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# CONTEMPORARY PROBLEMS IN REPORTING THE EFFECTIVENESS OF SCIENTIFIC RESULTS – SCOPUS, WEB OF SCIENCE, AND THE NATIONAL CITATION INDEXES<sup>1</sup>

**Abstract**: The article presents the evaluation of scientific publications of Bulgarian scientists. The current problems in journal indexing in the field of social sciences and humanities in the most popular databases are discussed. There is emphasized the necessity to be established a national citation index for increasing the visibility of scientific results and for improving the quality of scientific publications through criteria relevant to the practice. The national citation index is highlight as a reliable tool for assessing the scientific results of Bulgarian scientists.

Keywords: databases, citations, references, national citation index, social sciences.

<sup>&</sup>lt;sup>1</sup> The article is a result of the project "Design and Development of a Prototype of the Information System", "Citation Index of Publications by Bulgarian Authors (Social Sciences)" (Contract № DN 15 / 11 December 2017), funded by the National Science Fund of Bulgaria (Ministry of Education and Science).

## The hegemony of the most popular databases

The citation indexes related mostly to the impact factor, which strongly deformed the scientific publication activities in the previous years, are a major challenge today. A lot of scientists from all over the world pay attention to the deficiency of metrics and relativity in reporting the effectiveness of scientific result.<sup>2</sup> The impact factor is often criticized mainly because of the increasing trend of the conscious manipulation with the journal citation index by its publishers or/and editors with the so-called journal self-citation<sup>3</sup>, coercive citation<sup>4</sup>, and citation stacking<sup>5</sup>. Such a behaviour is most often explained by the editorial politics and practices of various scientific journals, influenced by the conditions and related interests. These organizational and political aspects must be continuingly analyzed, identifying the reasons for manipulation with the impact factor. However, the approach to assessing the prestige of universities and researchers, as well as relating the evaluation results with their funding, represent another challenge.

The main disadvantages of Scopus and Web of Science are the language barrier and scientific fields. The language barrier is the main one. Although the publishing language of a scientific journal officially does not matter, both databases have specific criteria about the bibliography – it must be written in Latin script. This limits the opportunities for citing publications in other orthographic systems like Cyrillic. The existing transliteration of any system generates various mistakes and it is often impossible to find the cited publications transliterated with non-standardized systems. That influences the scientific metrics<sup>6</sup>. On the other hand, there is a strong limitation of the thematic coverage in the included

<sup>&</sup>lt;sup>2</sup> А. Д. Полянин, "Недостатки индексов цитируемости и Хирша и использование других наукометрических показателей", *Математическое моделирование и численные методы* бр. 1 (2014): 131–144.

<sup>&</sup>lt;sup>3</sup> D. Straub and C. Anderson, "Journal self-citation VI: Forced journal self-citation – Common, appropriate, ethical?", *Comm. Assoc. Inf. Syst.* no. 25 (2009): 57–66.

<sup>&</sup>lt;sup>4</sup> Allen W. Wilhite and Eric A. Fong, "Coercive Citation in Academic Publishing", *Science* no. 6068 (2012): 542–543.

<sup>&</sup>lt;sup>5</sup> Petr Heneberg, "From Excessive Journal Self-Cites to Citation Stacking: Analysis of Journal Self-Citation Kinetics in Search for Journals, which Boost their Scientometric Indicators", *PLoS One*. No. 4 (2016), https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0153730 (accessed 18 May 2019), DOI 10.1371/journal.pone.0153730.

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journals. Both databases index publications in social sciences and humanities, but they are not numerous comparing with the publications in natural sciences, mathematics, and informatics.

The main question is where can be indexed the scientific publications concerning a non-English region? Where can be indexed the scientific publications in the fields where foreign scientific literature cannot be used, but only literature published in languages which do not use Latin script? Such scientific fields are national languages and literature, national history, cultural heritage, and other regional topics.

Web of Science and Scopus are the only sources used for world university ranking. The lack of data from countries like Bulgaria distorts the results because there is no real recognition of the quality of their scientific publications. Korean scientists<sup>7</sup> made a comparison of the results in the most popular databases, Google Scholar and Korean Citation Indexes. Korean scientists have reached three very important conclusions, which reveal the relativity of the results in using only few databases for bibliometric and scientometric analysis:

- The coverage of non-English journals in the three databases Web of Science, Scopus, and Google Scholar is minimal;
- Google Scholar includes more English and more non-English publications;
- The number of citations depend on the journals indexed in the database, so there are significant differences in scientific metrics.

