

Investigation on Regional Recognition of Open Access Journals

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Abstract—To investigate regional differences in open access among China, USA and Japan, we presented different test methods in contrast distributions of open access journals in SCI-E. We analyzed quartiles in category and influence of open access journals in basic subjects (mathematics, physics, chemistry) by JCR, found top 0.10% papers and highly cited papers according to baselines in ESI. The results show that Chinese scholars approved open access journals better than USA and Japan, the ratio is 6.78%; three countries have significant difference in OA overall distribution; OA articles of China increases significantly since 2008, while Japan is relatively stable growth in mathematics, fluctuating in physics and chemistry; three countries publish more than 30% in top 50% journals in the each subject; Chinese scholars issue more than 50% papers in open access journals of chemistry and mathematics; highly cited papers are mostly interdisciplinary research papers or publishing in interdisciplinary journals. Acceptances to OA journals seem likely to incline to some publisher's country/territory.

Keywords- Open Access; regional recognition; highly cited; Kruskal-Wallis test; Wilcoxon test

I. INTRODUCTION

Open access (OA) movement began in the 1990s. OA repository arXiv first appeared on the Internet in 1991. Its intention is to solve the current "crisis of scholarly journal publishing" to promote free access in Internet, dissemination of scientific research, academic exchange and information publication, and ensure long-term preservation of scientific information^[1]. The famous international Open Access Journals Directory DOAJ (Directory of Open Access Journals) only includes 375 kinds of peer-reviewed OA journals in 2003^[2], the number changes into 10,294 till February 2015, covers almost all of the disciplines, and promotes the free exchange of scholarly information, and maximize the impact of scientific research^[3]. Users reduce to rely on Library Information Resources in OA environment. OA publishing model presents a challenge to journal management of the traditional library^[4]. To understand the real quality of OA

resources, integrate OA resources for library, it becomes new challenges for library. At present, researchers focused on open access journals in ISI and other platforms (database) to find the status quo of open access journals in one disciplinary^[5, 6]; OA academic publishing features^[7, 8]; OA publishing how to affect the citation index, evaluation and control of OA quality^[9-16]; assessment of university research in network by OA^[17]; researchers accept open access to what degree^[18-20]; OA data format conversion, data download, etc.^[21-24]; OA journals distribution, acquisition mode, use status, trends, comparison in different countries^[25-38], etc. . In order to investigate regional differences in open access among China, USA and Japan, we chose SCI-E and used hypothesis test method, collected data of open-access journals and non-open access journals; compared the main research fields among China, Japan, and the United States to explore the similarity and differences in subject distribution of open access and non-open access papers; contrast differences among basic subjects (mathematics, physics, chemistry); analyzed main journals that three countries' scholars published their articles most in three subjects, and evaluated journals' quartile and impact in category according to JCR; at the same time, analyzed Top 0.10% highly cited papers (open access vs. non open access) based on baseline in ESI.

II. METHODOLOGY

Because SCI-E began to identify open access and non open access by refining results from 2014, therefore, we used the function to classify the data directly. We counted all published data in basic subjects (mathematics, physics, chemistry) and data from China, USA, Japan in 1985 to 2014 (retrieving time ended in 02/04/2015). And we used hypothesis method and other statistical method in analyzing data.

III. COMPARISON AND ANALYSIS

A. Comparison of published papers in China, USA, Japan

All three countries published papers as shown in TABLE I. The three countries published papers mainly in non open access journals, and Chinese scholars had the highest recognition of open access journals, 6.78% of their articles were published in open access journals, while the USA scholars only published 2.49% in OA journals. At the same time, we studied main research directions in open access, non open access, and total of three countries. We found the research directions are same in non open access and total published, non open access papers controlled major research direction. The first three research directions are chemistry, physics and engineering in China and the USA, while they are physics, chemistry, and engineering in Japan. Three countries' main research directions are apparently different in open access. Only three basic subjects of China are among the top 10, in which mathematics (13018 articles, top2), chemistry (7472 articles, top 4), physics (4855 articles, top10); Japan has two subjects into the top 10, physics (6894 articles, top4), chemistry (5848 articles, top5); and the United States only physics (8280 articles, top9) into the top 10. In physics the United States has contributed the most to global articles output (712,855), Japan (328,507) Second, China (296,836) Third, the three countries accounted for 46.58% of all the published papers in this subject; in chemistry USA (879,299) first, China (377,744) Second, Japan (297,518) Third, the three countries accounted for 45.53% of all the published papers in this subject; in mathematics USA (278,410) first, China (115,064) Second, Japan (43,459) Eighth, the three countries accounted for 44.23% of all the published papers in this subject. Therefore, we choose these three countries in our study.

