

Discussion on the Development of Journal *Industrial Technology Innovation*—as per a Bibliometric Perspective

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Abstract: Discovery and induction on experiences and circumstances are the cornerstones of the development of a journal. As per a bibliometric perspective, the Journal *Industrial Technology Innovation (ITI)* is taken as an example to carry out multi-dimensional analysis by statistics and coupling of essential parameters and data in Issues 1~15, and implement strategic practices in Issues 16~18. Analysis show that, (1) Young authors of post-80s and post-90s are the main forces of paper publication, and their research papers need more revisions and refinements for the improvement of writing quality; (2) Coverage of the journal is increasingly broadened while urging expansion of more impacts; (3) Amount of funded research papers is decreasing, indicating requirement of deep understanding on the management structures and operation mechanisms of various kinds of affiliations. Practices show that, the development of the Journal *ITI* must be based on a long-term strategy, and following principles must be obeyed: (1) Giving priority to social benefits while unifying social and economic benefits; (2) Giving priority to the quality while unifying quality and quantity; (3) Avoiding academic discrimination while unifying expert attraction and new scholar encouragement; (4) Fostering academic editors as specialists of various fields for their project participation and discourse power strengthening.

Keywords: *Industrial Technology Innovation*, Journal Development, Bibliometrics, Multi-dimensional, Coupling, Core Journal

1. Introduction

Academic journal, as an important part of publications, has been paid close attention to by researchers worldwide. China Center for Information Industry Development (CCID) is hosting 4 academic journals [1], where *Industrial Technology Innovation (ITI)* was officially founded bimonthly on April 25, 2014 [2]. As of the completion of this paper, the Journal *ITI* has published 18 issues, consisting of more than 600 research papers [3]. As a Chinese industrial journal of just 3 years, the ways to serve for the innovation of science and technology, to enhance its national and international influences, and to enter the indexes of core journal evaluations, are all essential topics that must be seriously considered.

Statistics of historical data using scientific methods such as bibliometrics can be helpful for the investigations of potential

regularities, problems and risks of journal (s). In this paper, all the 425 research papers from the first 15 issues published from April 2014 to August 2016 are bibliometrically analyzed, to point out the countermeasures and suggestions for the development planning and discipline construction of the Journal *ITI*. Moreover, recent published issues are taken as benchmarks for the feasibility of the opinions proposed.

2. Journal Development Experiences

Valuable experiences are obtained during the 3-year development of the Journal *ITI*.

2.1. Persistence on the Aims and Scopes, Abidance on the Publication Fundamentals

Promoting industrial technology innovation, urging for industrial reformation, and upgrading and serving for

national construction, are the aims and scopes of the Journal *ITI*, taken as the spirit since its foundation. In accordance with disciplines of CCID, and in adhere to the unification of responsibility/right/interest, national administrative laws and State Council regulations including *Regulations on the Administration of Publication* and *Provisions on the Administration of Periodical Publication* are strictly abided. National Standards in China (Guóbìāo) associated with publication are also obeyed at utmost [4-8].

2.2. Emphasis on the Column Construction, Solicitude for the Paper Highlights

Diversity of columns and specialization of papers are the width and the depth of an academic journal, respectively. The feasibility of column construction directly determines whether the characteristics of a journal can be appropriately embodied. Columns of the Journal *ITI* comprise a series of evolutions, such as initial options including *Technology & Innovation*, *Fundamental Research*, *Intellectual Property Rights & Standards* and *Comprehensive Review*, as well as more detailed subsequent options including *Industrial Science*, *Technological Design*, *Technological Transformation*, *Intelligent Control*, *Industrialization & Informatization Integration* and *Comprehensive Review*, which always conform to the dynamic variations and innovation perspectives of newly submitted manuscripts. Meanwhile, titles of 1~2 most representative papers in each column are listed in the cover of each issue, expecting attentions of researchers in the related cutting-edge fields.

2.3. Regulation on the Paper Style, Enthusiasm on the Impact Expansion

The paper style not only includes writing norms, but also includes the specification of paper elements such as figures,

tables and formulas. Each academic editor has various specialties for the elaboration of papers. Editing process of Chinese/English abstracts, keywords and references is enhanced. Authors are asked for raw figures or data, so that academic editors can standardize these elements that are not clear or artistic. Such a process can make authors and readers feel comfortable when reading the Journal *ITI*.

At the end of the year 2015, aiming to solve the bottleneck of manuscript insufficiency, CCID expanded the cooperation of calling for papers, laying out a considerable foundation for the increase of manuscripts in the year 2016.

