Validity of Basing Authors’ Publication Strategy on Journal Impact Factors
Staša Milojević and Filippo Radicchi
School of Informatics and Computing, Indiana University, Bloomington, USA
Judit Bar-Ilan
Department of Information Science, Bar-Ilan University, Ramat Gan, 5290002, Israel
(Dated: July 13, 2016)

Choosing the best scientific venue for the submission of a manuscript, with the aim of maximizing the impact of the future publication, is a frequent task faced by scholars. In this paper, we show that the Impact Factor (IF) of a journal allows to rationally achieve this goal. We take advantage of a comprehensive bibliographic and citation dataset of about 2.5 million articles from 16,000 journals, and demonstrate that the probability of receiving more citations in one journal compared to another is a universal function of the IF values of the two journals. The relation is well described by a modified logistic function, and provides an easy-to-use rule to guide a publication strategy. The benefit of publishing in a journal with a higher IF value, instead of another with a lower one grows slowly as a function of the ratio of their IF values. For example, receiving more citations is granted in 90% of the cases only if the IF ratio is greater than \( \sim 6 \), while targeting a journal with an IF \( 2 \times \) higher than another brings in marginal citation benefit.

I. INTRODUCTION

An important decision-making process faced by scholars on a regular basis is choosing the outlets for publication of their manuscripts (1-3). The right choice of venue can have a significant effect on the dissemination, usage, and even the preservation of the future scientific paper (4, 5). Pepermans and Rousseau (6) identified three types of factors driving the decisions of authors: author characteristics, journal characteristics and other characteristics, focusing on the acceptance/rejection rate as an important factor in those decisions. Prestige of a journal is often used, implicitly if not explicitly, as an assessment of the quality of research (7). Maximizing the impact of a publication, most commonly quantified as a number of received citations, is a natural goal of most authors, even when it is expressed as a desire to reach the widest possible audience (8, 9). Author’s citation count and the related h-index (10) can be critical factors for funding, hiring, tenure and promotion decisions. Such practices have resulted in a pressure to publish in high-impact, often general-science journals, versus the specialized venues with smaller impact factors (11). Some authors target highest-impact venue first, “cascading” to journals with lower impact until acceptance (8), a process that can exert significant publication delays and place burden on editors and reviewers, as well as the authors. Authors often rely on the impact of target journal even when choosing among alternative specialized venues (12, 13). Understanding if and when such strategies are worth the additional effort is clearly important.

Evaluating the impact of journals is not a straightforward task. The most widely used measure, known even outside of scientific community (14), is the so-called journal Impact Factor (IF). The IF is a metric introduced by Eugene Garfield in 1972 (15), and its definition is rather simple: The IF of a venue in year \( y \) equals the average number of citations received in \( y \) from all papers published in the preceding two years (\( y - 2 \) and \( y - 1 \)) covered by the citation database. Official IF values are released annually by the Thomson Reuters Journal Citation Reports. A widespread habit to assess, at least in the short-term, the quality of scientific publications, and consequently the authors of these papers on the basis of the IF of the venue has received much criticism (16, 17). The basis for this criticism lies in the fact that IF is a very poor indicator of the actual number of citations that a given paper will receive (18, 19). Furthermore, the number of citations received by a journal can be dependent not only on their quality, but the quantity of articles that they publish (15). While qualitative assessment of the quality and significance of work is still unsurpassed by any indicator, most authors intuitively presume that a journal with a higher IF offers a greater probability that their article will perform well in terms of received citations (20). There is some empirical evidence that very similar articles published in higher-IF journals do receive more citations than their "twins" published in lower-IF journals, thus justifying such notion by authors (21). Such advantage may seem obvious when the difference in impact factors of potential journals is very large, but is less clear in cases when the choice is between journals having IFs of, say, 3 vs. 4.