TABLE I CHINA USA AND JAPAN PUBLISHED ARTICLES IN OPEN ACCESS AND NON OPEN ACCESS JOURNALS OF SCI-E

Country	Articles in OA	Articles in non OA	Total articles
China	129751	1784963	1914714
USA	239372	9371105	9610477
Japan	105968	2133282	2239240

B. Comparative study on open access journals in basic subjects among China, USA, and Japan in 2005-2014

We used multiple independent sample test Kruskal-Wallis H (K), respectively, in open access papers test of China, USA, and Japan from 2005 to 2014 among physics, chemistry, and mathematics (results in Table 2). The results indicated that three countries had significant difference in OA distribution, and there was significant difference in physics, mathematics.

For a more objective analysis of scholars' recognitions in three countries to open access, we let open access papers and non open access papers as a ratio (percentage) in three countries. The results showed that the trends were overall upward of physics, chemistry, mathematics in China and USA, and China increased significantly since 2008, while Japan was relatively stable growth in mathematics, and the others were fluctuating apparently.

TABLE II . KRUSKAL-WALLIS H TEST OF OA DISTRIBUTION IN BASIC SUBJECTS

country	physics	chemistry	mathematics
China(Mean Rank)	15.50	20.55	20.20
USA(Mean Rank)	21.60	13.70	19.60
Japan(Mean Rank)	9.40	12.55	6.70
N	10	10	10
Chi-square	9.603	5.073	15.015
Df	2	2	2
Asymp.sig	.008	0.079	.001

C. Analysis of Open Access Journals in China, USA and Japan (according to JCR)

We statistic the top ten journals that published open access papers most in physics, chemistry, mathematics of three countries (impact factor on the basis of 2013 JCR), the results were as follows: in physics there were three journals in Q1 (Quartile in Category), one in Q2, journals that published papers most were all in Q1 quartile of different branches in physics, and China had absolute advantage in journal "NANOSCALE RESEARCH LETTERS"; in chemistry there were three journals in Q2, Chinese scholars published more than 50% papers in the first three journals that published the most papers in chemistry; in mathematics three journals were in Q1, three journals in Q2 (we chose the highest quartile of each journal), Chinese scholars published more than 88% in the first three journals. And, by the impact factor trend of JCR we found just as Qin^[10] said that open access journals' impact factors didn't continue increasing and impact factors of OA journals were not higher than the non OA journals. Meanwhile, the acceptances of open access journals had something with journals' country/territory. As we saw PROGRESS OF THEORETICAL PHYSICS which published the most papers in physics, although published in English, the publisher was C / O KYOTO UNIV (Japan). Therefore, it mainly collected papers from Japan, 4445 papers were completed by the Japanese authors (total papers were 5019).

D. Comparisons in open access journals with non open access journals in basic subjects

1) Total comparison in open access journals with non open access journals in basic subjects

We used the Wilcoxon test and Sign test for paired samples as open access articles and non open access articles of 2005-2014 in physics, chemistry, mathematics for Nonparametric tests. The results showed that the overall distribution between open access and non-open access journals in the three subjects were significantly different (Wilcoxon test sig=0.005, Sign test sig=0.002). Major open access journals in physics were 49, while non open access journals were 1187 (the former: the latter was 1:24.22); major open access journals in chemistry were 52, while non open access journals were 1610 (the former: the latter was 1:30.96); major open access journals in mathematics were 83, while non open access journals were 1311 (the former: the latter was 1: 15.80).

2) Top 0.10% articles contrast in basic subjects

TABLE III TOP 0.10% ARTICLES BETWEEN OPEN ACCESS JOURNALS AND NON OPEN ACCESS JOURNALS OF 2005-2014

Subject	year	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Physics	Top 0.10% citations	507	428	396	417	310	260	174	132	56	14
	Total articles	124	134	143	122	155	165	195	191	273	410
	Non OA articles	123	134	143	121	152	163	195	191	272	403
	OA articles	1	0	0	1	3	2	0	0	1	7
Chemistry	Top 0.10% citations	507	481	450	442	362	320	209	156	64	17
	Total articles	156	144	166	169	218	225	270	251	388	527
	Non OA articles	156	144	166	169	362	225	269	250	388	523
	OA articles	0	0	0	0	0	0	1	1	0	4
Mathematics	Top 0.10% citations	176	162	143	132	97	76	52	31	16	7
	Total articles	119	96	107	98	129	130	142	181	185	122
	Non OA articles	116	94	103	95	126	123	134	167	163	114
	OA articles	3	2	4	3	3	7	8	14	22	8

According to per year cited indicators data of Baseline database based on ESI, we analyzed statistically top 0.10% articles of 2005-2014 among the three basic subjects. The results indicated the top 0.10% articles primarily published in non open access journals, open access journals in mathematics had more top 0.10% articles than in physics and chemistry (as shown in Tab.3).

