

# International references increase Chinese papers' citation impact

Kaile Gong<sup>1</sup>, Juan Xie<sup>1</sup>, Ying Cheng<sup>1</sup>, Yi Bu<sup>2</sup>, Cassidy R. Sugimoto<sup>2</sup>, and Vincent Larivière<sup>3</sup>

<sup>1</sup> [gong@smail.nju.edu.cn](mailto:gong@smail.nju.edu.cn); [xiejjuan9503@163.com](mailto:xiejjuan9503@163.com); [chengy@nju.edu.cn](mailto:chengy@nju.edu.cn)

School of Information Management, Nanjing University, Nanjing, Jiangsu 210023 (China)

<sup>2</sup> [buyi@iu.edu](mailto:buyi@iu.edu); [sugimoto@indiana.edu](mailto:sugimoto@indiana.edu)

School of Informatics, Computing, & Engineering, Indiana University Bloomington, Bloomington, IN 47408 (USA)

<sup>3</sup> [vincent.lariviere@umontreal.ca](mailto:vincent.lariviere@umontreal.ca)

École de bibliothéconomie et des sciences de l'information, Université de Montréal, Montréal, QC H3C 3J7, (Canada)

## Introduction

China has been the world's largest producer of academic publications since 2016 (Tollefson 2018). Although English is the current scientific lingua franca (Gordin 2015), Chinese remains its predominance in China's scholarly communication (Shu et al. 2018). The progress of science requires researchers to understand previous literature before doing their research, and the abundant Chinese academic resources can provide an easily accessible and understandable literature foundation for Chinese scholars. However, the language barriers, cultural identity and other factors make a part of Chinese scholars be lacking in international outlook and fail to incorporate international literature (Gong et al. 2019). Since contemporary scientific exchanges are international, and such internationalization has shown a positive influence on scientific impact (Sugimoto et al. 2017), we may hypothesize that a lack of use of international scientific literature has a negative effect on its scholarly impact. In this study, we take citation count as the indicator of academic impact, and the language of cited references as an indicator of using international scholarly literature.

## Methodology

### Data

The bibliographic and citation data of 37,801 papers published from 1998 to 2009 in 14 library & information science (LIS) journals were collected from the Chinese Social Science Citation Index (CSSCI), which is a China's leading and authoritative database for scholarly citations in social sciences. All of the included papers are written in Chinese, and the first authors are all affiliated to China's institutions.

### Key variables

Key variables are shown in Table 1. Y is the indicator of papers' academic impact; X1~X5 reflect different features of foreign language references.

**Table 1 Key variables and definition**

Code	Variable	Definition
Y	Five-year cumulative citation count	The number of citations, within CSSCI, received by the paper in five years after being published.
X1	Number of cited foreign language references	The number of non-Chinese references, including all document types, in the paper's reference list.
X2	Number of cited foreign language journal articles	The number of non-Chinese journal articles in the paper's reference list.
X3	Number of cited foreign language journal articles weighted by journal reputation	The weighted number of non-Chinese journal articles in the paper's reference list. The weight is equal to zero if the cited journal was not indexed by Journal Citation Report (JCR) in the cited article's publishing year; otherwise, it's equal to the cited journal's Journal Impact Factor Percentile (JIFP) <sup>1</sup> in the cited article's publishing year. The articles published before 1997 (earliest year covered by JCR) are calculated as 1997.
X4	Number of cited foreign language journal articles that belong to the same discipline as the citing paper	The number of non-Chinese journal articles, whose journal is classified as <i>Information Science &amp; Library Science</i> in Web of Science or <i>Library and Information Science</i> in Scopus, in the paper's reference list.
X5	Number of cited newer foreign language journal articles	The number of non-Chinese journal articles, whose age is smaller than the median age of foreign language journal articles cited in the same year, in the paper's reference list.

<sup>1</sup> <http://help.incites.clarivate.com/incitesLiveJCR/glossaryAZgroup/g8/9586-TRS.html>

### Control variables

The control variables are shown in Table 2. All of them are verified to affect papers' citation counts by previous studies (Tahamtan et al. 2016). X6~X8 are the paper-related factors, X9 is the journal-related factor, and X11~X14 are the author-related factors.

