

# Citation analysis as an auxiliary decision-making tool in library collection development

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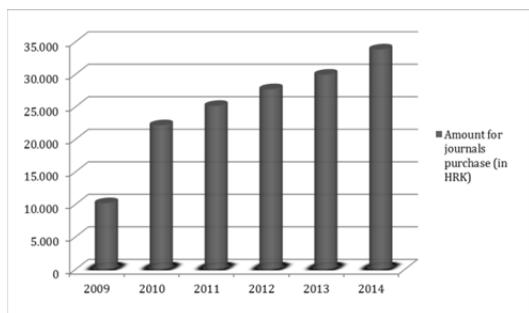
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## Introduction

Academic libraries in Croatia are facing constant budget cuts, making it difficult to obtain access to current scientific and professional journals (Krajna & Markulin, 2011). At the end of 2008 the Croatian economy had plummeted into recession and the *Ministry of Science, Education and Sports* ceased the funding of scientific literature acquisition (Krzna, 2011).

Parallel to budget cuts, the prices of scientific journals increased. The period from 2009 to 2014 showed a threefold increase in prices of the journals acquired by the Geophysical library in Zagreb (Figure 1), making it necessary to review the need for the purchase of each journal.



**Figure 1. Threefold increase in prices of the journals acquired by the Geophysical library in Zagreb.**

Quantitative and qualitative methods can be used to make optimal decisions regarding the purchase of journals (Gomez, 2002). The qualitative method is based upon interviewing lecturers and other competent scientific staff and taking their suggestions on which journals are essential. Their assessment of the journals' relevance is the most important guideline in creating an acquisitions policy. The quantitative method, on the other hand, provides the much-needed objectivity in the acquisitions process, but can only be used as an additional guideline to the qualitative method. This method can come in the form of usage statistics or the assessment of the journal's importance through citation analysis. Such an assessment is described in this paper. Although the quantitative method is

objective, its results (list of most used/most relevant journals) cannot replace subject-matter experts' opinion, only inform them.

## Methodology

The goal of this study is to determine the importance of certain journals for the geophysical community at the Faculty of Science in Zagreb. This will be done by compiling a list of journals most cited by the scientific staff at the Geophysical department from 2000 to 2014. References from all scientific papers published by the staff at the Department of Geophysics in the last 14 years were collected, and 6120 references were selected from journals cited by our geophysicists. The citation frequency was analysed, and references were listed for each journal.

## Results and discussion

Assuming the citation frequency of articles from a certain journal confirms its importance for the scientists, the journals were listed by relevance after the data had been processed. The result is a list of 512 journals ranked by the number of citations. A "Top 15" list has also been created – 15 most cited journals by the members of the Department of Geophysics from 2000 to 2014 (Table 1).

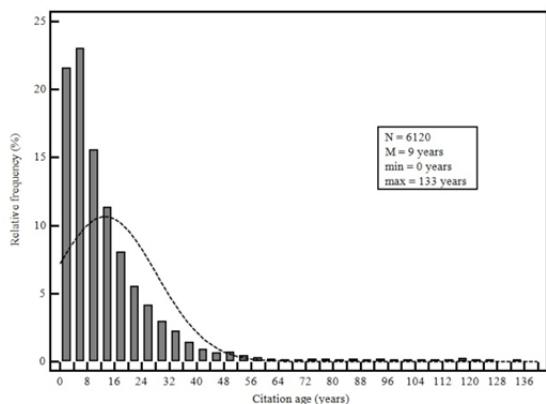
**Table 1. Top 15 – most cited journals by the members of the Department of Geophysics from 2000 to 2014.**

| Journal title  | citation |
|--|----------|
| 1 <i>Journal of Geophysical Research</i>                       | 448      |
| 2 <i>Journal of the Atmospheric Sciences</i>                   | 349      |
| 3 <i>Quarterly Journal of the Royal Meteorological Society</i> | 335      |
| 4 <i>Monthly Weather Review</i>                                | 222      |
| 5 <i>Boundary-layer meteorology</i>                            | 213      |
| 6 <i>Journal of Climate</i>                                    | 202      |
| 7 <i>Atmospheric Environment</i>                               | 195      |
| 8 <i>Journal of Applied Meteorology and Climatology</i>        | 185      |
| 9 <i>Geo fizika</i>  | 162      |
| 10 <i>Geophysical Research Letters</i>                         | 115      |
| 11 <i>Tellus</i>   | 114      |
| 12 <i>International Journal of Climatology</i>                 | 108      |
| 13 <i>The Astrophysical Journal</i>                            | 97       |
| 14 <i>Bulletin of the Seismological Society of America</i>     | 95       |
| 15 <i>Annales Geophysicae</i>                                  | 93       |

Data on the age of journal citations (cited by the members of the Department of Geophysics in a 14-

year period) was processed. Citation age is determined as the discrepancy between the publishing years of both the cited and the citing paper.

The citation age median for the whole set is 9 years. The histogram (Figure 2) shows that half of the citations are 0 to 9 years old, and rest of them are 10 to 133 years old. Citation frequency in 1<sup>st</sup> quartile shows statistically significant greater representation of citations in relation to the 2<sup>nd</sup> quartile ( $\chi^2 = 9,86$ ;  $P < 0,0017$ ).



**Figure 2. Citation frequency relative to citation age.**

Therefore, recent scientific papers are the most cited.

### Instead of a conclusion

Why is optimizing the library's acquisitions policy so important? The answer is, of course, because optimization is crucial in creating a list of the most relevant journals to be acquired, which can also be illustrated using the *Pareto principle*.

The Pareto principle is, amongst other things, used to evaluate periodicals collections. It was named after Vilfredo Pareto, an Italian sociologist, who first used it to explain the distribution of land in Italy, where 80% of the land was owned by 20% of the population.

As previously mentioned, the principle applies to many different areas, so if applied to a periodicals collection, it will show that 20% of the periodicals in the collection will cover 80% of information needs. Also, 80% of the citations will be found in 20% of the periodicals (Dewland & Minihan, 2011).

This analysis further establishes the Pareto principle: 85,87% of the citations were found in the upper 20% of the periodical list. As a relatively low number of periodicals (20%) generates the most citations (85%), it's possible to conclude that, if an academic library strives to acquire the right periodicals and makes an optimal selection, it can provide good coverage of relevant information for

its patrons, even if the quantity of said periodicals is low. In other words, a small but optimal selection of periodicals can cover the most of an institution's information needs.

### References

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