With the increasing number of databases and included publications (as well as those included in the most popular databases), the control can be reduced. The authors' names are often misspelled. Some of them are even missing. This is a serious distortion of metrics. The quality can be guaranteed only when there is a strong bibliographic and authority control in the process of indexing, which can ensure the correct spelling of authors' names. It can be achieved with national citation indexes, developed by all participants in the scientific communication – authors, publishers, and librarians.

It must be mentioned that Web of Science and Scopus are maintained by private corporations. The Impact Factor can be considered as a system which binds academic societies with organizations (mainly private companies) serving and measuring the scientific ranking of journals in various scientific fields.

<sup>&</sup>lt;sup>7</sup> Jank Kiduk and Lee Jongwook and Choi Seon-Heui, "Comparison of Citation Indexes in Korea: An Exploratory Study", *Collnet Journal of Scientometrics and Information management* no. 2 (2013): 231-245, DOI 10.1080/09737766.2013.832905

With the passing of time, the corporations aggressively impose their interests in the world of science, which forms strong commercialization of publication activity. It is not committed with the desire to integrate the achievements of research and practice (business), but with the necessity of paying the access to the databases. The national licenses provide the scientists with the access (full or limited) to the contents of corresponding journals. Interediate organizations are the strongest part of the scientific communication and the exchange of knowledge. They are at the "input" and the "output" of the process of popularizing the scientific results.

Undoubtedly, the abovementioned databases have a profitable business model. They mediate or offer services, which have been accepted as "ideal" and "inestimable" since their emerging, and impose their business policy on all research areas, implementing "standards" of the structure of scientific publications. Thus, they affect the career development of scientists and the recognition of their achievements. Actually, they already control the access to knowledge.

#### The role of national citation indexes

The review of literature and practice in scientometrics shows that a lot of countries developed national indexes which present the scientific publications of researchers, because the majority of publications of scientists from non-English speaking countries remain "invisible" and unavailable for the world scientific community.<sup>8</sup>Most organizations which have established national citation indexes point out as a main reason for their development the launching of favourable conditions for assessment of scientific publications. A citation index can be used not only for assessment of scientists but in university accreditation and ranking, as well as in the elaboration of national policy in science, academic publishing, and quality of scientific editions. Thus, most of the scientific citation indexes have been developed with the support of the corresponding ministries of education and science.

The main focus of all national citation indexes is the improvement of the visibility of researchers and the inclusion of regional researches which are not indexed in the most popular databases. The national citation indexes have been launched during the last thirty years, from the late 1980s. In the beginning,

<sup>&</sup>lt;sup>8</sup> M. S. Galyavieva, "Bibliometric Analysis of the Document flow of Informetrics Based on the Russia Science Citation Index", *Scientific and Technical Information Processing* vol. 41, no. 4 (2014): 220–229.

most of them included scientific publications in social sciences and humanities because they were less represented in the most popular databases.

Table 1 presents the data for some of the existing citation indexes, the years of their establishment, and the institutions financing their maintenance.

| Citation index  | Establishment<br>year | Institution financing its maintenance   |
|---|-----------------------|---|
| China Scientific and Technical<br>Papers and Citations    | 1989                  | Institute for Scientific and<br>Technical Information   |
| Taiwan Citation Index –<br>Humanities and Social Sciences | 1999                  | National Central Library,<br>Department in Humanities and<br>Social Sciences<br>Ministry of Science and<br>Technology<br>Science and Technology Policy<br>Research and Information Center |
| Russian Science Citation Index                            | 2005                  | Ministry of Education and Science   |
| Korea Citation Index                                      | 2007                  | National Research Foundation of Korea   |
| Serbian Citation Index                                    | 2007                  | Center for Evaluation in Education and Science  |
| Pol-index   | 2007                  | Ministry of Education and Science   |
| Indian Citation Index                                     | 2010                  | The Knowledge Foundation  |
| ASEAN Citation Index                                      | 2010                  | Ministry of Education of<br>Corresponding Countries   |
| Greek Citation Index                                      | 2011                  | National Documentation Center   |
| Malaysian Citation Index                                  | 2011                  | Ministry of Education   |
| African Citation Index                                    | 2017                  | The Council for the Development<br>of Social Science Research<br>in Africa  |

*Table 1.* Some national citation indexes according to the year of establishing.

