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Analysis of Evaluation Indicators of Academic Journals Based on the Background of Digital Communication

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Abstract

In order to test the impact of the communication of new media on the evaluation of academic journals, this paper carries out the evaluation indicator analysis of academic journals based on the background of digital communication. Firstly, taking Chinese science and technology journals as the research object, the WeChat official account is selected as an example of new media platforms, and the authoritative indicators are selected from the citation report and WeChat platform to represent the evaluation of journals and the influence of the WeChat official account respectively. Then, the journals were grouped according to whether they had opened a WeChat public account. And the most representative evaluation indicator of the journal, impact factor was selected as the explained variable. Regression analysis of the impact factors was carried out through other indicators. Finally, this paper obtained the impact factor regression analysis results based on the opened WeChat, not opened WeChat, and the full sample journals. It is proven that digital media has a significant effect on the promotion of the influence of journals. Under the environment of new media communication, the function of the historical scale variables of journals has been weakened to a certain extent.

Keywords: digital communication, academic journals, journal evaluation, WeChat, impact factor

1. Introduction

In the era of diversified information dissemination channels, almost all information seekers are capturing the latest information on the internet. For academic journals to seize development opportunities in the new media environment, it has become an inevitable choice to innovate the operation of journals while maintaining the original academic concept.

Among Chinese academic journals, the main digital dissemination platforms currently in operation are websites, emails, WeChat public accounts, microblogs, Jitterbug, Bilibili, etc. WeChat public account is the most mature and influential new media platform for Chinese academic journals among them (Zhang et al., 2022). Since WeChat public accounts contribute a huge Internet influence to Chinese academic journals, it becomes necessary to study the role

of WeChat public accounts in the evaluation of academic journals.

2. Review

Existing scholars have invested many efforts in new media communication of journals and academic journals evaluation. This paper reviews the relevant and important results.

A study focused on open access and peer review in the digitization of journals, selected indicators of journal characteristics from multiple journal databases, and explored how such information can be used to better understand specific journals and scholarly publishing systems (Gu & Blackmore, 2017). A study of management journals in the SSCI database examined the application of digital services in journals and explored the extent to which journals can leverage the advantages of digital communication to enhance their influence (Milan & Alexander, 2020). A study launched an international survey to discuss the credibility and quality of academic journals in digital communication (Tenopir et al.,2016). A study looked at the leading digital journals and their journal evaluation metrics based on managed journals in the SSCI database from 1989 to 2016 (Dilger & Klus, 2019).

A study of international emergency medicine journals presented a multivariate model that selected the most representative citation indicators to evaluate medical journals (Antonio & Ines, 2017). A study took open-access journals as the research object and used Scopus as the database of influence evaluation of open-access journals to study the influence of citation indicators and open-access metric indicators on journals (Wei, 2020). A study discussed many problems with citation-based evaluation methods for journals, focusing on the comprehensive citation of cited articles (Bharathi, 2011). A study of legal journals discussed the limitations of journal rankings and journal citation reports and illustrated the impact of database bias on journal rankings through case studies (Eisenberg & Wells, 2013).

In the evaluation of academic journals, a series of indicators show the influence of journals from many aspects. This paper will take the Chinese Science and Technology Journal Citation Report as an example to carry out the research. The citation report includes 18 measurement indicators (Institute of Scientific and Technical Information of China, 2023). It includes two categories that are journal citation measurement indicators and source journal measurement indicators. This paper takes the journals included in the Catalog of China Science and Technology Journals in 2022 as the research object, adds the influence indicators of the journals' WeChat public accounts on the basis of the citation reports, and analyzes the evaluation indicators of Chinese academic journals under the background of digital communication.

3. Statistical Description of Variables

3.1 Description of Variables

In order to reflect the digital communication influence of journals, WeChat public account is taken as an example to display the digital platform communication effect of academic journals by selecting WeChat communication indicator (*WCI*) and the number of subscribers of WeChat public accounts (*FANS*). The data are from Qingbo (https://www.gsdata.cn/), accessed on February 19th, 2023.

From the journal citation report, this article chose 11 variables to describe the journal evaluation. The variables are journal impact factor (*IF*), the number of citations (*CITE*), the number of funds the paper received (*FUND*), the number of institutions involved by the author of the paper (*INST*), the number of regions to which the author belongs, the number of overseas authors included in the journal paper (*OVERSEA*), the number of the publication of the journal in the current period quantity (*PUBLISH*), the total publication quantity (*SIZE*), the establishment years (*AGE*), the interdisciplinary influence (*SUBSPD*), the influence within the discipline (*SUBIN*).