In this paper we use detailed citation data on \( \sim 2.5 \) million papers from all disciplines to test the validity of a publication strategy based on journal IF, and to quantify the benefits of targeting higher-ranked journals. Furthermore, we explore whether, in the absence of detailed citation data, the IF can give a quantitative guidance to the author regarding the benefit of targeting a higher-ranked journal.
II. MATERIALS AND METHODS

For this study we use Thomson Reuters Web of Science (WoS) database of bibliographic records of journal articles obtained in 2015. Specifically, we use all records that WoS classifies as the following document types: article, review and proceedings paper. These are the types of documents that are commonly cited, and are the types that are included in the calculation of the official IF in Journal Citation Reports (JCR). For simplicity, we will refer to these three types of documents as “articles.” We perform all analysis for citations received in 2010. Our results do not depend on the choice of year. The IF for year 2010 (which JCR released in 2011) is the number of citations that the articles published in years 2008 and 2009 received in 2010 divided by the number of these publications. For the analysis we select 15,906 journals which have published 25 or more articles during the publication window (years 2008 and 2009). The cut was chosen to ensure well-sampled citation distributions, but the results are insensitive to the exact choice of threshold. The total number of articles published in selected journals in 2008/09 is 2,352,554. The IF values computed from our data are smaller than from those officially published by JCR by about 4%. In our analysis, we therefore multiplied all IF values by a factor 1.04. There are a number of reasons for slight discrepancies between the official IFs and the one calculated from WoS data (28). Being able to accurately reproduce the official IFs is not essential for our analysis. However, it is important to base both the calculation of the IF and the citation benefit on the same data, which we do.

The goal of the study is to examine how IFs are related to a probability of receiving higher number of citations in one journal (Journal A) compared to another (Journal B). In order to calculate this probability, we first construct citation distribution for every journal in the study. We then calculate rank-sum corresponding to Journal A \((U_A)\) from the Mann-Whitney U test. The probability that a randomly drawn article from Journal A will have a greater number of citations than an article drawn from Journal B will be \(P = U_A/(n_An_B)\), where \(n_A\) and \(n_B\) are the number of articles in each journal. In case of a tie, the rank-sum splits the score in two. So, if two journals have identical citation distributions, the probability is 50% \((P = 0.5)\). In other words, probability of 50% means that both journals do equally well. Probability of 90% suggests than Journal A is considerably more likely to bring more citations than Journal B.

![Citation benefits of 15,906 journals with respect to Nature.](image)

FIG. 1: Citation benefits of 15,906 journals with respect to Nature. Citation benefit is the probability of an article published in a target journal with impact factor IF; receiving more citations than an article published in a reference journal, in this case Nature. Benefit of 50% means that there is no net advantage of targeting that journal instead of Nature. The relation is relatively narrow and the benefit increases gradually as the IF value increases. Significant outliers and notable multidisciplinary journals are designated by abbreviations.
III. RESULTS

A. Empirical relation between citation benefit and Impact Factor

We consider 15,906 journals, spanning all disciplines, indexed in the Thomson Reuters Web of Science (WoS) database. For each of the 2,352,554 research articles published in these journals in years 2008 and 2009, we compute the total number of citations the articles have received in year 2010. The average number of citations received by papers in a specific journal determines the IF value of that journal for year 2010. For a pair of journals \( t \) and \( r \), we calculate, using Mann-Whitney rank sum, the probability \( P \) that a paper published in journal \( t \) (the target journal) would have accumulated a greater (or equal) number of citations than a paper published in journal \( r \). We refer to this probability as the citation benefit of publishing in journal \( t \) instead of journal \( r \).

Fig 1 shows the citation benefit of publishing an article in a journal different from Nature, which represents the reference journal in this case. Our measure of citation benefit is plotted against the IF value of the target journal. We note that the IF values of the various target journals range from 0 to 110, whereas the term of comparison, i.e., Nature, has IF value 35.5. If for some target journal the benefit equals 50%, there is no expected advantage in targeting that journal in place of Nature, and vice versa.