One of the first national citation indexes is the China Citation Index.<sup>9</sup> The Chinese researchers are the third in number, after the USA and Russia, but not

<sup>&</sup>lt;sup>9</sup> China Scientific and Technical Papers and Citations Database, http://en.cqvip.com/cstj.html (accessed 18 May 2019)

more than 5% of their publications are indexed in the most popular databases.<sup>10</sup> The Institute for Scientific and Technical Information began the development of China Scientific and Technical Papers and Citations in 1987. One year later, there were 1189 journals indexed and today there are more than 12,000. The database provides access to more than 30 million full-text articles and over 40 million references in all scientific fields.

Another good example is the ASEAN Citation Index,<sup>11</sup> launched in 2010 by the Association of South-East Asian Nations (ASEAN) with 10 countries participating – Brunei, Cambodia, Indonesia, Laos, Malaysia, Myanmar, Philippines, Singapore, Thailand, and Vietnam. The main goal of the member states in the Association is to collaborate in economics, social activities, science, culture, technology, education, and other fields, and in the promotion of regional peace and stability. The Steering Committee of ASEAN Citation Index consists of two representatives, nominated by the Ministry of Education of each member country. It manages and provides sustainability of the citation index. As a result of the establishment of this citation index, the number of scientific publications of researchers from South-East Asia countries increased more than three times – from over 6,000 publications in 1996 to over 28,000 publications in 2008.

In 1999, two scientific centers were established in Taiwan – Research Center for Social Sciences and Research Center for Humanities. Their role was to establish and maintain citation indexes in corresponding scientific fields. It is very important to be mentioned that they do not include information that can be found in other databases.<sup>12</sup> The country has an active policy in this field, trying to contribute to the increase in the scientific results of Taiwan scientists, enhancing the quality of scientific journals, making the achievements of Taiwan scientists visible, stimulating the development of science and research in significant subject for the country and the region, as well as contributing to adequate assessment of researchers in the country.

The Taiwan Citation Index – humanities and social sciences<sup>13</sup> was established in 2013 after the merging of both indexes. It is coordinated and maintained by the National Central Library, Department of Humanities and Social

<sup>&</sup>lt;sup>10</sup> Yishan Wu et al., "China Scientific and Technical Papers and Citations (CSTPC) : History, impact and outlook", *Scientometrics* vol. 60 no. 3 (2004): 385–397.

<sup>&</sup>lt;sup>11</sup> Asean Citation Index, https://www.asean-cites.org/ (accessed 18 May 2019)

<sup>&</sup>lt;sup>12</sup> Kuang-hua Chen, "The construction of the Taiwan Humanities Citation Index", Online Information Review vol. 28, no. 6 (2004): 410–419.

<sup>&</sup>lt;sup>13</sup> Taiwan Citation Index – Humanities and Social Sciences, http://tci.ncl.edu.tw (accessed 18 May 2019)

Sciences, Ministry of Science and Technology, and Science and Technology Policy Research and Information Center. There are indexed over 1,220 scientific journals, monographs, and dissertations.

One of the biggest citation indexes is the Russian Science Citation Index.<sup>14</sup> It was established in 2005 as a project (http://elibrary.ru/project) financed by the Ministry of Education and Science of Russia. The main aim of the project was "the necessity for establishing an objective system for evaluation and analysis of publication and citation activities of national researchers, organizations, and publications",<sup>15</sup> because only 10% of scientific publications of Russian scientists are indexed in the most popular databases. At the beginning of 2019, over 6,000 scientific journals have been indexed. Most of the publications are full text, but access to some of them is paid. The system is constantly improving. A service was implemented in 2011, permitting every author to register, check and specify his publications and citations in the database. A year later, information and analysis system for organizations was implemented, which offered various scientometric retrievals, reports, and analysis. It must be mentioned that there can be found a lot of Bulgarian researchers who work in the social sciences and humanities. The Russian Science Citation Index is maintained by a private company after the end of the project. It requests subscription and offers paid services.

A good example of a qualitative citation index is the Polish Citation Index,<sup>16</sup> which is also established in 2005. It is a part of the university education system and its launching and maintaining is financed by the European Social Fund – Operational Programme "Human Resource Development 2007-2013". The citation index is the main tool which is used by the Ministry of National Education in Poland. The main role in the maintenance of the index has the Polish national bibliography, which is a source for bibliographic data of scientific publications in the country.

