

Croatian Journals Covered by SCIE/SSCI: the Story from the Periphery

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Abstract

The study analysed Croatian journals covered by Web of Science (WoS) Science Citation Index Expanded (SCIE) and Social Science Citation Index (SSCI) over three time periods. The first two periods were the periods of inclusion of Croatian journals in SCIE/SSCI, and the third period was the period of exclusion of journals. In 1999, there were 12 Croatian journals indexed, and in 2011, mostly as a result of the WoS Regional Expansion Programme, there were 50 Croatian journals covered by SCIE/SSCI. The IF range of the Croatian journals showed an increase over the years from 1999 to 2011, but most journals remained in the fourth quartile (Q4). Although Croatia is considered as a country from the scientific periphery, in comparison with neighbouring Italy, Hungary, Slovenia, and Serbia in 2005, 2011, and 2018, Croatia had a permanently strong journal representation in JCR.

Keywords: Croatian journals, SCIE, SSCI, international visibility, bibliometric analysis

1. Introduction

Croatia is considered a country from the scientific periphery, with a small economic potential and low share of gross domestic product (GDP) allocated to research and development [1], [2]. Majority of Croatian scholarly journals are published by organizations and institutions funded by the government [3]. Journals of cultural, national or regional importance receive financial support from the Croatian Ministry of Science and Education and should be non-profit [4].

Scientific journals are the major medium of exchange and dissemination of scientific information [5] and reflect potential and performance of scientific community [6]. Journals from the periphery usually have poor international recognition due to many factors such as small author pool, poor review process, limited finances, language of publication other than English, and low visibility [7]. Although they strive to become included in the major indexing databases, most are rejected. Although such journals may publish important results, they cannot reach a broader scientific community.

In 1961, the Institute for Scientific Information (ISI) from Philadelphia, USA, began to compile Science Citation Index (SCI) database, which included journals

from the field of natural and applied sciences. The selected journals were considered to the “core of scientific production”[8]. In 1970, another ISI database was compiled – Social Science Citation Index (SSCI). Both databases use clearly defined criteria that journals have to meet in order to be included, and both are available through the Web of Science (WoS) database service owned by Clarivate Analytics. In 1975, Eugen Garfield, the founder of ISI and creator of SCI/SSCI indices, created another special statistical database called Journal Citation Reports (JCR) as a quantitative tool to rank, evaluate, categorize and compare journals [9]. Every journal after being indexed in the WOS SCIE or SSCI for at least two years receives an impact factor (IF) and quartile (Q) ranking in the relevant subject category based on the IF. A journal’s IF is a ratio where the numerator is the number of citations in the current year to items published in the previous two years (all items including editorial material, letters, news, book reviews, bibliographical items, etc.) and the denominator is the number of original research articles, case studies, short communication, professional papers, proceeding papers, and reviews published in the same two years [10].

Wos SCI and SSCI had been the only data sources available for citation analysis until 2004, when Scopus and Google Scholar were launched. Scopus is Elsevier’s bibliographic and citation multidisciplinary database. In comparison with WoS, it has lower inclusion criteria and covers more journals. Google Scholar is a search engine that crawls the web and indexes any document with a seemingly academic structure, counting the citations [11].

Journals published in developing, non-English speaking countries from the scientific periphery were poorly represented in the SCI and SSCI databases [12]. Although many of these journals did not meet the required standards nor publish “good” manuscripts, it was obvious that regional journals were not seriously evaluated for the inclusion in WoS indexes. Journals from the USA and Western Europe were clearly favoured in the selection process [13]. In response to this and to the emergence of new citation databases, the Editorial Development Department of Thomson Reuters, the owner of the ISI and WoS from 1992 to 2016, started the Regional Expansion programme in 2006 [14], which indexed the best of the regional journals on the basis of their regional relevance. Thus WoS ensured regional research to become visible to the broader international scientific community. As for the Croatian journals, in the period from 2006 to 2011, forty more of them became indexed by SCI/SSCI. Most of them still are.

