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# THE IMPORTANCE ATTACHED TO CITATIONS FOR JUDGING THE QUALITY OF RESEARCH

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ABSTRACT. In this paper I am particularly interested in exploring the potentialities and limitations of the impact factor, the massive use of journal self-citation, citation analysis as a measurement of scientific quality, and the detrimental effect of the impact factor as an instrument for research evaluation. The theory that we shall seek to elaborate here puts considerable emphasis on the impact factor's establishment as a crucial criterion of evaluation and achievement, the pressure resulting from the need to publish in high impact factor journals, and the potential for abuse and manipulation of the impact factor.

Keywords: impact factor; scientific quality; citation analysis

## 1. Introduction

This study is grounded in the considerable body of scholarship examining the importance attached to citations for judging the quality of research, the use of citation counts as a quality indicator, and the weaknesses of citation counts and impact factor. The analysis presented in this paper contributes to research on editors' incentive to inflate impact factors through self-citation, the practice of coercive self-citation, the deleterious effects of impact factor manipulation, the dependence of the author on the editor's decision for publication, and the limitations of citation measures.

## 2. The Potential for Abuse and Manipulation of the Impact Factor

The use of the Journal Impact Factor (JIF) as an evaluation tool has continued undeterred. JIFs represent citations normalized by numbers of citable documents. Widely cited papers and journals can be fairly

characterized as being widely influential. With fewer citations per paper on average, the total citations that any paper accumulates are correspondingly few. JIFs are mostly uncorrelated to the percentage of self-citations or negatively correlated for some journals. Citations and citation rates can be useful tools to compare scientific influence and importance. Potential influences on JIF are the percentage of international collaborations, the publication of fewer low-citation papers, and the references/document ratio. High JIF journals publish fewer papers that receive no citations in the year that the JIF is calculated. A greater number of references per document leads to higher JIF. The JIF says nothing about the citation rate of individual papers. Commercially published journals have been speeding past society-published journals in regards to growth in JIF. (Putirka et al., 2013) Self-citation may improve the visibility of authors' prior works or the authority of their arguments (self-citations increase future citations from others). Authors have more opportunities for self-citation if they publish more in better journals with many coauthors. (Fowler and Aksnes, 2007)

Many journals receive increasing numbers of submissions through time, *but do not increase the number of accepted articles proportionally*, journals solicit some reviewers more than others, individual reviewers may be solicited by many different journals, and top journals typically reject 50% or more of submissions. Thus, journals and authors will rely on an increasingly small pool of reviewers, journals may need to adopt more active policies for encouraging or enforcing review, and there may be a shift in submissions towards journals that minimally review. (Hochberg, 2010) Journal editors' decisions about what articles to publish, and what to commission are influenced by value judgments about what they perceive to be relevant to their field. There are considerable pressures on journal editors to develop editorial strategies that maximize their impact factor. Relevant, rigorous research of better quality, papers that have a large number of references to articles already published in their journal, or publishing a highly controversial paper – all will drive up the citation rates (some important articles may not appear to have significant potential for citation). (Gray, 2012) The IF is only a numerical indicator of visibility and may be weakly related to quality – itself a subjective notion. (Wu, Fu, and Rousseau, 2008) Authors seeking to be well cited should write comprehensive and substantial review articles. Publishing in a journal with a higher impact factor is the most effective strategy to increase citation rates. The Thomson-Reuters IF is a strong indicator of journals likely to facilitate a high citation rate. Strategic placement of articles is complementary to careful crafting of good quality research (citation rates are just one aspect of successful research impact). (Vanclay, 2013)

## 3. Citation Analysis as a Measurement of Scientific Quality

The number of citations may be a reliable estimate of the intellectual impact of a publication. It would be better to use the number of citations to a publication than only the impact factor of the journal. The impact factor's uncritical use for the evaluation of individual manuscripts, single researchers or research groups is detrimental to science. Pure methodological papers or technical notes, which do not create or modify hypotheses or theories, may get high citation counts, whereas relevant, revolutionary and paradigm changing publications may have low citation counts. Different scientific areas should not be compared by the number of citations to their publications. (Metze, 2012) The citation rate of a journal is quantified as its impact factor (the impact factor is a good technique for scientific evaluation). A journal's impact factor is based on the numerator, which is the number of citations in the current year to any items published in a journal in the previous 2 years, and the denominator, which is the number of substantive articles published in the same 2 years. (Sevinc, 2004) Impact factor and citations counts are weak indicators of scientific quality. Citation counts indicate the attention an author receives, whereas the journal impact factor shows the attention a journal receives. Applying the journal impact factor (JIF) as proxy for the quality of individual authors is both misleading and unethical. (Krell, 2010)