The first citation index in the Balkans is the Serbian Citation Index.<sup>17</sup> It was established by the Centre for Evaluation in Education and Science (CEON/ CEES)<sup>18</sup> in 2007, providing access not only to citation information and scientometric reports, but to the full text of Serbian scientific publications. Its main

<sup>&</sup>lt;sup>14</sup> Russian science citation index, https://elibrary.ru/projects/citation/cit\_index.asp (accessed 18 May 2019)

<sup>&</sup>lt;sup>15</sup> Russian science citation index, https://elibrary.ru/projects/citation/cit\_index.asp (accessed 18 May 2019)

<sup>&</sup>lt;sup>16</sup> POL-index, https://pbn.nauka.gov.pl/polindex-webapp/# (accessed 18 May 2019)

<sup>&</sup>lt;sup>17</sup> Serbian Citation index, https://scindeks.ceon.rs/ (accessed 18 May 2019)

<sup>&</sup>lt;sup>18</sup> Centre for Evaluation in Education and Science, https://ceon.rs (accessed 18 May 2019)

aim is to support "quality of the papers published in journals of our partners and clients, providing researchers easy access to the papers and, at the same time, producing indicators suitable for evaluation". There are indexed over 251 journals.

The national citation indexes present the national scientific production and provide metrics for evaluation of researchers and institutions. Some of them have an aim to implement their data in the most popular databases after the improvement of the database on a national level. Examples of such databases are the Korean Journal Database and the Russian Science Citation Index, which are part of the collections of the Web of Science. This contributes to better visibility of authors. There is a major breakthrough – since 2018, publications with parallel references in Latin and Cyrillic can be found indexed in the most popular databases. However, the Cyrillic references cannot be searched. This is a significant step for including non-English publications and references in the future.

#### The Bulgarian experience and the problems related to social sciences

The Bulgarian efforts involved the establishing of a citation index in one scientific field. The first attempt was made by the Central Medical Library in 1993. Bulgarian Medical Literature database was launched including articles and reviews from Bulgarian and foreign authors from authoritative Bulgarian journals on a university level of medicine.<sup>19</sup> Due to technological development, there were some software changes and conversion of records. Some data was lost. Today, the database continues to be developed and it indexes more than 150 Bulgarian medical journals and symposiums since 1996. Unfortunately, it is accessible only offline and cannot be used by internet users.

The experience of the University Library at the Academy of Economics "D. A. Tsenov" – Svishtov is also interesting. In collaboration with the Bulgarian software company PC-TM, modules of the library system AB have been developed. <sup>20</sup> Users can search by cited author or title. The main disadvantage is the lack of metrics. Although the system is for local use only, it is useful for professors and librarians for bibliometric and citation retrievals.

The main disadvantage of the Bulgarian policy in evaluation the scientific publications is the requirement to be used only the most popular databases in the

<sup>&</sup>lt;sup>19</sup> Central Medical Library, http://cml.mu-sofia.bg/cmb\_htm/CML\_Sofia\_Mobile/Bazi\_Danni. html (accessed 18 May 2019)

<sup>&</sup>lt;sup>20</sup> The most used library system in Bulgaria developed by PC-TM

process of assessing the social science publications and citation activities. Thus, the publications in Bulgaria cannot be reported. This is fully understandable because there is no tool for identification of publication and citation activities – there has not been developed such a system yet. Meanwhile, as it was mentioned above, researchers who work in the social sciences have limited visibility, so the scientific achievements of these researchers cannot be evaluated at the moment. For example, according to data given by Clarivate Analytics<sup>21</sup> and presented during a seminar held in Sofia on 17 April 2019, the number of indexed Bulgarian journals in Web of Science is 56<sup>22</sup> and only 15 of them belong to the Core Collection. Most of the indexed Bulgarian journals are in the field of natural sciences, mathematics, and informatics (14). Only one journal is in the field of arts and humanities and none in social sciences (Fig. 1).



#### Figure 1. Bulgarian journals belonging to the Core Collection of Web of Science<sup>23</sup>

<sup>&</sup>lt;sup>21</sup> Thomson Reuters sold its scientific and information products for 3,55 billion dollars in July 2016. The new owners of the scientific and information division are Onex Corp. and Baring Asia, which manage the new company Clarivate Analytics, http://www.clarivate.com/ (accessed 18 May 2019)

<sup>&</sup>lt;sup>22</sup> Eniko Tot Szasz, "Arts and social sciences and Humanities in Web of Science" (Seminar of Web of Science, Sofia, Bulgaria, 17 April 2019], slide 12.

<sup>&</sup>lt;sup>23</sup> Eniko Tot Szasz, "Arts and social sciences and Humanities in Web of Science" (Seminar of Web of Science, Sofia, Bulgaria, 17 April 2019], slide 21.

