904	34848	80.164	0.370	79.794
2001	13	192	2496	32448	83.905	0.393	83.511
2000	14	187	2618	36652	87.549	0.416	87.132
1999	15	116	1740	26100	89.809	0.438	89.371
1998	16	94	1504	24064	91.641	0.460	91.181
1997	17	74	1258	21386	93.083	0.480	92.603
1996	18	59	1062	19116	94.232	0.500	93.733
1995	19	41	779	14801	95.031	0.518	94.513
1994	20	37	740	14800	95.752	0.537	95.216
1993	21	37	777	16317	96.473	0.554	95.919
1992	22	39	858	18876	97.233	0.571	96.662
1991	23	27	621	14283	97.759	0.587	97.172
1990	24	19	456	10944	98.129	0.603	97.527
1989	25	22	550	13750	98.558	0.618	97.940
1988	26	13	338	8788	98.811	0.632	98.179
1987	27	10	270	7290	99.006	0.646	98.360
1986	28	10	280	7840	99.201	0.659	98.542
1985	29	9	261	7569	99.376	0.672	98.704
1984	30	7	210	6300	99.513	0.685	98.828
1983	31	9	279	8649	99.688	0.696	98.992
1982	32	5	160	5120	99.786	0.708	99.078
1981	33	3	99	3267	99.844	0.719	99.125
1980	34	8	272	9248	100.000	0.730	99.270
		5132		556540			

$\Sigma f(X) = 5132$, $\Sigma fx(X) = 133376$, $2\ fx^2(X) = 556540$

$X = \Sigma Xf(X) / \Sigma f(X)$

133376/5132

X=25.98 …….(1)

The variance $=\sigma^2 = \Sigma X^2 f(X) / f(X) - (x)^2$

$=556540/5132-(25.98)^2$

=108.44 -674.96

=24.577% of error

The value of mean is 7.274

The value of the mean is 25.98 and that of the variance 24.57. The percentage of error is 7.27. The percentage error is insignificant; hence the distribution pattern of citation follows a negative exponential of the distribution.

Another test-Kolmogorov-smirnov (K-S Test) is applied to test the exponentiality of the distribution. The observed value of cumulative citation frequencies were calculated with the total citations, as given in column 6 of table- 2 as F(x).The estimated values were calculated by using the following formula for negative exponential distribution.

$$E(x) = 1 - e^{0x}$$

Where(K-S Test), is applied to test the

$$d = 1/\text{mean and}$$

$$x = 0,1,2 \ldots..n$$

The estimated values are presented in column 7 of table-2

RESULTS AND DISCUSSION

Table 1 shows the age-wise distribution of citations (citation frequency) of CA: A Cancer Journal for Clinicians. The table indicates that more than 27% of the journal citations are seven years or less in age. A total of 50% of citations are 12 years old or less.

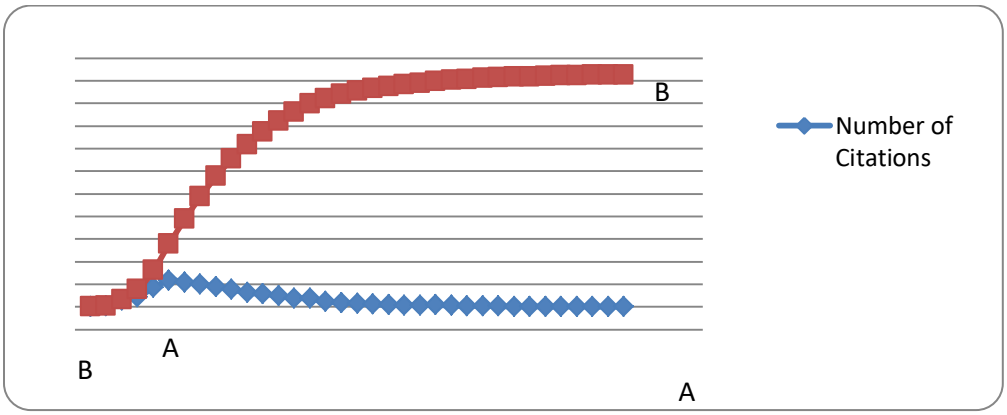

Figure -1: AA - Number of Citations BB – Cumulative Number of Citations.

The data of Colum 3 of table - 1 is plotted as frequency polygon 'AA' in figure 1. The data shows a declining trend in the frequency citations as against the cited ages. 'AA' shows a negative exponential distribution. Initial buildup, occurs from the first entry. The citation data concentrated at one end the curve tapers off gradually to zero at the other end while an in by taking age of citations on the X-axis and frequency of citations on the Y-axis. The cumulative percentage of citations is also shown in the same figures.

The data indicates a roughly declining trend in the frequency of citations as the cited literature ages. An initial build-up occurs from the first entry (t=0).

Citation analysis techniques are found to be very useful in the determination of obsolescence factors of literature of specific subject areas. The present study attempts to find out the obsolescence of literature in medicine by applying the citation analysis techniques.

Half-Life

In 1960, the term 'half-life' was introduced by Burton and Kebler (Száva-Kováts, E. (2002). This technique used to quantitatively describe the rate of obsolescence of literature. Where as in 1970, Line defined half-life as "the time during which one-half of the currently active literature was published". Line & Sandison (1974) Obsolescence has been defined as the "decline overtime in validity of information". Obsolescence or aging is influenced by several factors such as the social status of the author(s), the reputation of the journal, the special form of communication, etc. Even within the same subject field, these factors may cause significant deviations.

The half-life is the time (actual or expected) during which half the total use of individual articles constituting the documents on a subject has been or is expected to be needed. Figures 1, shows the half-life of journal in cancer literature is calculated. A line parallel to the X-axis is drawn from a point, say A on the Y-axis representing the half of the citations (i.e.50%) to meet the curve say at B. Then a perpendicular to X - axis (BA) is drawn from point B to meet the X - axis B. B represents the half-life period for citations. From the figure it is observed that the half-life period is 17 years and 92.60 for journal citations as mentioned.

Conclusion:

Obsolescence is preceded by a steady decline in popularity. Obsolescence studies are useful for researchers and librarians in information centers. They are also helpful for pioneers in a scientific discipline to know how far they must go back to obtain material in their field of interest and deciding which documents are to be kept or discarded in order to maintain the need-based collection and manage the storage space problems in libraries. It is evident that some material in libraries becomes out of date as time progresses.

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