3. Bibliometric Model

Numbers of published papers in the first 18 issues are shown in Figure 1. The statistical data and practical work reveal 3 aspects:

(1) Along with the foundation of the Journal *ITI*, strong supports were provided by core leaders and related departments. Number of published papers per issue maintained 22~23, and contribution fees were paid to all authors;

(2) From August 2015, manuscript insufficiency occurred. Although editors recommended the Journal *ITI* to previous schoolmates and colleagues, the hardship was maintaining for a long time;

(3) From the year 2016, the cooperation of calling for papers is deeply explored, so that the number of published papers per issue greatly increases, and more features are to be revealed.

Based on the situations from stability to decline to sharp increase, analysis and introspection are carried out as per the perspective of bibliometrics, expecting to seek out valuable information implicated in the historical data.

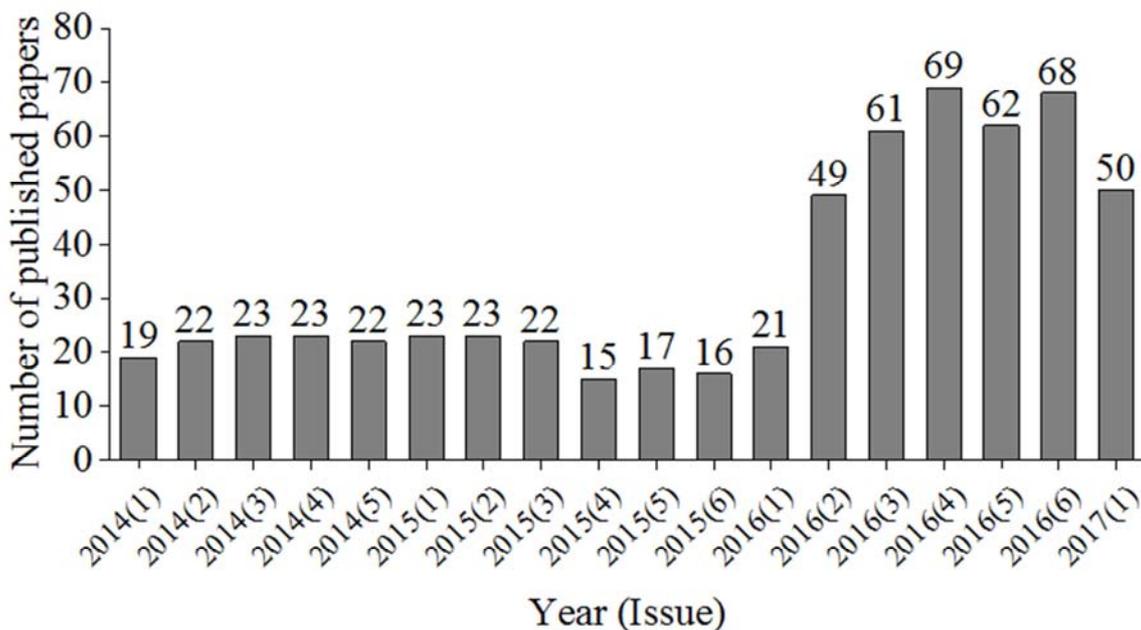


Figure 1. Number of published papers in the first 18 issues.

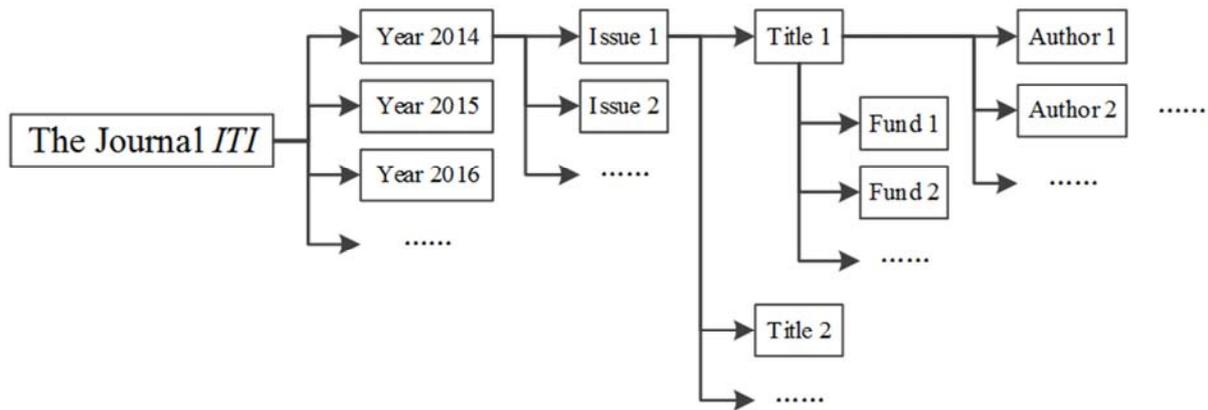
3.1. Journal Database Establishment

All papers in the 18 published issues of the Journal *ITI* are taken as data sources. By collecting the basic parameters of each paper, a complete set of journal database is formed.