In the Emerging Sources Citation Index, only 37% of the included publications are in social sciences, and 16% in arts and humanities. Most of the publications (88%) are in English (Fig. 2).

Figure 2. Indexed journals in Scopus (in %)



The number of journals indexed in Scopus was 90<sup>24</sup>, while 30 of them dropped out until January 2019. So the number of journals indexed in this database is 60. Only 15% of them are published in Bulgarian. Two titles (3%) are in social sciences, and two titles are in humanities.

Besides these good practices in Bulgaria, all scientific libraries in the country, publishers, and researchers should develop a citation index. In this way, there will be launched a citation index similar to the existing national citation indexes in other countries. Obviously, they can be a good example for the development of a national system which can index all Bulgarian scientific journals.<sup>25</sup> The visibility of scientific results would increase significantly, and the quality of scientific publications relevant for Bulgarian practice would be improved.

<sup>&</sup>lt;sup>24</sup> Scientific Resources : A list of Bulgarian journals, indexed in Scopus, http://resursi.blogspot. com/p/scopus.html (accessed 18 May 2019)

<sup>&</sup>lt;sup>25</sup> Support of the idea for establishing a National citation index is declared in an open letter from researchers from the Institute of Balkan Studies with Centre of Thracology – Bulgarian Academy of Science to the Minister of Education and Science from 23 April 2019, https://www.peticiq. com/-otvoreno-pismo\_ibct (accessed 18 May 2019)

A three-year project "Design and Development of a Prototype of the Information System", "Citation Index of Publications by Bulgarian Authors (Social Sciences)" is underway at the Sofia University "St. Kliment Ohridski". It is financed by the National Science Fund of the Ministry of Education and Science (contract DN15/11.12.2017). The aim of the project is to create a model and system software prototype for identification and processing of the Bulgarian scientific publications in social sciences. The goal to be achieved is the validation of data for citations and citing authors, as well as additional processing of data for references and citation reports. Although the prototype is announced to be for publications in social sciences and the first indexed journals will be in the same scientific field, the prototype will receive scientific publications in all science fields. The establishment of the system is a prerequisite for qualified bibliometric and scientometric reports, including an adequate evaluation of the scientific contribution of each researcher in the country. The possibility of combining efforts to be established a regional union citation index remains open.

The team of the project shares the opinion that there is a change in the process of scientific communication in the digital era. The review of most popular databases (Web of Science and Scopus) and the national citation indexes shows that they are focused on traditional ways of visibility. The Impact Factor (IF) remains the most popular metrics for evaluation of scientific journals and Hirsch index (h-index) for researchers and institutions. There is a lot of digital scientific content in open access and there are new possibilities for evaluation of scientific publications. The changing scientific environment leads to digital publishing of journals and it predetermines the emerging of new quantitative metrics like Usage Factor (UF) and Web Impact Factor. Thus, quantitative metrics are a prerequisite for forming a new bibliometric concept that overcomes the basic evaluation of the logic of citations among authors, inherited from the paper world, re-evaluate the role of readers compared to the authors.<sup>26</sup> It is obvious that there is a need of a relevant model for measurement and evaluation of scientific results, which takes into account the technology progress and contemporary communication possibilities for exchange of knowledge.

<sup>&</sup>lt;sup>26</sup> Maria Casella and Oriana Bozzarelli, "Nuovi scenari per la valutazione della ricerca tra indicatori bibliometrici citazionali e metriche alternatice nel contest digitale", *Biblioteche oggi* vol. 29, no. 2 (2011), 66–78.

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# САВРЕМЕНИ ПРОБЛЕМИ У ПРИКАЗИВАЊУ ЕФЕКТИВНОСТИ НАУЧНИХ РЕЗУЛТАТА – СКОПУС, ВЕБ ОВ САЈЕНС И НАЦИОНАЛНИ ЦИТАТНИ ИНДЕКСИ

Сажетак: У раду је приказана евалуација научних публикација бугарских научника. Разматрају се актуелни проблеми у индексирању часописа у области друштвених и хуманистичких наука у најпопуларнијим базама података. Истакнута је неопходност успостављања националног цитатног индекса за повећање видљивости научних резултата и побољшање квалитета научних публикација кроз критеријуме релевантне за праксу. Национални цитатни индекс је истакнут као поуздан алат за процену научних резултата бугарских научника.

**Кључне речи**: базе података, цитати, референце, национални цитатни индекс, друштвене науке.

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