

Measuring the Impact of Engineering Research Publications

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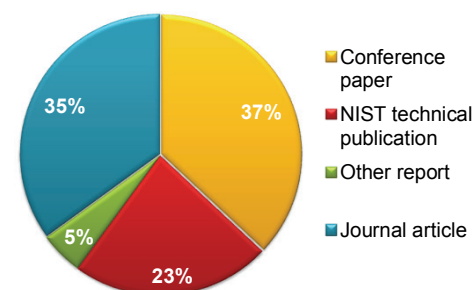
Introduction

The Information Services Office (ISO) of the National Institute of Standards and Technology (NIST) conducted a study to assess the impacts of NIST Fire Research Division (FRD) publications. ISO used Google Scholar (GS) to identify a list of publications for specific authors, calculate the h-index for those authors, and examine citation patterns.

Although there are disadvantages to using GS, it is the best option for analyzing the non-journal literature where FRD researchers publish. As a result of conducting this study, ISO developed a methodology for assessing impact that can be replicated with other groups of NIST researchers who publish primarily in non-journal literature.

NIST Fire Research Division Publications

The analysis yielded 2,030 FRD publications, of which 65% (1,313) was non-journal literature.



The broad spectrum of publishing venues reflects the diverse audience of both researchers and practitioners that FRD serves, and validated the need to use GS to analyze the non-journal literature.

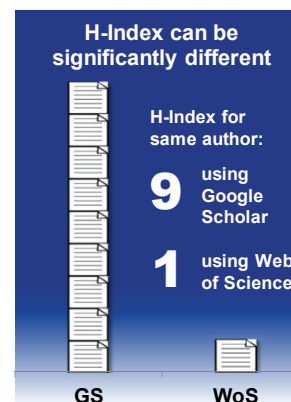
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Methodology

FRD provided ISO with a list of the 44 authors to include in the study. ISO conducted searches on GS using author names to create a list of publications. When necessary, key words and broad subject categories were used to limit and refine search results.

Because ISO is familiar with FRD's body of literature, ISO determined that GS was the best tool for conducting this analysis. To confirm this assumption, preliminary searches using a sampling of authors were conducted in both GS and Web of Science (WoS).

H-index values were also calculated using preliminary search results. Significant differences in citation counts and h-index values were found for the pure engineering papers between the GS results and the WoS results. For authors whose papers addressed topics in physical science fields, such as materials science, there were similar results using GS and WoS. The results of these preliminary searches indicated that GS would provide a more accurate representation of all of FRD's publications.



The differences between GS and WoS in citation counts and papers found resulted in significant differences in the h-index of certain FRD authors.

ISO reviewed the bibliographic information retrieved to verify that the publications were written by the FRD authors. Source titles were put in standard formats to ensure there were accurate counts among titles. Publishing venue types (e.g. conference papers, journal articles) were assigned to each title. This entire process allowed ISO to create a big-picture view of FRD's publications.

Findings and Results

The GS publications analysis revealed that FRD publishes frequently in two high-impact combustion journals (*Combustion and Flame* and *Proceedings of the Combustion Institute*), and these papers have high citation rates. Two other high-impact titles (*Progress in Energy and Combustion Science* and *Combustion Theory and Modelling*) are used less often, yet the citation rates for FRD papers in these journals are also very high.

Journal	2008 Impact Factor	# division articles	Average cites/article
Progress in Energy and Combustion Science	8.000	12	41.17
Combustion and Flame	2.160	74	23.42
Proceedings of the Combustion Institute	1.906	82	4.28
Combustion Theory and Modelling	1.112	4	9.25
Combustion Science and Technology	0.877	33	14.67
Flow Turbulence and Combustion	0.776	0	NA
Combustion Explosion and Shock Waves	0.526	0	NA

The GS publications analysis showed that FRD published 743 conference papers. While the citation rates of conference papers vary by conference, FRD's conference papers have high citation rates. In some cases, the rates are equal to or greater than the citation rates of FRD journal articles published in high-impact combustion journals.

Conference	# division papers	Total citations	Average cites/paper
Combustion Institute	82	351	4.28
Halon Options Technical Working Conference	63	218	3.46
Symposium (International) on Combustion	62	1292	20.84
International Symposium on Fire Safety Science	55	538	9.78
Interflam	40	135	3.38

Conclusions and Recommendations

In conducting this study, ISO developed an analysis method that can be used to assess the publications impacts of other NIST researchers who publish in the non-journal literature. As a result of this study, ISO developed these recommendations for FRD to increase or show their impact:

- Track download counts in addition to citation counts. Non-journal publications may not get cited but may be used by practitioners.

Downloads and Citations for Two FRD Reports



Smoke Alarms – R. W. Bukowski, R. D. Peacock, J. D. Averitt, T. G. Cleary, N. P. Bryner, W. D. Walton, P. A. Reneke, E. D. Kuligowski, Performance of Home Smoke Alarms Analysis of the Response of Several Available Technologies in Residential Fire Settings, NIST TN 1455-1, National Institute of Standards and Technology, Gaithersburg, MD, December 2007, 386 pp.
Thermal Cameras – M. K. Donnelly, W. D. Davis, M. J. Selapak, Performance of Thermal Imaging Cameras in High Temperature Environments, NIST TN 1491, National Institute of Standards and Technology, Gaithersburg, MD, November 2007, 17 pp.

- Put more effort into publishing more often in journals with higher impact factors.
- Consider re-publishing selected conference papers in journals to reach a different and possibly broader audience for greater accessibility and visibility.
- Assess conference papers by number of attendees, breadth of the audience, and breadth of the conference to add depth to the impact of the conference literature.
- Consider standards and market impact to show a more robust view of impact.
- Maintain a current publications list to make future impact assessments quicker, easier, and more accurate.
- Understand the differences between impact assessments using GS and those using WoS.