Fourty Years of *Network Science*: Analysis of Journal Contribution to the Field

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Abstract. The goal of this study is to analyze the Social Networks Journal contribution to the sphere of social network analysis and as a result, improve the methodology that reflects the theoretical contribution of empirical articles within three dimensions: theory building, theory testing and applied method. In addition, the paper includes the examination of journal co-evolution within the field of social network analysis. In this study, we build a model of social network journals and identify the place that *Social Networks* occupies within this network, with its unique impact.

Keywords: *Social Networks*, citations, coevolution

1 Introduction

The idea of academic "impact" has been on the forefront of many fields for a number of years. To illustrate, multiple studies, especially in the field of management, have looked at the scholarly impact. There were two levels of research - on the author level: "What causes a management article to be cited - article, author, or journal?" [2] , and on the journal level: "The influence of management journals in the 1980s and 1990s" [3]. Nevertheless, at the current moment there are no studies that have looked at the journal-field co-evolution. In this paper, we present the preliminary results of an ongoing research project based on data from a sample of 41 top-cited articles of the Social Network Journal are presenting the dynamics of citation rates of the journal within the timeframe and citation network of the Social Network Journal.

2 Methodology

The issue of journal impact is of great interest to researchers in many fields; the field of social networks is no exception. Usually, the choice of a journal for analysis is rather difficult, because usually several journals occupy a place of

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prominence and have different impact numbers reported in different databases. Such ratings are often subjective. This is not the case with the field of social networks; the *Social Networks* is the best journal to analyze, for a number of reasons. It was founded in 1978 and for a number of years, was the only journal for social network scholars to publish their research. Thus, it is possible to track the influence of the journal on the field and the influence of the field on the journal. Moreover, this journal is interdisciplinary and covers many subjects, such as mathematical methods of network analysis, applications of SNA to different subject matter areas, development and testing of new theory, etc.

To evaluate the impact of *Social Networks* Journal we examined the Eigenfactor indices (Fig.1) [4]. To calculate these indices, journals are rated according to the number of incoming citations, with citations from highly ranked journals weighted to make a higher contribution to the Eigenfactor than those from lower ranked journals. Article Influence is calculated by dividing the Eigenfactor score by percentage of all articles recorded in the Journal Citation Reports published in a specific journal. As is seen from the graph, these indices are influenced by the number of articles published per year, thus, the higher is the number of articles, the higher is the measure of influence. Moreover, also obvious is the decline in impact of *Social Networks* from 2013 to 2015. One possible explanation is an appearance of a new journal aimed at studying the field of network analysis – *Network Science*. In other words, such indicators of influence can hardly serve as a reliable or meaningful source of information about the journal-field mutual influence and co-evolution.

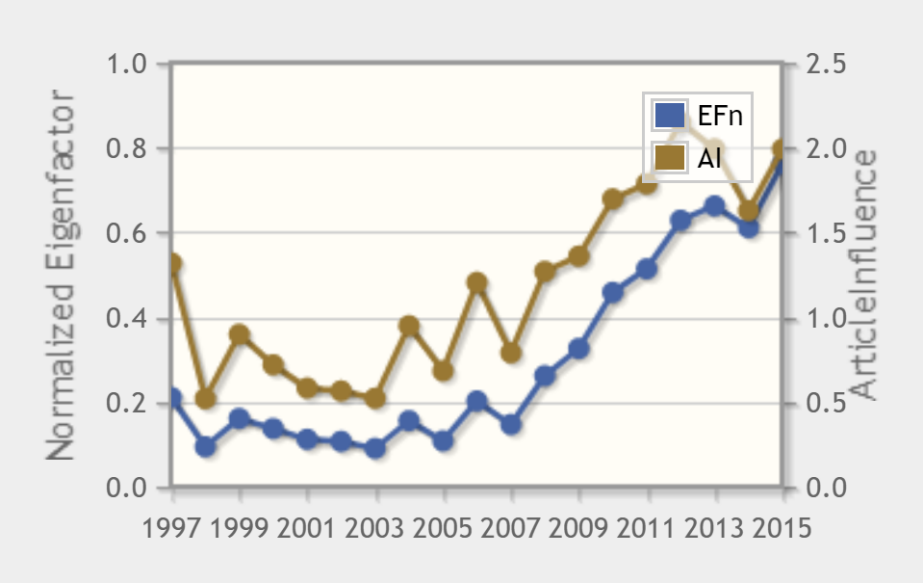

Fig. 1. Figure 1. Normalized Eigenfactor and Article Influence

For this study, we opted to use methods of network analysis to evaluate the impact of a network-subject journal, build the network of studies and authors, evaluate the longitudinal impact by building a co-evolutionary model of social influence, and as a result, trace the development of the field and determine the antecedents of scholarly influence. We created our measurement model on the network that consists of 41 articles with 41 citations or more and a matched set of top 200 articles with citations and without for trends in the following categories:

- **Methodology**: improvement of an existing method, testing of an existing method, application of an existing method to a new context;
- Proposition of a fundamentally new methodology;
- **Field**: Sociology (social influence, social selection), Management.

The next step in the study was to conduct the network analysis of the citing articles and fields. The goal was to track the field that published the most studies in *Social Networks* Journal and the influence of publications in that area. Our network model includes 125 peer-reviewed journals that have strong connection with *Social Networks*. Preliminary results indicate that each article from *Social Networks* Journal is connected, on average, with six other articles from other journals which cite the first article. In order to examine the research data, we used the "Mendeley" reference manager; for building sample articles the data was uploaded from *Science Direct* according to article citation level, and we used the *Polinode* platform for visualization. The results obtained are presented and discussed below.