3.2 A Statistical Description of a Variables

As can be seen from Table 1, various variables show great differences in data statistics. In terms of skewness, *WCI*, *FANS*, *FUND*, *INST*, *REGION*, *SIZE*, and *AGE* show the characteristics of the right-sided thick tail. *IF*, *CITE*, *OVERSEA*, *PUBLISH*, *SUBSPD*, and *SUBIN* have the characteristics of a left thick tail. From the perspective of kurtosis, there are extremely dense distribution intervals for *OVERSEA*, *SUBSPD*, and *SUBIN*.

Table 1. Description of Statistical Characteristics of Journal Evaluation Indicators

Variables	Mean	Md	Max	Min	Std. Dev.	Skewness	Kurtosis	N
IF	0.86	0.61	9.42	0.01	0.97	3.92	27.15	396
WCI	3.78	5.67	9.34	0.00	2.94	(0.47)	1.31	396
FANS	5.66	8.06	11.96	0.00	4.46	(0.41)	1.31	396
CITE	6.25	6.22	9.82	3.66	0.96	0.11	3.38	396
FUND	0.61	0.63	0.98	0.00	0.19	(0.57)	3.17	396
INST	3.98	3.99	5.94	0.00	0.69	(2.13)	15.44	393
OVERSEA	0.06	0.02	12.00	0.00	0.60	19.72	391.33	396
PUBLISH	4.67	4.64	6.85	3.00	0.56	0.46	3.63	396
REGION	2.86	2.94	3.40	0.00	0.43	(3.87)	24.89	396
SIZE	8.55	8.60	12.41	0.00	0.88	(4.50)	46.84	396
SUBSPD	2.05	1.66	81.20	0.10	4.17	17.36	329.72	396
SUBIN	0.89	0.81	54.00	0.00	2.71	19.09	373.60	396
AGE	3.68	3.69	4.75	1.95	0.33	(0.67)	7.10	396

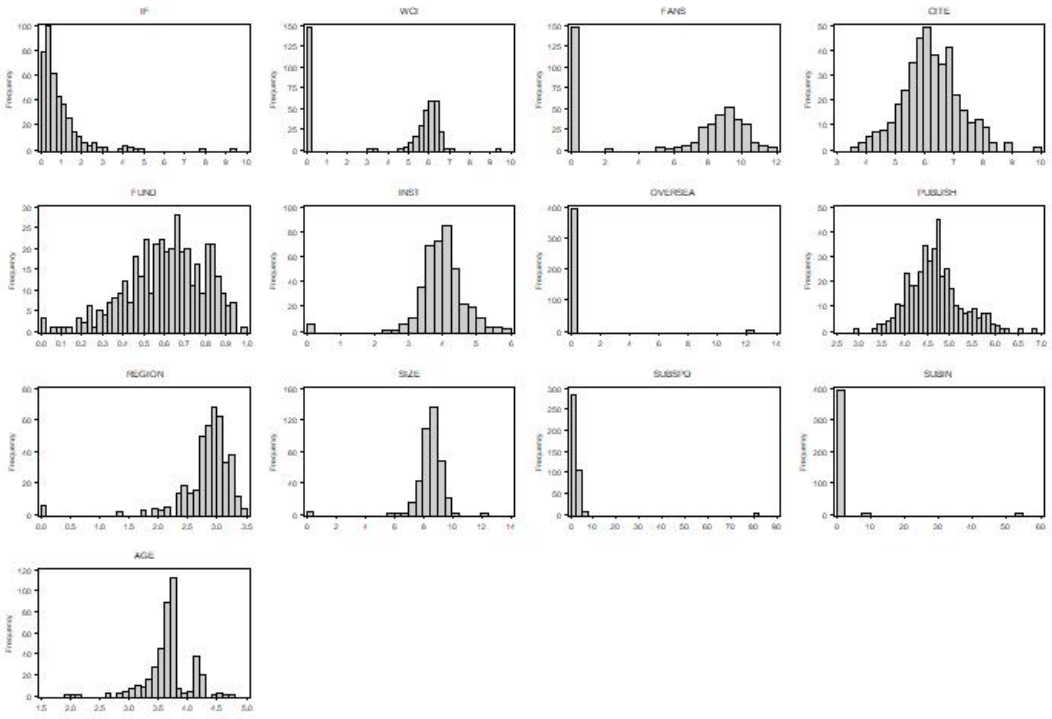

Figure 1. Distribution of Journal Evaluation Indicators

As can be seen from Figure 1, the distribution of *IF* presents an obvious right skew. The distributions of *CITE*, *FUND*, *PUBLISH*, and *AGE* are closer to the normal distribution. The distribution of *INST*, *REGION*, *SIZE*, and *AGE* presents a left skew. It can be seen that *CITE*, *FUND*, and *PUBLISH* are evenly distributed among all variables.