Hrčak, the central portal of Croatian scientific journals, was launched in 2006 as an outlet for journals without the infrastructure for e-publishing and an interface for free access to journals’ content [4]. Due to Hrčak, Croatian scientific journal obtained greater international visibility, but they also had to upgrade their editorial practices to meet the Hrčak requirements. Together with realization of WoS Regional Expansion programme, the improvement of editorial practice created good conditions for indexation. Also, to increase the number of Croatian journals covered by their services and to speed up the indexing process, cooperation with Elsevier and Thomson Reuters has been established [4].

According to the number of scientists, Croatia has a considerable number of indexed scholarly journals as the result of a long-term and systematic government support of scholarly publishing [15]. In 2005, Croatia had more than twice as many JCR-indexed journals as Hungary, Italy, Slovenia, Serbia, and Montenegro when normalized to GDP [16].

Within this historical, bibliometric, and context, the chronological order of inclusion and exclusion of Croatian journals from SCI/SSCI is presented. The analysis was performed to determine the number of Croatian journals that were and still are covered by SCIE/SSCI; the effect of citation data before indexing on covering the journals; the types of articles published by Croatian indexed journals; the JCR subject categories that Croatian journals belong to; the level of international orientation for Croatian indexed journals; and the reasons for the exclusion of individual journals from SCIE/SSCI.

2. Methods

The analysis included Croatian journals covered by WoS SCI and SSCI since 1975, when the first Croatian journal was indexed in SCI. Three time periods were analyzed: the period of journal inclusion from 1975 to 1999, the period of intensive journal inclusion during Thomson Reuters' Regional Expansion Programme from 2006 to 2011, and the journal exclusion period from 2011 to 2015.

For both journal inclusion periods, the first indexed volume of a journal was selected for analysis. It was assumed that the first indexed volume had the same qualitative and quantitative characteristics as previous volumes evaluated for the covering. On the other hand, for several journals the first indexed volume was the first volume ever, for their start year was the same as the year of their indexing. As editors set the criteria they adhere to and apply to every volume, it may be assumed that a single volume can represent the entire journal.

Eugene Garfield defined three broad criteria that are used in the evaluation of journals for SCI/SSCI coverage: citation data, journal standards, and expert judgment [17].

Citation data for Croatian journals before the coverage were calculated using WoS tool - Cited reference research. Citation data spanned the period from 1955 to the year of indexation. Journal standards, such as regularity (frequency), peer review of submissions, requirements for abstracts, titles, and references set by professional associations of publishers and editors, editorial board membership, and similar characteristics were not included in the analysis as journals would not even be considered for the inclusion had they not met these basic standards.

The analysis was focused on the number of papers published by an indexed journal within one volume, the first indexed volume, and types of articles published: research paper, short communication, review, case report, professional paper, conference paper, editorial, letter to editor, book review, biographical item, news item, and meeting abstract. As WoS offers no information on the type of article, older journals were manually searched to determine the types of articles, while other

journals were searched by HRCĀK, the central database of full-text articles published in Croatian scientific and professional journals, which was established in 2006.

JCR subject category is added to every journal.

Garfield suggested that if a journal is of interest to only a small region of the world, ISI indexes are less likely to cover it [17]. A Croatian journal's international orientation was determined from the language of publication (Croatian, English, other), national affiliation of the journal's editorial board members (national/international), and author affiliation (national, foreign, collaborative). Authors who published before 1991, the year when Croatia became an independent country, and indicated having a Yugoslavian affiliation were considered Croatian authors.

IF and Q are presented for 1999, the end year of the first inclusion period, and for 2011, the end year of the second inclusion period.

The exclusion period was the period from 2011, when two Croatian journals were excluded from SCI, to 2015. Each of the excluded journals was evaluated during the last years of indexation according to bibliometric indicators, such as IF, Q, total cites and self cites, and cites and self cites used in IF calculation.