3 Preliminary results

Results of the analysis of 41 top-sited articles are presented in Table 1.

As is evident from the table, high citation count is limited to specific topics and issues, i.e. the Issue 34 (1) covers the topic of spatial processes (Figure 2).

Articles that test existing methodology are cited the most, however, the number of citations normalized by article type is higher for articles that improve existing methodolody. Results are presented in Table 2.

Further analysis shows that the impact of the journal appears to reach most academic fields (Figure 3). Articles from Social Network Journal are colored blue, articles from the other journals are colored in accordance with the legend on the graph. The principal number of citations come from fields of Management (Academy of Management Journal, Academy of Management Review, etc.), Political Science (American Political Science Review), Sociology (American Journal of Sociology, American Sociologist, etc.), Biology, Statistics, Computer Science and a vast number of other fields. Thus, the Social Networks Journal seems to connect different fields of research by its interdisciplinary nature.

Issue	Sum of Citations	Year	Improve Existing Method	New Context	Testing of Existing Method	Social Influence	Social Selection	Management
Social Networks 34(1)	980	2012	2	-	6	4	2	2
Social Networks 34(2)	110	2012	-	-	-	1	1	1
Social Networks 34(3)	313	2012	2	1	3	2	-	-
Social Networks 34 (4)	472	2012	4	-	4	4	1	-
Social Networks 35 (1)	209	2013	1	-	-	-	1	-
Social Networks 35 (2)	389	2013	3	1	2	-	-	-
Social Networks 35 (3)	89	2013	1	-	1	2	-	-
Social Networks 35 (4)	50	2013	-	-	-	1	-	-
Social Networks 36	106	2014	1	-	1	2	-	-
Social Networks 37	55	2014	-	-	1	1	-	-
Social Networks 38	64	2014	-	-	1	-	-	-
Social Networks 39	43	2014	1	-	-	1	-	-
Social Networks	43	61	2015	-	-	-	-	1
Total	2941	-	15	2	19	18	6	3

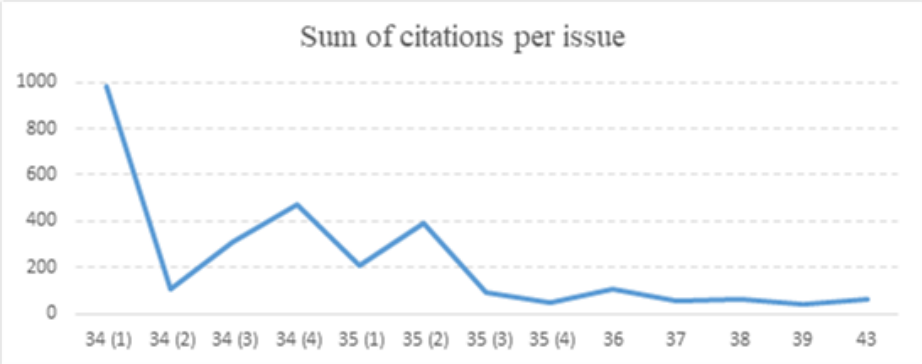

Fig. 2. Figure 2. Sum of citations per issue

Type of article*	New method	Improve existing method	No improvement	New context	Social influence	social selection	Management	Editorial
Number of articles	-	15	2	19	18	6	3	1
Number of citations normalized by article type	-	766,5	66,5	559,5	726	677	95,5	51

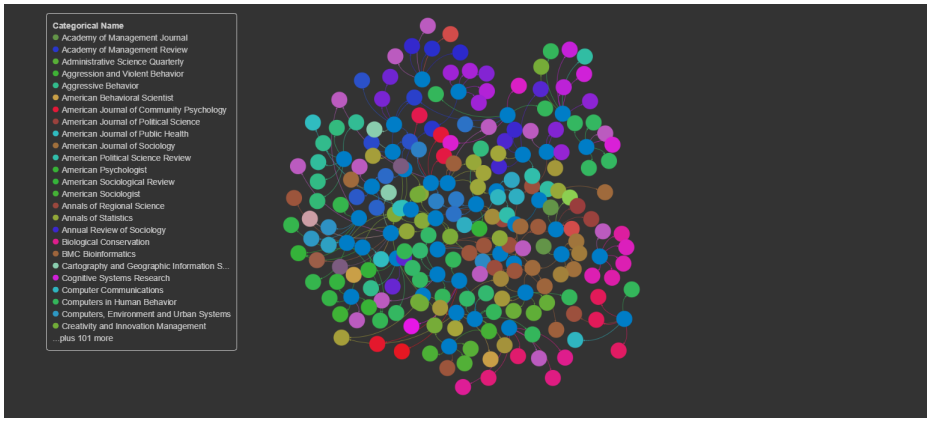

Fig. 3. Figure 2. Network model of Social Networks Journal articles citation

4 Conclusion

Though the results are only preliminary, it is already apparent that *Social Networks* as a journal has made a significant contribution to the development of social network analysis field. Though the journal publishes many different types of articles, those that apply new methods to new context appear to get cited the most. The range of fields that cite *Social Networks* is also rather broad; it appears that all social science fields are about equally affected by the journal's influence. We hope that further development of the model and testing of individual parameters will help understand the contribution that the journal, and all authors who published in it, have made to the development of science in social network analysis.

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