Researchers are judged by where their articles are published rather than by the content of their publications. The JIF is the metric that is most often misused to quantitatively assess research outputs. Assessing a research publication requires actually reading it and understanding its content. Article-specific metrics may provide a numerical gauge of how well an article has been received and has influenced subsequent work. When a publication is evaluated according to the JIF of the journal in which it appeared, it is being evaluated on the number of citations to all of the other articles that are published in that journal. (Bertuzzi and Drubin, 2013) The mechanism by which science is disseminated has yet to develop an acceptable way of measuring itself. The IF will play a role in journal rankings until a more appropriate metric takes its place. (Menz et al., 2012) Interpreting the number of citations of a publication as an *approximate* measure of the scientific impact of the publication, having more citations *may not* coincide with having more impact. Publications may become highly cited without actually having a lot of impact on the progress of science (there exists no perfect relationship between scientific impact and citations). A researcher's overall scientific impact is determined by the number of high-impact publications the researcher has produced. A researcher with a given number of high-impact publications can always be

outperformed by another researcher with a sufficiently large number of low-impact publications (by producing lots of low-impact publications it is possible to obtain a large number of highly cited publications). (Waltman, van Eck, and Wouters, 2013)

## 4. Citation Counts and Impact Factor as Quality Indicators to Judge Journals

Most scientific output takes the form of publication in peer-reviewed journals. No existing method captures all the criteria that are needed for a rigorous and comprehensive measure of scientific output. The goal of developing quantitative criteria to evaluate scientific output is to complement peer-review efforts. A reliable measure of scientific output should be based on hard data rather than subjective ratings. The scientific literature is the natural place to look for a measure of scientific output. Citations provide an objective, quantifiable, and available resource. More-cited articles tend to correlate with important new findings. Subjective evaluations by well-qualified experts may be an essential component of evaluating scientific output. A robust index of scientific output will depend to a large extent on citation data. (Kreiman and Maunsell, 2011) The journal in which an article is published is a key determinant of the dissemination of results. Citations are determined by many factors other than quality: they may be selected because of their accessibility in electronic databases, scholars may select the articles they cite because they have a professional interest in promoting a given line of research, or because of the utility of a citation to support a particular opinion, or to influence peers or decision makers, an article may be cited because it is written by a productive research group whose members often cite each other, or because it was published in a first-rate journal. The concentration of citations on a small number of articles may be explained by the practice of extracting citations from reference lists in other articles (an article that was ever cited is more likely to be cited again). Journals may obtain a high impact factor by the frequent citation of a limited number of their articles only. An article can be cited because it makes unacceptable or provocative claims that need to be refuted. The impact factor is not corrected for self-citation, and should not be used to assess the quality of individual articles or the output of research groups or of individual researchers. (Ettera and Stapleton, 2009)

As quantified metrics, citations are necessary for evaluating the impact and visibility of significant scientific research output. Acceptance of a paper for journal publication relies on a handful of decision makers, who determine the explicit rejection rate of a journal *before* publication. (Chang

et al., 2013) The Comprehensive Citation Factor (CCF) would include in the denominator all citable articles, specifically editorials and letters, resulting in better overall representation, decreasing subjectivity in determining a journal's power, and having a positive outcome on the quality of articles (CCF provides a more accurate quantitative representation of individual journal comparison). Although editorials, letters, and the brief case and research reports are considered non-source items, ISI includes citations to both source and non-source items in the numerator value. (Wolthoff, Lee, and Ghohestani, 2011) Academic impacts are most objectively demonstrated by citation indicators. Citation patterns are strongly linked to academic career development. Citations chiefly depend on where authors are placed in their career trajectories. An *inward citation* is a citation to that person, whereas an *outward citation* is that academic citing someone else. The number of outward citations indicates whether the work of a given academic is well grounded in the body of academic research. Young academics will probably have a higher number of outward citations relative to their inward citations. Self-citations may be a useful promotion mechanism to increase citations from others (self-citations can increase the *visibility* of someone's work). Self-citations can be legitimately used to get visibility for key or supportive works that may not yet be published. Citations tend to reflect networking effects. (Bastow, Dunleavy, and Tinkler, 2014)

## 5. Conclusions

Our paper contributes to the literature by providing evidence on the biases of the impact factor, excessive orientation towards the impact factor, and citation counts and impact factor as quality indicators to judge journals. The implications of the developments outlined in the preceding sections of this paper suggest a growing need for a research agenda on the detrimental effect of the impact factor as an instrument for research evaluation, the relationship between scientific impact and citations, the ISI's practice of not counting all articles, and manipulation of scientific processes.

### NOTE

For more details see: Lăzăroiu, George (2013), "The Misuse of Journal Impact Factors in Evaluating Scientific Output," *Contemporary Readings in Law and Social Justice* 5(2): 164–169; Lăzăroiu, George (2013), "On Citation Ethics: Editorial Shenanigans to Boost Impact Factor," *Contemporary Readings in Law and Social Justice* 5(1): 82–87; and Lăzăroiu, George (2012), "The Reliability of

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