3. Results

3.1. The 1975-1999 inclusion period

The first Croatian journal covered by SCI was *Croatica Chemica Acta* in 1975 and the first Croatian journal covered by SSCI was *Collegium Antropologicum* in 1980 (Table 1). Until 1980, 4 journals had been indexed, 3 covered by SCI and 1 covered by SSCI. After a huge gap between 1980 and 1994 when no Croatian journals were indexed, 8 journals became indexed between 1994 and 1999: 7 covered by SCI and 1 covered by SSCI. Finally, 12 Croatian journals were indexed in 1999, 10 covered by SCI and 2 covered by SSCI.

Journal/start year	Year of inclusion	Citation index*	No. of citations before coverage (from 1955)	No. of citations per year before coverage
Croatica Chemica Acta/1956	1975	SCIE	4698	247.3
Periodicum biologorum/1970	1976	SCIE	618	103
Strojarstvo (Mechanical Engineering)/1959	1976	SCIE	11	1.5
Collegium Antropologicum/1977	1980	SSCI	168	56

Društvena istraživanja (Social Research)/1992	1994	SSCI	132	66
Neurologia Croatica/1991	1994	SCIE	26	8.7
Chemical and biochemical engineering quarterly/1987	1995	SCIE	77	9.6
Metalurgija (Metallurgy)/1962	1995	SCIE	1955	45.5
Tekstil (Textile)/1952	1995	SCIE	376	11.1
Food technology and biotechnology/1963	1996	SCIE	223	6.8
Mathematical inequalities & applications/1998	1998	SCIE	-	-
Croatian Medical Journal/1992	1999	SCIE	1422	203.1

* SCIE = Science Citation Index Expanded; SSCI = Social Science Index Expanded

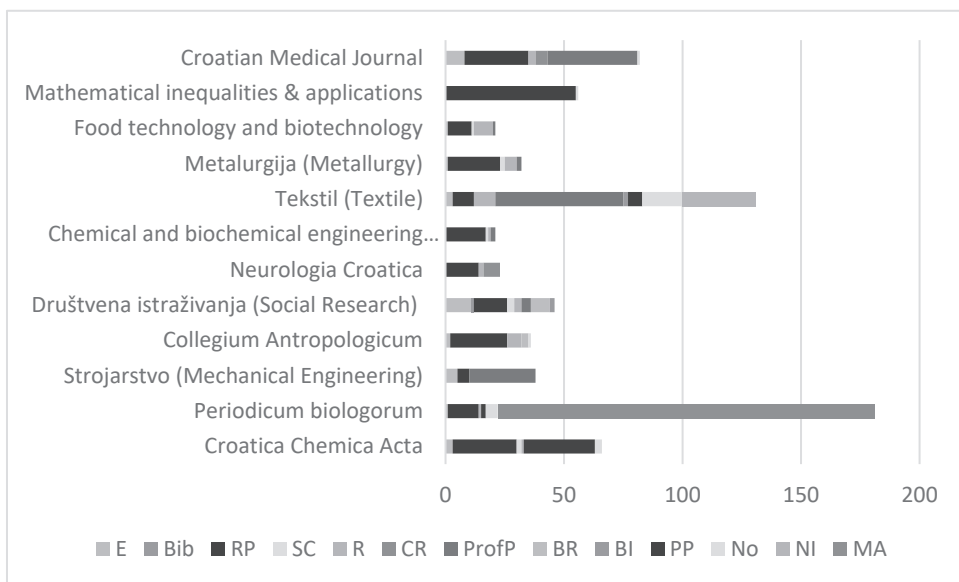
Table 1. Journals in the first 1975-1999 inclusion period and respective citation data before coverage

The citation data in SCIE/SSCI for Croatian journals before coverage (Table 1) show great variation in the number of citations (range: from 11 to 4698). By the time of inclusion, 36.4% of Croatian journals had less than 10 citations per year, 72.7% had less than 100 citations per year, and only 27.3% had more than 100 citations per year.