4. Analysis of Impact Factors of Academic Journals

4.1 Journal Impact Factor Analysis Based on the Full Sample Range

The research object of this paper is from the core catalog of Chinese science and technology

journals. The number of the remaining journals is 396 after eliminating the journals without records. As the impact factor is still the most important indicator in the current journal evaluation system, this paper will carry out a regression analysis on the impact factor of journals through other indicators.

Among all the periodicals in the sample group, 249 journals have opened WeChat official accounts, while the remaining 147 journals have not. In the full sample of journals, for journals that do not have an official WeChat account, the value of 0 is assigned in both *WCI* and *FANS* variables.

Table 2 shows the regression results of the journal impact factors for the full sample. It can be seen from Table 2 that the regression coefficients of *FUND*, *OVERSEA*, *SUBSPD*, and *SUBIN* are not significant. Especially after adding *OVERSEA* as the explanatory variable, the coefficient of *OVERSEA* is negative, which is against the practical significance. This result indicates that *OVERSEA* is multicollinearity with the previous variable. Therefore, the above four variables are removed from the regression model. The following impact factor regression model is obtained based on the full sample of journals.

$$IF = 0.0829 + 0.17 * WCI + 0.12 * FANS + 0.84 * CITE + 0.12 * INST + 0.65 * PUBLISH + 0.28 * REGION + 0.15 * SIZE + 0.17 * AGE \quad (1)$$

Table 2. Regression Results of Impact Factors based on the Full Sample Journals

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.0829	0.0416	1.9935	0.0469
WCI	0.1724	0.0641	2.6909	0.0074
FANS	0.1183	0.0423	2.7960	0.0054
CITE	0.8439	0.0397	21.2743	0
FUND	0.0442	0.1827	0.2419	0.8090
INST	0.1166	0.1014	1.6945	0.0933
OVERSEA	-0.0413	0.0505	-0.8182	0.4137
PUBLISH	0.6451	0.0850	7.5904	0
REGION	0.2763	0.1292	2.1386	0.0331
SIZE	0.1479	0.0343	4.3113	0
SUBSPD	0.0036	0.0077	0.4660	0.6415
SUBIN	0.0004	0.0113	0.0365	0.9709
AGE	0.1685	0.0986	2.0671	0.0927

4.2 The Impact Factor Analysis of Journals Without WeChat Official Accounts

As can be seen from Table 3, in the regression analysis of journal impact factors in the samples of periodicals without WeChat official accounts, the coefficients of *FUND*, *OVERSEA*, *SUBSPD*, and *SUBIN* are not significant. Therefore, these variables are eliminated from the regression analysis of impact factors of journals without WeChat official accounts. From the results in Table 3, we can get the following regression model of impact factors based on journals without WeChat official accounts.

$$IF = 0.47 + 0.63 * CITE + 0.29 * INST + 0.58 * PUBLISH + 0.35 * REGION + 0.07 * SIZE + 0.64 * AGE \quad (2)$$

Table 3. Regression Analysis of Impact Factors of Journals Without WeChat Official Accounts

Variables	Coefficient	Std. Error	t-Statistic	Prob.