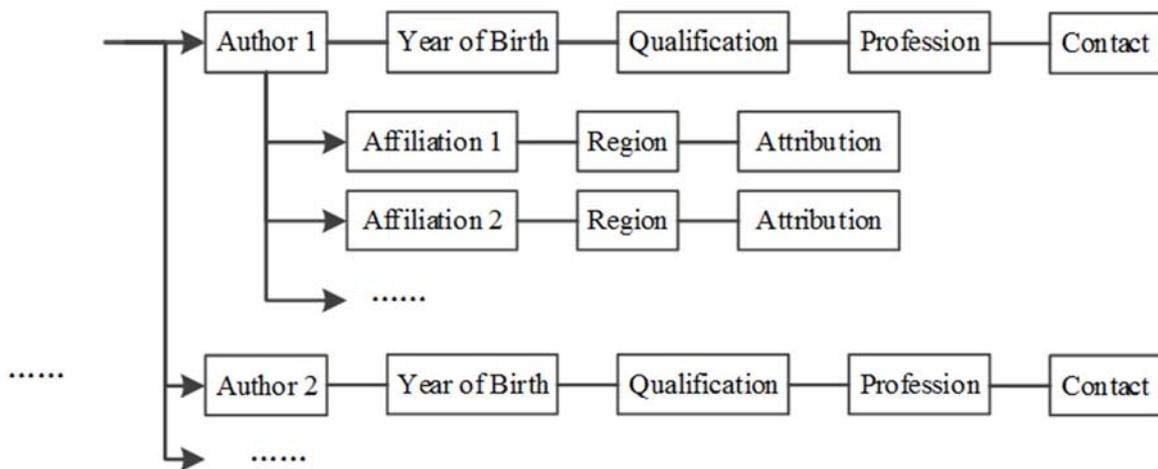
Definitions of basic parameters and their data structures are shown in Figure 2. The data amount of essential parameters of the first 15 issues (from April 2014 to August 2016) is shown in Table 1.

Table 1. Data amount of essential parameters of issues published from April 2014 to August 2016.

Essential parameter	Data amount
Titles	425
Funded papers	58
Authors	897
Affiliations	about 300
Regions	28



(a)



(b)

Figure 2. Definitions of basic parameters and their data structures. (a) Part 1 of 2; (b) Part 2 of 2.

3.2. Essential Parameters Coupling

Being benefit from the cross coupling characteristics between most of the essential parameters from the database, multi-dimensional investigations on the internal relations between them will greatly help to improve the quality of a journal for its breakthrough. The research contents and methods are as follows:

(1) The age structure, namely, the distribution of authors in each age level. Filter all the authors that marked their years of birth in the "biography" of their papers, to calculate the

respective proportion for the post-80s, post-90s, and so on.

(2) The region distribution, namely, the changes of paper origins as the years go by. Filter all the first authors, to perform classification according to the provinces (municipalities or autonomous regions) of their affiliations.

(3) The affiliation attribution, namely, the evolution of affiliation nature of published papers along with the transformation of the journal. Integrate the affiliations of all authors for each paper. If all the affiliations are "school" or "research institute and enterprise" for a certain paper, the attribution of it corresponds. Otherwise, the attribution

should be "school-enterprise cooperation".

(4) The funding, namely, the number of papers funded. Filter all the papers that marked the definition and identifier of funded projects, to perform classification according to the funded level. If a certain paper has more than one funded project, the highest level is taken into account.

4. Results and Analysis

Based on the bibliometric process, following results and analysis can be drawn.

4.1. Large Proportion of Young Authors

Figure 3 shows the proportions of authors in each age level by year. In general, the age distribution is stable. Because the Journal *ITI* only has experience of 3 years, and it has not yet become the core journal, the proportions of famous scientific researchers are low.

The post-80s and post-90s are the main forces, especially with highest proportion of more than 70% in the year 2014. Because most of them are post graduates or technical personnels with flexible ideas, innovative abilities and pressures on graduation or promotion, they are more likely to possess the dominant position in the research projects, although their manuscripts need more revisions and refinements for the improvement of writing quality.