The number of articles varied from 23 to 181 per volume. In 8 out of 12 journals, the predominant type of paper was research paper (Figure 1). Review papers were not published by many journals, the exception was *Food technology and biotechnology* with 38% of review papers. *Collegium Antropologicum* and *Društvena istraživanja (Social Research)* covered by SSCI published book reviews in Croatian, whereas book reviews in English published by *Croatian Medical Journal*, *Croatica Chemica Acta* and *Neurologia Croatica* were not covered by SCIE.

Of all analysed journals, 58.4% published articles only in English, 25% only in Croatian, 8.3% in both English and Croatian, and 8.3% in English, Croatian, and German (Figure 2).

Editorial boards of 42% of Croatian journals consisted of national members only, and 58% of journals had an international editorial board (Figure 3).



E-editorial; Bib-bibliography; RP-research paper; SC-short communication; R-review; CR-case report; Prof P-professional paper; BR-book review; BI-biographical item; PP- proceeding paper; No-note; NI-news item; MA- meeting abstract

Figure 1. Type of articles published in SCI/SCIE-covered journals

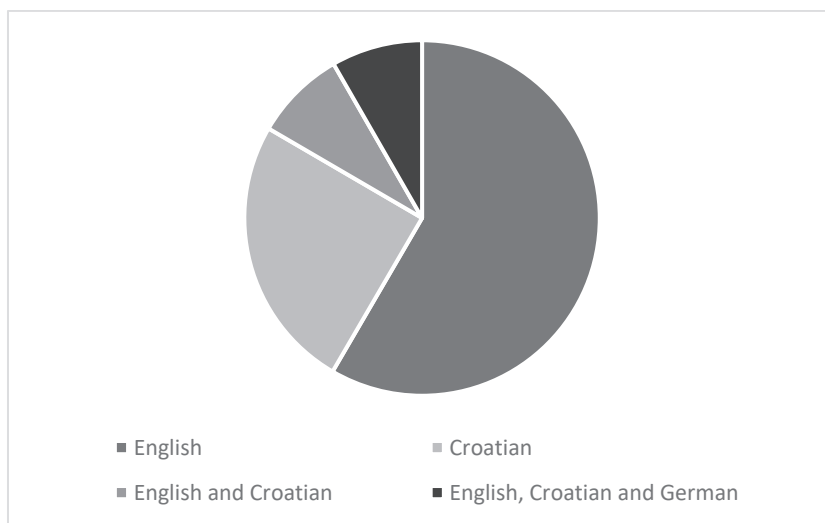


Figure 2. The publication language of articles published in Croatian journals

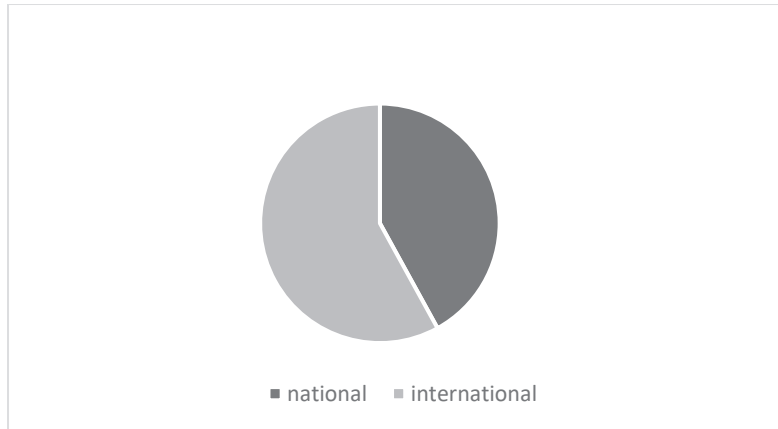


Figure 3. Editorial board structure

One of the requirements for non-English journals to be included in SCIE/SSCI was to publish article titles and abstracts in English [14]. To be more visible, a few Croatian journals also published their content in other languages in addition to English: *Strojarstvo (Mechanical Engineering)* published entire articles (title, abstract and body text) in English, German and Russian, and *Društvena istraživanja (Social Research)* and *Tekstil (Textile)* published their content in English and German.