C	0.4679	0.123693	3.7824	0.0002
CITE	0.6294	0.0541	11.6339	0
FUND	0.1221	0.2501	0.4883	0.6261
INST	0.2923	0.1588	1.8413	0.0677
OVERSEA	-0.0323	0.0394	-0.8189	0.4143
PUBLISH	0.5836	0.1014	5.7567	0
REGION	0.3496	0.2055	1.7010	0.0912
SIZE	0.0722	0.0324	2.2274	0.0275
SUBSPD	0.0052	0.0064	0.8120	0.4182
SUBIN	0.0013	0.0088	0.1519	0.8795
AGE	0.6446	0.0544	11.8547	0

4.3 Impact Factor Analysis Based on the Journals that Have Opened WeChat Public Accounts

As can be seen from the regression results in Table 4, the coefficients of *FUND*, *INST*, *OVERSEA*, *REGION*, *SUBSPD*, and *SUBIN* are not significant in the impact factor analysis results of journals with WeChat official accounts. After eliminating these variables, the impact factor regression model based on the journals within WeChat official accounts has been obtained.

$$IF = 0.2 + 0.23 * WCI + 0.1FANS + 1.01 * CITE + 0.59 * PUBLISH + 0.2 * SIZE + 0.11 * AGE \quad (3)$$

Table 4. Analysis of the Impact Factors of Journals with WeChat Official Accounts

Variables	Coefficient	Std. Error	t-Statistic	Prob.
C	0.2000	0.1044	1.9164	0.0565
WCI	0.2322	0.0932	2.4915	0.0134
FANS	0.1029	0.0462	2.2271	0.0269
CITE	1.0135	0.0737	13.7586	0
FUND	0.0796	0.2495	0.3192	0.7499
INST	-0.0041	0.1336	-0.0304	0.9758
OVERSEA	-0.9111	1.2056	-0.7557	0.4506
PUBLISH	0.5853	0.1437	4.0737	0.0001
REGION	0.1559	0.1694	0.9200	0.3585
SIZE	0.1980	0.0758	2.6125	0.0096
SUBSPD	0.0239	0.0571	0.4187	0.6758
SUBIN	0.1116	0.2042	0.5467	0.5851
AGE	0.1054	0.0464	2.2698	0.0241

5. Conclusions

From the regression results of impact factors based on the full sample journals, it can be seen that the number of citations still has the greatest impact on the impact factor *IF*, followed by the number of annual papers published. WeChat communication indicator (*WCI*) and WeChat public account subscriber (*FANS*) have little difference in the impact factor. However, the regression results confirm the significant effect of new media platforms on the influence of academic journals. Therefore, it can be concluded that the opening of WeChat official accounts can significantly improve the influence of academic journals. On the contrary, since both interdisciplinary influence and intra-discipline

influence of journals have no significant effect on the impact factors, it can be considered that the subject influence indicator of journals is relatively independent from other evaluation indicators in the evaluation indicators of academic journals. The subject exchange indicator of periodicals reflects the subject influence of periodicals more than the journal influence.

According to the regression model based on the impact factors of journals without WeChat official accounts, compared with the regression results of the full sample journals, the main factors of explained variables have not changed in the regression results of impact factors of journals. The biggest influence is still the number of citations and the number of papers published each year. However, among the samples of journals without WeChat official accounts, the age of journals has an important impact on the journal impact factor. This conclusion can be drawn from the larger coefficient of journal age in formula 2.

According to the regression analysis based on the impact factors of journals that have opened WeChat official accounts, compared with the samples of journals that have not opened WeChat official accounts, the impact factors of journals that have opened WeChat official accounts are no longer affected by the regional distribution of paper authors. After the opening of the digital communication platform, the influence of regional restrictions on journals is no longer significant. Compared with the full sample of academic journals, the impact factors of the samples of journals that have opened WeChat public accounts are more influenced by the number of citations. It has been driven down by the number of papers published by journals each year. It is also reduced by the age of the journals. It can be concluded that the role of traditional channels on journal influence has shrunk to a certain extent under the communication effect of digital platforms.

6. Recommendations

Academic journals should strengthen the spirit of innovation and improve their operation concepts with the times. From the above regression results, it can be seen that the impact factor of academic journals has improved significantly after the opening of WeChat public accounts. Therefore, it can be concluded that strengthening the ability of journals to operate new media channels can inherit the historical influence of academic journals. Academic journals should strengthen their service consciousness and direct readers' attention to journal content through the new media platform. The influence of academic journals can be improved by new media.

Academic journals should improve the service function of new media channels and create a high-quality new media communication platform. Due to the interactive nature of the new media platforms, academic journals should pay attention to the needs of readers and attract users' participation in the dissemination of academic results. Academic journals can combine the technical advantages of new media channels with traditional editorial systems to attract readers to participate in hot discussions. The operation of digital platforms can enable academic journals to conduct academic research based on maintaining user groups, thus helping journals achieve the dual goals of improving timeliness on the Internet and ensuring quality in paper journals.

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