The remarkable feature of Fig 1 is that the dispersion of the empirical points is relatively small: for a given IF value, the citation benefit is narrowly distributed. The IF is a simple citation average, and is often perceived as an inadequate or at least very limited characterization of journal’s citation capacity. As Fig 2 shows, citation distributions of journals are indeed very broad, spanning two to three orders of magnitude even after only a few years (23,24). This broadness implies that the IF value poorly represent the range of actual number of citations received by the population of papers published in those journals. Nonetheless, our non-parametric measure of relative citation benefit is well captured by IF values. Since this is exactly the consideration that many authors have when they are facing the selection of a publication venue, we conclude that the IF does represent a meaningful and easily retrievable metric to guide publication strategy.

Given that Nature is already one of the journals with the highest IF value (it is in top 10 most highly ranked journals), it is not surprising that no other journal has a significantly higher citation benefit, thus leaving only a few alternatives with marginally higher chances of receiving more citations. Indeed, seven of the ten journals with positive benefit with respect to Nature are review journals (Annual Review of Immunology, Nature Reviews: Molecular Cell Biology, Nature Reviews: Cancer, Nature Reviews: Immunology, Nature Reviews: Neuroscience, Physiological Reviews, Annual Review of Neuroscience), and therefore not valid alternatives for original research papers. The remaining three are Cell, Nature Genetics, and New England Journal of Medicine, and they can be therefore targeted only by biomedical researchers. Two journals with the highest IF values (CA: A Cancer Journal for Clinicians and Acta Crystallographica Section A) actually show citation benefit smaller than 50%. The reasons why some journals scatter off the tight relation lies in the fact that their citation distributions are atypical compared to other journals of the same IF, usually because of a small number of very highly cited articles that boost the average citation, and thus the IF value. However, such journals are rare (see Fig 1).

We note, however, that even large differences in IF values of two journals do not translate into significant differences in the benefit associated with publishing in one journal instead of the other. For example, as Fig 1 shows, targeting a journal with an IF value equal to 20 (almost two times smaller than the IF of Nature), still permits a 35% probability that publishing in that journal will result in an article more cited than a Nature paper. Going to IF values approximately equal to 10 (e.g., that of PNAS), leads to a probability of 17%. As the IF of the target journal decreases, so do the chances of receiving more citations than if the article was published in Nature. However, even in more extreme cases, for example, for a journal with IF \(~4\) (e.g., PLOS ONE), the probability is still non-negligible and equals 7%.

The reason why the relation between the IF of the target journal and the citation benefit is not very steep lies in the fact that the citation distributions of journals tend to be broad and to overlap. This can be appreciated from Fig 2, where we show citation distributions of articles published in four major multidisciplinary journals: Nature, Science, PNAS and PLOS ONE. The four journals have a wide range of IF values: from 35.5 for Nature to 4.5 for PLOS ONE (complete information is given in Table 1). Nevertheless, their citation distributions overlap to a large extent. Nature, Science and PNAS have papers with anywhere between 0 and \(~1000\) citations, while this range is between 0 and 200 for PLOS ONE. The relation between IF values and citation benefit would have been steeper if the citation distributions were narrower. For example, if papers in PLOS ONE only had between 0 and 10 citations (which could still produce the actual IF = 4.5), while all papers in Nature had more than 10 citations (which could still result in IF = 35.5), then there would have been a null probability for PLOS ONE papers to accumulate more citations than a Nature paper. We also note that Nature and Science actually have very similar citation distributions, but the reason why Science has a somewhat smaller IF value than Nature (28.9 vs. 35.5) is due to slightly fewer very highly cited papers than Nature.

So far, we have discussed the relation between various journals and Nature. In Table 1, we present cross comparisons
FIG. 2: Citation distributions for four multidisciplinary journals (citations to papers published in 2008 and 2009 received in 2010). Despite very different IF values (from IF = 4.5 for PLOS ONE to IF = 35.5 for Nature) the distributions have significant overlap. They principally differ by the position of the peak and to some extent in the slope of the power-law tail of highly cited articles. The broadness of the distributions is the principal reason why the citation benefit is not a very steep function of IF ratio.