3) Contrast highly cited papers between open access and non open access journals

We examined highly cited papers between open access journals and non open access journals respectively in physics, chemistry, and mathematics during 2005-2014. The highest cited paper in open access journals was Sakai, T, et al. 2005 “Low energy hadron physics in holographic QCD” published in Progress of Theoretical Physics (PHYSICS, MULTIDISCIPLINARY Q1, impact factor 2.056, journals ranking 18), which was cited 679; the most cited non open access journal article was Geim, AK, et al. published in Nature Materials 2007 (PHYSICS, APPLIED Q1, PHYSICS, CONDENSED MATTER Q1, impact factor 36.425, journals ranking 1) “The rise of graphene”, citations were 11639. The highest cited article in open access journal of chemistry was Bai, Hua et al. published in Sensors 2007 (CHEMISTRY, ANALYTICAL Q2, journals ranking 36, ELECTROCHEMISTRY Q3 journals ranking 15, INSTRUMENTS & INSTRUMENTATION Q1 journals ranking 10, impact factor 2.048) “Gas sensors based on conducting polymers”, had been cited 365 times; the most cited non open access journal article was Geim, AK, et al. 2007 published in Nature Materials (CHEMISTRY, PHYSICAL Q1, MATERIALS SCIENCE, MULTIDISCIPLINARY Q1, impact factor 36.425, journals ranking 1) “The rise of graphene”, 11,639 citations. The most cited open access journal article in mathematics was Friedman, Jerome, et al., published in 2010 Journal of Statistical Software (STATISTICS & PROBABILITY Q1 journals ranking 2, COMPUTER SCIENCE, INTERDISCIPLINARY APPLICATIONS Q1 journals ranking 9, impact factor 3.801) “The Regularization Paths for Generalized Linear Models via Coordinate Descent”, 659 citations; The most cited non open access journal article was Larkin, MA, et al. published in Bioinformatics (MATHEMATICAL & COMPUTATIONAL BIOLOGY Q1 journals ranking 4, BIOCHEMICAL RESEARCH METHODS Q1 journals ranking 12, BIOTECHNOLOGY & APPLIED MICROBIOLOGY Q1 journals ranking 18, impact factor 4.621) “Clustal W and Clustal X version 2.0”, 9012

citations. These highly cited papers were published in a professional journal and their quartiles in category were Q1. Interdisciplinary research or articles published in interdisciplinary journals were easy to widely cite.

In general, there are significant differences in the distribution between open access journals and non open access journals of the three basic subjects; Top 0.10% articles are major in non open access journals; the highest cited papers in open access journals and non open access journals were published in professional journals in Q1 quartile (that is, top 25% of journals in category), and these highly cited papers, mostly were interdisciplinary research papers or published in the interdisciplinary journals.

IV. CONCLUSION

Through comparative analysis of open access and non open access journals in physics, chemistry, and mathematics (three basic subjects), we found that Chinese scholars would like to publish their research in open access journals, the ratio was 6.78%; three countries had significant difference in OA distribution in three subjects, and there were significant difference in physics, mathematics; China and USA both increased in three subjects by the ratio of open access and non open access journals, and China increased significantly since 2008, while Japan was relatively stable growth in mathematics, fluctuating in chemistry and physics; the proportion of open access journals to non open access journals were 1:24.22 in physics, 1:30.96 in chemistry, 1:15.80 in mathematics, there were significant differences of open access journals and non open access journals in overall distribution of the three basic subjects; Top 0.10% papers mainly published in non open access journals; highly cited papers were published in professional journals in the Q1 quartile (that is, top 25% of their subject), and these highly cited papers, mostly were research papers cross different subject or published in interdisciplinary journals. The results showed that: open access journals in SCIE were still a small part, three countries published more than 30% in top 50% open access journals of each subject. Chinese scholars issued more than 50% papers in open access journals published in chemistry and mathematics. Highly cited papers, mostly were interdisciplinary research papers or published in the interdisciplinary journals. Acceptances of open access journals seemed likely to incline to some country/territory (eg. PROGRESS OF THEORETICAL PHYSICS). The United States and Chinese scholars would like to issue in open access journals, they would lead to more widely cited of open access journals as major

countries in basic research fields. So they would promote the development of open access journals. Meanwhile, we hope open access journals in China would continuously improve the quality to meet the scientific research needs of Chinese scholars.

ACKNOWLEDGMENT

This article is supported by Heilongjiang Art Planning Project(2015D087)

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