The analysis of author’s affiliation showed that 6 journals published more articles written by local authors, and 6 journals published more articles written by foreign authors (Figure 4). The collaborative papers were more commonly published by two journals, *Metalurgija (Metallurgy)* and *Mathematical Inequalities & Applications*, in comparison with others.

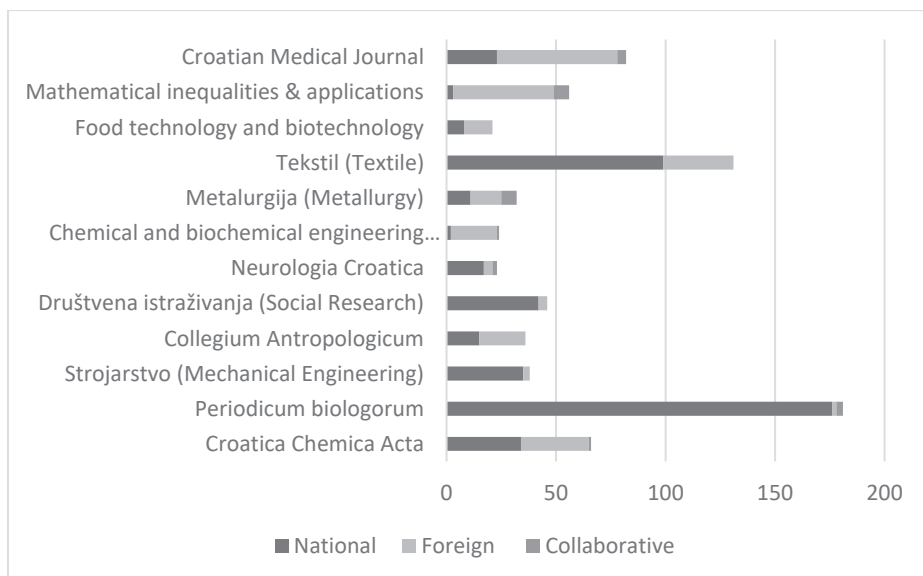


Figure 4. Distribution of papers by author’s affiliation

In 1999, 9 of 12 journals had an IF ranging from 0.056 to 0.533 (Table 2). Although indexed since 1994, *Neurologia Croatica* had no IF in 1999 and *Periodicum Biologorum* was delisted from 1993 to 1997 and re-included in 1998, but in 1999 was still without an IF. *Mathematical Inequalities & Applications* had an IF calculated from one year only. *Croatian Medical Journal* did not have an IF in 1999 because it was the year of its inclusion. Because journals can be categorized into more than one JCR subject category, 12 Croatian journals were categorized into 15 subject categories.

Journal	IF (1999)	Q (1999)
Croatia Chemica Acta	0.533	Q3
Periodicum biologorum	-	-
Strojarstvo (Mechanical Engineering)	0.081	Q4
Collegium Antropologicum	0.376	Q3
Društvena istraživanja (Social Research)	0.061	Social issues Q4; Sociology Q4
Neurologia Croatica	-	Q4
Chemical and biochemical engineering quarterly	0.438	Biotechnology & applied microbiology Q4; Engineering, chemical Q3
Metalurgija (Metallurgy)	0.056	Q4
Tekstil (Textile)	0.106	Q4
Food technology and biotechnology	0.404	Biotechnology & applied microbiology Q4; Food science & technology Q3
Mathematical inequalities & applications	0.250	Q3
Croatian Medical Journal	-	-

Table 2. IF and Q ranking in 1999

3.2. The 2006 – 2011 Inclusion Period

In 2006, James Testa, Director of Editorial Development of Thomson Reuters, the owner of ISI Web of Knowledge, presented four main components of the journal selection process: journal publishing standards, editorial content, international diversity, and citation analysis [14].