TABLE I: Citation benefits among the pairs of four main multidisciplinary journals.

| Journal    | Nature (from data) | Science (JCR2010) | PNAS (JCR2014) | PLOS ONE (JCR2014) | IF (JCR2010) | IF (JCR2014) |
|------------|--------------------|-------------------|----------------|--------------------|--------------|--------------|
| Nature     | -                  | 57%               | 82%            | 93%                | 35.5         | 36.1         | 41.5         |
| Science    | 44%                | -                 | 79%            | 92%                | 28.9         | 31.4         | 33.6         |
| PNAS       | 18%                | 21%               | -              | 74%                | 10.1         | 9.8          | 9.7          |
| PLOS ONE   | 7%                 | 8%                | 26%            | -                  | 4.5          | 4.4          | 3.2          |

A generic entry of the table shows the relative citation benefit of publishing in one of the journals listed in first column instead of a journal from columns 2-5. The three rightmost columns of the table report: the 2010 IF derived from our bibliographic dataset, and the official IFs for years 2010 and 2014 as published in the Journal of Citation Report (JCR).

among four multidisciplinary journals. As expected, the biggest contrast is between PLOS ONE and Nature, in the sense that Nature papers have 94% probability to accumulate more citations than PLOS ONE papers. Minimal benefit is present between Nature and Science, with only 56% of the papers accumulating more citations in Nature. We remark that our calculations are based on 2010 data. The most recent IF values are slightly different: Science and especially Nature have higher IF values than they did in 2010, while PNAS is nearly the same, and PLOS ONE is lower. These changes will likely be reflected in somewhat greater benefits of the first two journals with respect to the other two.

We also present a case study of relative citation benefits for publishing in biochemistry. The list of all journals in the JCR category Biochemistry & Molecular Biology was presented to an expert in the field who selected a comprehensive set of journals that are most relevant to his research field. From the list we selected a subset of 24 journals for which relative benefits were calculated (see Table S1). These journals have IF values in the range 1.3 to 14.9. For journals in the intermediate impact range (IF ~ 5) the change in IF of 1 (from 5 to 6) is associated with a marginal advantage (5% increase) of receiving more citations in a higher-ranked journal. This should be kept in mind when authors strive, sometimes at a cost of greater inconvenience or higher publication charges, to publish in a journal with a nominally higher IF.
B. Universal relation between citation benefit and Impact Factors

The exact computation of the relative benefit for a pair of journals requires the availability of full citation distributions for both journals. This is a clear limitation for wide implementation. Fortunately, as Fig 1 shows, the relative benefit and IF values are related by a narrow function. This empirical fact allows the possibility of estimating the citation benefit rather precisely using only the IF values of the journals, which are readily available to authors.

In Fig 3, we show citation benefit for four reference journals (Science, PNAS, PLOS ONE, and Proceedings of the Royal Society A (PRSA)), chosen to exhibit a fairly wide range of IF values, from 28.9 (Science) to 1.7 (PRSA). We now plot the citation benefit as a function of the ratio of the IF values of target to reference journal, on a logarithmic scale. The shape of the relation for all four reference journals is similar and has a characteristic sigmoid shape. When the IF ratio is high, the relative benefit approaches 100%. When the IF ratio is 1, benefit is around 50%, as expected.

FIG. 3: Citation benefit as a function of impact factor ratios of the two journals. Each panel shows a different reference journal (A = Science; B = PNAS; C = PLOS ONE; D = PRSA), spanning a large range of impact factors. Trends are similar except for the lower plateau that depends on the fraction of uncited articles in the reference journal (see text). All trends can be well described by a modified logistic function (Eq.2, red curves) with a variable starting point (the plateau) and the exponent that is approximately independent of the reference journal.