**Table 2 Control variables and definition**

Code	Variable	Definition
X6	Document type	Research article or review.
X7	Length	The number of pages in the paper.
X8	Early received citations	The number of citations, within CSSCI, received by the paper in the first two years after being published.

X9	Journal reputation	Whether the paper was published in a leading journal, which belongs to the <i>Catalogue of Leading Journals in Humanities and Social Sciences</i> <sup>1)</sup> , or a general-journal.
X10	Number of authors	The number of co-authors of the paper.
X11	Number of institutions	The number of institutions of co-authors of the paper.
X12	Type of first author's institution	Whether the first author's institution is a university, public library, or research institute.
X13	Level of first author's institution	985 <sup>2)</sup> , 211 <sup>3)</sup> or general-university; national-, provincial-, or city-library; national-, provincial-, or city-research institute.
X14	Foundation	Whether the paper was supported by national-, provincial/ministerial-, city/school -, or non-foundation.

1) <http://skch.nju.edu.cn/regulation>

2) [http://www.moe.gov.cn/srcsite/A22/s7065/200612/t20061206\\_128833.html](http://www.moe.gov.cn/srcsite/A22/s7065/200612/t20061206_128833.html)

3) [http://www.moe.gov.cn/srcsite/A22/s7065/200512/t20051223\\_82762.html](http://www.moe.gov.cn/srcsite/A22/s7065/200512/t20051223_82762.html)

### Statistical analysis

The Mann-Whitney U test is used to analyse whether there is a significant difference in the five-year cumulative citation count (Y) between papers with foreign language references and those without. Multiple linear regression is used to analyse the relationships between citations and foreign language references. Papers with foreign language references are taken as samples in the regression, the dependent variable is  $\log_{10}(Y + 1)$ , and X1~X14 are the independent variables. All of the categorical variables are converted into dummy variables.

### Results

Among all LIS papers included in this study, the papers with foreign language references are in the minority (37%), but the average five-year cumulative citation count of them ( $\bar{Y} = 2.71$ ) is higher than that of papers without such references ( $\bar{Y} = 1.55$ ). The result of Mann-Whitney U test ( $Z = -31.063$ ,  $p < 0.01$ ) demonstrates that the numbers of citations received by papers with foreign language references and those without differ significantly.

Table 3 shows that the regression is significant ( $F(10, 13923) = 1805.399$ ,  $p < 0.01$ ) and approximately 56.5% of variance in citations can be explained ( $R^2 = 0.565$ ). Tests to see if the data meet the assumption of collinearity indicate that multicollinearity is not a concern (all VIFs  $< 5$ ). After controlling widely-recognized factors, among papers with foreign language references, those citing more foreign language references (X1:  $\beta = 0.026$ ,  $p < 0.01$ ), more articles published in prestigious (X3:  $\beta = 0.031$ ,  $p < 0.05$ ) and own discipline's (X4:  $\beta = 0.042$ ,  $p < 0.01$ ) journals can receive more citations, but those citing more articles published in low-level journals belong to other disciplines cannot (X2:  $\beta = -.054$ ,  $p < 0.01$ ). In addition, the timeliness of cited foreign language journal articles has no significant effect on the citing papers' citation counts (X5:  $p > 0.1$ ).

**Table 3 Results of the regression analysis**

Independent Variable	Standardized Coefficients ( $\beta$ )
<i>Features of cited foreign language references</i>	
X1	.026***
X2	-.054***
X3	.031**
X4	.042***
<i>Paper-related factors</i>	
X6 (Review)	.026***
X7	.049***
X8	.725***
<i>Journal-related factor</i>	
X9 (Leading-journal)	.041***
<i>Author-related factors</i>	
X13a (985-university)	.029***
X14 (National-foundation)	.015***
R <sup>2</sup> = .565	F(10, 13923) = 1805.399
	Sig. = .000

\*\*p < 0.05, \*\*\*p < 0.01, N = 13934, all VIFs < 5

### Conclusion

We find that the inclusion of international literature helps to enhance Chinese papers' academic impact. It may be because of the instrumental function of references -- signalling readers works they may be unaware of (Merton 1988). In this case, papers with international references become a window for domestic scholars to understand the work of international peers and thus play a key media role in the diffusion of knowledge from the international to the local. In short, diversity and openness can facilitate scientific research.

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