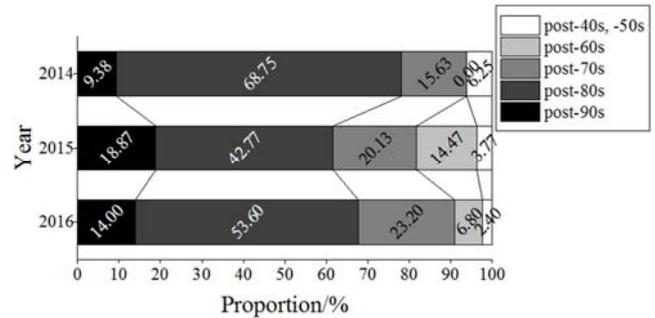


Figure 3. Proportions of authors in each age level.

4.2. Continuous Increase of Region Coverage

Figure 4 shows the number of published papers in each year by region. 3 papers from the United Kingdom or the United States do not participate in this statistics. In the year 2014 and 2015, Beijing possessed the largest proportions by 39.45% and 33.62%, respectively. In the year 2016, however, Beijing and Guangdong both became the most productive regions, but each by less than 10%.

Meanwhile, regions of authors are covering more broadly and averagely, the numbers of which are from 18 and 19 in the year 2014 and 2015 to 28 in the year 2016. The continuous increase of papers promotes the diversification of themes, enhances the options of columns, and raises the impact of the Journal *ITI*.

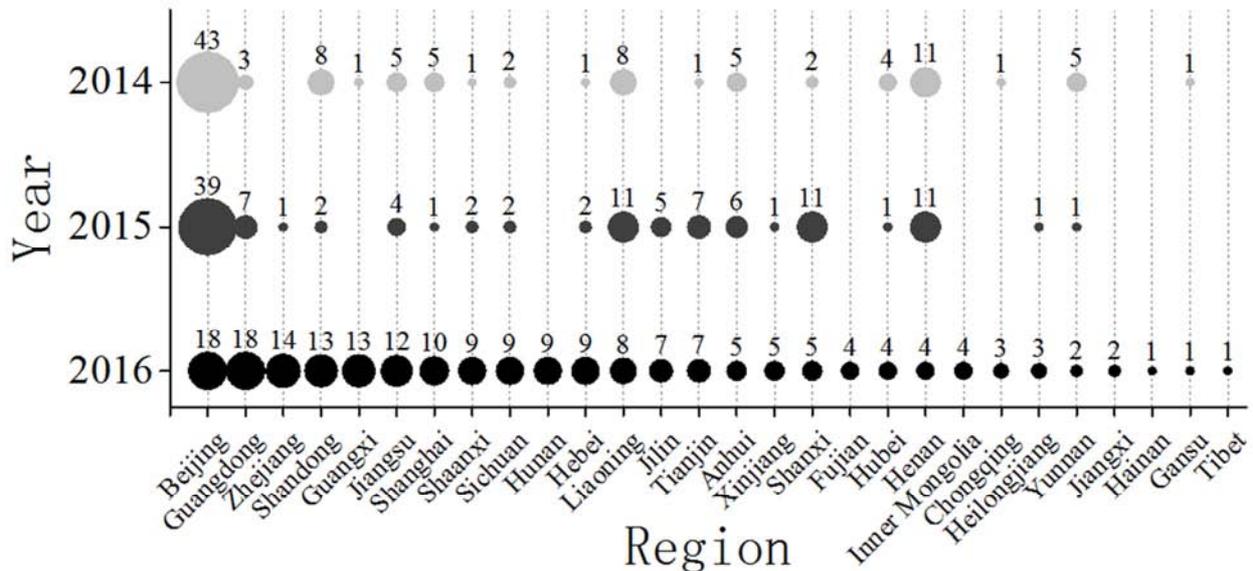


Figure 4. Number of published papers in each region.

4.3. Amount Decrease of Funded Papers

Figure 5 and Figure 6 show the evolution of affiliation attribution and funded level by year, respectively. According to the ups and downs of the data, 3 phenomena can be found:

- (1) National funds have positive correlation with papers from schools;
- (2) Provincial funds have positive correlation with papers from research institutes and enterprises;
- (3) Other funds including below provincial funds and

funds that are difficult for classification, have positive correlation with papers from school-enterprise cooperation.

Above phenomena are in accordance with management structures and operation mechanisms of various kinds of affiliations. In conjunction with practical situations, authors from enterprises is possessing large proportion with the transformation in the year 2016. However, most funded projects are mainly inclined to schools and research institutes, so that the amount decrease of funded paper is inevitable.