The main difference between the four curves consists in the location of the lower asymptote – the probability that a target journal with a very small IF will receive more citations than the reference journal. This plateau probability is close to zero for a high-IF journal like Science, but becomes as high as 20% for PRSA (IF = 1.7). The non-zero plateau is due to the uncited papers in the reference journals. PLOS ONE and PRSA publish a non-negligible proportion of
papers that do not receive citations (at least in the time window used for calculating IF), so even a target journal with IF = 0 (no paper having received any citation) will be tied with uncited articles from the reference journal. Because ties count as “greater than” half of the time, the plateau will be located at 1/2 of the “uncited fraction” \( f_0 \) of the reference journal.

The existence of a plateau that depends on the uncited fraction seems to prevent the construction of a benefit function that would only depend on easily available IFs. Fortunately, Fig 4A shows that the fraction of uncited articles is itself a tight function of IF, a feature noted in some previous studies (25-27). This is another consequence of the fact that the journals with the same IF have similar citation distributions. For journals with IF \( \sim 1 \), the uncited fraction is around 50\%. The tightness of the scatter plot suggests that a suitable functional form could allow relatively precise determination of \( f_0 \) from IF alone. We find that \( f_0 \) is described almost perfectly by the generalized logistic function (to be accurate, the function is logistic when IF is expressed as a logarithm):

\[
f_0 = \frac{1}{(1 + qIF^\alpha)^\beta}
\]

where the values of the factor \( q \) and exponents \( \alpha \) and \( \beta \) are: \( \alpha = 0.94, \beta = 2.37, \) and \( q = 0.33. \)

![Graph showing the relation between the fraction of uncited articles in a journal and its impact factor.](image)

**FIG. 4: Relation between the fraction of uncited articles in a journal and its impact factor.** (A) For every journal, we computed the fraction \( f_0 \) of papers that have accumulated zero citations one or two years after their publication and plot it as function of the IF value of the journal. The blue curve is given by the generalized logistic function of Eq 1. (B) Residuals are symmetrically distributed around the fit (blue curve and line), and their value is independent of the IF value of the journal.

At this point, we have all the ingredients necessary to establish a relation between citation benefit and IF ratio. This is given by a logistic function with a positive lower asymptote:

\[
P = \frac{f_0}{2} + \frac{1 - f_0/2}{1 + cx^{-k}}
\]

where \( x = IF_t/IF_r \) is the ratio of IFs of target and reference journals, and \( f_0 \) is the uncited rate of the reference journal that can be evaluated from Eq 1, or read off from Fig 4. Factor \( c \) is required to ensure that \( P = 0.5 \) when \( x = 1 \), and equals \( c = 1/(1 - f_0). \)
Fitting of Eq 2 to the data in order to determine $k$ is performed as follows. Benefit probabilities from Mann-Whitney calculation are averaged in equal bins in log $x$ of 0.05. Binning ensures that equal weight is given to journals with different IF ratios. Fitting is performed by minimizing square deviations of probability with respect to the fitting function. The fitting has only one free parameter, the exponent $k$.

Fig 5 shows that $k$ only weakly depends on the reference journal, giving Eq 2 a universal character. On average it takes the value $k = 1.23$ The benefit is therefore a function of two independent variables, IF$_r$ and $x$. When the uncited rate of the reference journal is low (IF$_r \gtrsim 10$) or when $x \gtrsim 1$, Eq 2 simplifies to:

$$P = \frac{1}{1 + x^{-k}}$$

i.e., the benefit then depends solely on the IF ratio $x$.

In Fig 6 we show the benefit matrix for journals with IF > 3 and the residuals when the benefits are obtained using only Eq 1 and 2 with the value of $k$ fixed to 1.23. The residuals are small (few percent) and symmetric.

