

Examining computational measures and scholars' perceptions of scholarly venues / Shir Aviv-Reuven

Abstract

The Science of Science (SoS, also known as SciSci) is a consistently growing field focused on the systematic study of the structure and dynamics of scientific research. Evaluating research is crucial for assessing its contribution and impact within the academic community. It plays a significant role in academic systems, including academic recruitment, career advancement, and publication decisions. A central aspect of this evaluation is the notion of value—how it is defined, what influences it, and how it is perceived within the academic ecosystem. When observing scholars through this lens, they are assessed by a set of presumably objective values: their academic output, h-index, the number of journals in which they have published, these journals' metrics, and ranks, among other factors. However, while these quantitative measures may capture certain aspects of a scholar's perceived value, these measures are inherently subjective. The definition of these metrics is often unclear; moreover, they can be manipulated, and their application in evaluating scholars is contested. This dissertation examines value within the context of the Science of Science, particularly focusing on journals, with the aim of understanding the factors influencing a journal's perceived value and how scholars perceive this value. In doing so, it critically reassesses three widely accepted assumptions in SoS literature regarding the interaction between scholars and academic journals:

1. **Journal Value:** A journal's value is ostensibly determined by metrics such as Journal Impact Factor (JIF) and rankings induced by these metrics. These are considered objective measures of the journal value. In practice, however, these assessments depend on the journal's classification within a specific field and on the citation index that includes it—factors that are not necessarily objective.
2. **Scholar Evaluation:** Scholars are often evaluated partly based on how frequently they publish in high-value journals, which serve as a proxy to the scholars own value. Yet there is little consideration of whether they truly contribute to the journal's metric.

3. Choice of Journal: Due to the previous hypothesis, scholars often select a journal based on its perceived value, reflected in quantitative metrics like the JIF. In response, journals publicize their metrics and rankings to attract authors. This practice raises questions regarding the extent to which scholars consider these metrics paramount in their decisions, and how scholars perceive both these metrics and the implicit (or sometimes explicit) requirement to publish in highly ranked journals.

To reexamine these assumptions, four interrelated studies were conducted, each addressing distinct goals and research questions.:

The first article, “A Logical Set Theory Approach to Journal Subject Classification Analysis: Intra-System Irregularities and Inter-System Discrepancies in Web of Science and Scopus,” (published in *Scientometrics*), investigates intra-system irregularities and inter-system discrepancies in the journal classification systems of Web of Science (WoS) and Scopus. As journal's ranking is strongly related to classification system, it is necessary to understand what these classifications are and what issues arise in these classifications that may affect these rankings. This article asks: What are the irregularities within in each system, what discrepancies exist between the two systems, and to what extent might inconsistencies mislead users in evaluating journals? The findings in this article display unusually sized categories, high overlap and lack of cohesiveness between categories. These discrepancies reveal that most categories in either system are not adequately represented in the other.

The second article, “Exploring the Association Between Multiple Classifications and Journal Rankings” (published in *Lecture Notes in Computer Science*), explores the association between the number of subject categories assigned to a journal and its ranking across those categories. The key question is: Does classifying a journal into multiple categories distort the journal's ranking, and how does this affect perceived “journal quality”? The findings in this article, show that as the number of categories a journal is classified to increases, both the range of the ranking and the variance within the range increase.

The third article, “Quantifying Scholars' Contributions to Journals: A case for 'Negative Values',” (currently under consideration at *Aslib Journal of Information Management*) proposes new metrics that allow for “negative” contributions by individual scholars to a journal's metric, challenging conventional approaches. As scholars' contributions to a

journal are the building blocks of the metric, its central question is: How can the attribution of scholars' contribution to journal metrics be quantified more accurately? Three methods are proposed and analyzed mathematically: Two methods that complement existing methods and a third method which applied the Shapley value approach for value allocation. This approach has several desirable properties. The proposed methods were then empirically applied to a set of journals. The empirical results show that the majority of scholars in the analyzed journals contributed "negatively" to the journals' metric. When compared to two existing methods, the approximated Shapley-based approach was shown to be a desirable alternative to existing approaches.

The fourth article "Scholarship Explored: Motivations, Practices, and Perceptions in the Research Process," (currently under consideration in *Journal of Information Science*), shifts to a qualitative lens, examining scholars' motivations, practices, and perceptions. The focal questions include: How do researchers view their academic identity, decide on publication venues, and interact with research metrics in their day-to-day work? Specifically, it asks, what are scholars motivations when selecting a publication venue and what are their perceptions towards the publication venues' metrics. Five themes are identified: *Being a Scholar, Performing Scientific Research, Interaction with Information, Perceptions About Publication Process and Venues, and Changes in Research Process Due to COVID-19*.

The findings point to substantial irregularities and discrepancies within journal classification systems, for example, extremely small categories with very few journals, or very large categories, rendering their ranking within these categories meaningless. This underscores the need for standardized criteria to improve the reliability of bibliometric analyses. This is particularly crucial given the observed inconsistencies in how journals are categorized and ranked across indexing services such as WoS and Scopus. Moreover, the research delves into the complexities of multiple journal classifications and rankings, demonstrating that overlapping subject categories can lead to significant variability in journal metrics and rankings, suggesting the necessity for more transparent and consistent methodologies to reflect a journal's value more accurately. One of the novel contributions of this study is the proposal of new methods to quantify scholars' contributions to journal metrics, which, for the first time, consider the possibility of negative values. This approach challenges traditional metrics and promotes a more nuanced and equitable evaluation of

scholarly work, recognizing that many scholars may, inadvertently, negatively impact journal metrics. The qualitative analysis adds a critical dimension by capturing scholars' experiences and perceptions, providing context to the quantitative findings. For example, the qualitative study revealed scholars' views on journal rankings and the pressures of publication, offering insights into how these perceptions shape their publishing behavior and decisions. In summary, these four articles provide a clearer understanding of journals' value. They show that, contrary to current assumptions, this value is not objective, but rather is a skewed superficial subjective measure, impacted by the classification systems, the scholars, who frequently ``negatively" contribute to it and is perceived as an in-adequate proxy of both the journals' value and the scholars value.

Overall, this dissertation encourages more thoughtful approaches to assessing and valuing scholarly work. By spotlighting inconsistencies in journal classification, the distortive effects of multi-labeling, and the possibility of negative contributions to journal metrics, the articles collectively advocate a more nuanced and equitable evaluative framework. The qualitative findings underscore how scholars' experiences and motivations intersect with systemic challenges, reinforcing the importance of integrating both institutional and individual perspectives. Implementing such improvements—through standardized classification, refined metrics, and an openness to a diversity of scholarly research and outputs—can foster more transparent and effective research evaluation practices.

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