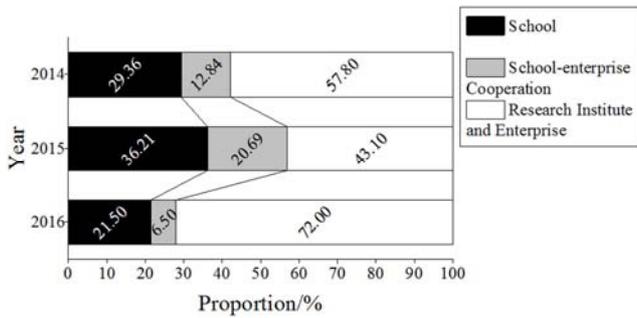


Figure 5. Affiliation attributions of published papers.

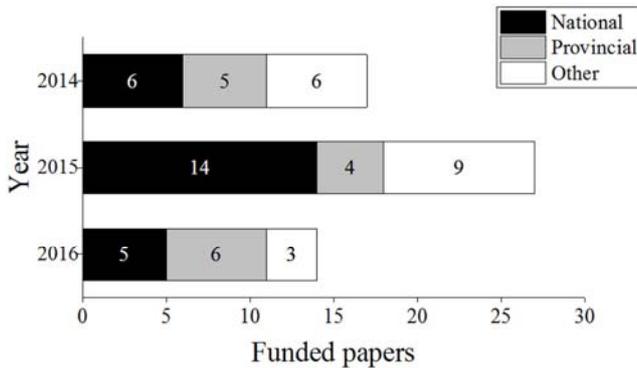


Figure 6. Number of funded papers.

5. Strategies and Practices

5.1. Giving Priority to Social Benefits While Unifying Social and Economic Benefits

In Sep 2015, General Office of the CPC Central Committee and General Office of the State Council commonly issued *Guidance for State-owned Cultural Enterprises on Giving Priority to Social Benefits while Unifying Social and Economic Benefits*, pointing out that the one-sided pursuit of economic benefits and ignorance of social benefits often occur along with the continuous deepening on economic development and cultural exchange [9]. As an academic journal organized by the Ministry of Industry and Information Technology, through study on the spirit of this document, senses of responsibility, urgency and mission were further attached to, so that more papers with academicness, specialness, scientificity and prospectiveness were received in the recent 3 issues.

5.2. Giving Priority to the Quality While Unifying Quality and Quantity

The content is the "king" of academic journals. Improving the quality of content is the eternal pursuit of readers, authors and editors. Feasible ways include: attendance in academic conferences, close contact with experts, journal recommendation to libraries and information propagation to colleges. The wider range of sources is bound to bring out higher qualities.

From Issue 17, quality is strictly concerned from paper elements including English abstracts, figures, tables,

formulas and references, as well as extra requirements such as "1 paper should be no less than 3 pages and contains no less than 2 technical figures", to enhance the readability of each paper.

From Issue 18, based on the previous situations from stability to decline to sharp increase, the unification of quality and quantity is achieved by optimizing the number of papers per issue to 45~50.

5.3. Avoiding Academic Discrimination While Unifying Expert Attraction and New Scholar Encouragement

Attracting manuscript submission or recommendation from famous experts can indeed harvest a multiplier effect. However, due to various subjective and objective reasons, some of the journals in China only accept papers from researchers of above a threshold (such as Ph.D. or above), which is overcorrect [10]. As previously stated, young researchers, even including high school students, are the main forces of project investigation and technological innovation. Although their academic presentation ability is weak, its enhancement can always be achieved periodically through the editing process, during which their writing skills and technological competence are also opened up.

5.4. Fostering Academic Editors as Specialists for Their Project Participation and Discourse Power Strengthening

A qualified editor of an academic journal must be a specialist in various fields. The cultivation channel is established, to lay out the foundation of talents for the sustained and healthy development of the Journal *ITI*. CCID has abundant academic resources [11]. The formation and fulfillment of rules and regulations are on their way to be enforced. Academic editors are urged to be initiative in participating in the project research, applying for the related funds and contacting with the industrial associations. "Going global" is also encouraged on the premise of essential task completion.

6. Postscript

The Journal *ITI* is also devoting to new publishing technologies including "Open Access (OA)" and "publishing ahead-of-print", which are along with the rise of digital publishing. Registration on ORCID (Open Researcher and Contributor ID) is also encouraged to authors. However, these never mean to perish the traditional publishing mode, because the hard copy of each paper is always a reflection of the *fructus industriales* of authors and editors, as well as a substantial carrier for communication and study. A printed academic journal is not only the presentation of the glory of academic researchers, but also the representation of the professional dedication of academic editors.

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