![Figure 5: The distribution of the best-fitting values of exponent $k$ in Eq 2, describing the shape of the citation benefit function. Based on 1,400 journals with IF > 3. Exponents take a relatively small range of values attesting to the universality of the benefit – IF ratio relation shown in Fig 3.

To facilitate the calculation of citation benefit, we also provide a web calculator [http://tinyurl.com/hxgnz4f](http://tinyurl.com/hxgnz4f), which only requires a user to input the IFs of two journals.

**IV. DISCUSSION AND CONCLUSIONS**

We have shown that the relation between the citation benefit and IFs is relatively tight, a consequence of the fact that citation distributions of journals with the same IF are similar (23,28). For the same reason the fraction of articles with zero citations can be predicted from the IF. Atypical distributions are rare, leading to few outliers in the benefit – IF ratio relation.

Furthermore, we have shown that the benefit – IF ratio relation is a universal function of the IFs of the target and reference journals. When the IF ratio $\gtrsim 1$ the benefit largely depends only on the ratio. For example, journal A will have $\sim70\%$ probability of receiving more citations than journal B regardless of whether IF of A is 10 and of B is 5, or if A is 30 and B is 15. Essentially, we demonstrate that the relative differences in IFs are more relevant than the absolute differences.

The benefit – IF ratio relation shows that in order to achieve a high benefit, e.g., with a confidence of 90%, one has to target a journal with $\sim5.5\times$ higher IF than the reference journal. The reverse is also true. Aiming for a journal with IF five times lower than a high-IF reference journal still gives some chance ($\sim13\%$) of doing as well or better than the high-IF journal. That the probability of receiving more citations is not significantly different for small relative differences in IF should therefore be born in mind when researchers strive, sometimes at great expense, to publish an article in a journal with marginally higher IF. The fundamental reason for the gradual change in probabilities lies in the fact that even journals with very different IFs have broad and largely overlapping citation distributions (Fig 2).
FIG. 6: The benefit matrix for journals with IF > 3. In panel A, we show the citation benefit of publishing in a target journal with IF value equal to IF\textsubscript{t} instead of a reference journal with IF value equal to IF\textsubscript{r}. To generate this figure, we consider only the 1,400 journals with IF > 3. Colors range from red (benefit = 0%) to blue (benefit = 100%). The empirical values in panel A are very well reproduced by our Eqs. 1 and 2, which only depend on the IFs. The residuals are typically small (few percent), and are distributed symmetrically around zero (panel B).

In this paper we have focused on a question of receiving more citations, regardless of how many. No sensible predictions are possible of how many more citations will be received, because the citation distributions are very broad. One can only estimate the average expected difference in citation counts, which will simply be the difference in IFs. On the other hand, it is perfectly justified to ask a question of a probability of receiving n times as many citations in one journal as opposed to another, as this is just the modification of our original question of receiving n = 1 times more citations. For example, we calculate that in order to make obtaining 2\times as many citations very likely (P > 90%) requires targeting a reference journal with 10 times higher IF. To summarize, the journal impact factors are useful in guiding publication strategy, but it is important to understand when the benefits are significant.

V. SUPPORTING INFORMATION

S1 Table. The citation benefit matrix for biochemistry journals. Citation benefit of an article in a biochemistry journal in row m (numbered 1-24) with respect to the journal listed in column n (numbered 1-24). For example, article published in Biomacromolecules (row 12) has 66% probability of receiving more citations than the article in Biochemistry (column 20).

VI. ACKNOWLEDGMENTS

This work uses Web of Science data by Thomson Reuters provided by the Network Science Institute and the Cyberinfrastructure for Network Science Center at Indiana University. We thank Andras Muhlrad for selecting the biochemistry journals. FR acknowledges NSF grant SMA-1446078.

[1] Borgman CL (2007) Scholarship in the digital age: Information, infrastructure, and the Internet (The MIT Press, Cambridge).
[2] Tenopir C & King DW (2000) Towards electronic journals: Realities for scientists, librarians, and publishers (SLA Publishing, Washington, DC).
[3] Rowland JFB (1982) The scientist’s view of his information system. Journal of Documentation 38(1):38-42.
[4] Lawrence S (2001) Online or invisible. Nature 411(6837):521.
[5] Kurtz MJ & Bollen J (2010) Usage bibliometrics. Annual Review of Information Science and Technology, ed Cronin B (Information Today, Inc., Medford, NJ), Vol 44, pp 1-64.

[6] Pepermans G & Rousseau S (2015) The decision to submit to a journal: Another example of a valence-consistent shift? Journal of the Association for Information Science and Technology doi: 10.1002/asi.23491.

[7] Ravetz JR (1971) Scientific knowledge and its social problems (Oxford University Press, New York).

[8] Gordon MD (1984) How authors select journals: A test of the reward maximization model of submission behavior. Social Studies of Science 14:27-43.

[9] Luukkonen T (1992) Is scientists’ publishing behavior reward-seeking? Scientometrics 24(2):297-319.

[10] Hirsch JE (2005) An index to quantify an individual’s scientific research output. PNAS 102(46):16569-16572.

[11] Verma IM (2015) Impact, not impact factor. Proceedings of the National Academy of Sciences (PNAS) 112(26):7875-7876.

[12] Garfield E (2006) The history and meaning of the journal impact factor. JAMA 295(1):90-93.

[13] Rousseau S & Rousseau R (2012) Interactions between journal attributes and authors’ willingness to wait for editorial decisions. Journal of the American Society for Information Science and Technology 63(6):1213-1225.

[14] Glänzel W & Moed HF (2002) Journal impact measures in bibliometric research. Scientometrics 53(2):171-193.

[15] Garfield E (1972) Citation analysis as a tool in journal evaluation. Science 178:471-479.

[16] DORA (2012) San Francisco declaration of research assessment. (Retrieved from http://www.ascb.org/files/SFDeclarationFINAL.pdf).

[17] Hicks D, Wouters P, Waltman L, de Rijcke S, & Rafols I (2015) Bibliometrics: The Leiden manifesto for research metrics. Nature 520:429-431.

[18] Seglen PO (1992) The skewness of science. Journal of the American Society for Information Science 43(9):628-638.

[19] Seglen PO (1997) Why the impact factor of journals should not be used for evaluating research. BMJ: British Medical Journal 314(7079):498-502.

[20] Calcagno V, et al. (2012) Flows of research manuscripts among scientific journals reveal hidden submission patterns. Science 338(6110):1065-1069.

[21] Larivière V & Gingras Y (2010) The impact factor’s Matthew Effect: A natural experiment in bibliometrics. Journal of the American Society for Information Science and Technology 61(2):424-427.

[22] Bar-Ilan, J. (2010). Rankings of Information and Library Science journals by JIF and by h-type indices. Journal of Informetrics, 4(2), 141-147.

[23] Stringer M, Sales-Pardo M, & Amaral LA (2008) Effectiveness of journal ranking schemes as a tool for locating information. PLoS ONE 3(2):e1683.

[24] Redner, Sidney (1998) How popular is your paper? An empirical study of the citation distribution. The European Physical Journal B-Condensed Matter and Complex Systems 4: 131-134.

[25] Weale AR, Bailey M, & Lear PA (2004) The level of non-citation of articles within a journal as a measure of quality: A comparison to the impact factor. BMC Medical Research Methodology 4(14).

[26] Schubert A & Glänzel W (1983) Statistical reliability of comparisons based on the citation impact of scientific publications. Scientometrics 5(1):59-74.

[27] Moed HF, Van Leeuwen TN, & Reedijk J (1999) Towards appropriate indicators of journal impact. Scientometrics 46(3):575-589.

[28] Radicchi F, Fortunato S, & Castellano C (2008). Universality of citation distributions: Toward an objective measure of scientific impact. Proceedings of the National Academy of Sciences 105(45): 17268-17272.