As the regional journal was measured by the specificity of its content rather than its citation impact [14], citation data before coverage were not included in the analysis of the journals in the 2006-2011 period of intensive inclusion of Croatian journals in indexing databases. Over this period of five years, 40 new Croatian journals were covered by SCIE/SSCI (Table 3): 28 journals by SCIE, 10 by SSCI, and 2 (*Kinesiology* and *Psychiatria Danubina*) by both SCIE and SSCI.

Journal/start year	Year of inclusion	Journal/start year	Year of inclusion	Journal/start year	Year of inclusion
Signa Vitae/2006	2006	Suvremena psihologija (Contemporary Psychology)/1998	2007	Drvna industrija (Croatian Journal of Forest Engineering) /1949	2008
Revija za socijalnu politiku (Croatian Journal of Social Policy)/1994	2006	Ljetopis socijalnog rada (Annual of Social Work)/1994	2007	Šumarski list (Journal of Forestry Society of Croatia)/1877	2008
Mljekarstvo (Dairy)/1951	2007	Jezikoslovlje (eng. Linguistics)/1998	2007	Automatika (Automation)/1960	2008
Psychiatria Danubina/1989	2007	Ekonomska istraživanja (Economic Research) /1988	2007	Tehnički vjesnik (Technical Gazette)/1993	2008
Biochemia Medica/1993	2007	Odgojne znanosti (Educational Sciences)/1999	2007	Gradevinar (Journal of Civil Engineers)/1949	2008
Operators and matrices/2007	2007	Govor (Speech)/1967	2007	Brodogradnja (eng. Shipbuilding)/1950	2008
Geofizika (Geophysics)/1984	2007	Geodetski list (Journal of Geodesy)/1919	2007	Geologia Croatica/1911	2009
Acta Dermatovenerologica Croatica/1993	2007	Promet (Traffic& Transportation)/1989	2007	Journal of Mathematical Inequalities/2007	2009
Acta Adriatica/1932	2007	Acta Pharmaceutica/1950	2008	Veterinarski arhiv (Vetrinary Archives)/1931	2009
Croatian Journal of Forest Engineering/1976	2007	Kinesiology/1971	2008	Hrvatski Casopis za odgoj i obrazovanje (Croatian Journal of Education) /1999	2011
Paediatrica Croatica/1956	2007	Arhiv za higijenu rada i toksikologiju (Archives of Industrial Hygiene and Toxicology) /1950	2008	Nanomaterials and nanotechnology/2011	2011
Transactions of FAMENA/1970	2007	Glasnik matematički (Messenger of Mathematics)/1966	2008		
Acta Clinica Croatica/1962	2007	Acta Botanica Croatica/1925	2008		

Zbornik Radova Ekonomskog Fakulteta u Rijeci (Proceedings of Rijeka Faculty of Economics /1971	2007	Mathematical Communications/1996	2008		
Sociologija i prostor (Sociology and Space)/1963	2007				

Table 3. Journals in the 2006-2011 inclusion period

The number of papers in analysed volumes varied from 8 to 162 per volume. In 65% of journals, the predominant type of paper was research paper, whereas review predominated type of paper in 5 journals (Figure 6). The only journal covered by SCIE with book reviews was *Veterinarski arhiv (Veterinary Archives)*.

With respect to the publication language, 60% of journals published papers exclusively in English, 15% exclusively in Croatian, 17.5% in both English and Croatian, 5% in English, German, and Croatian, and 2.5% in English and French (Figure 5).

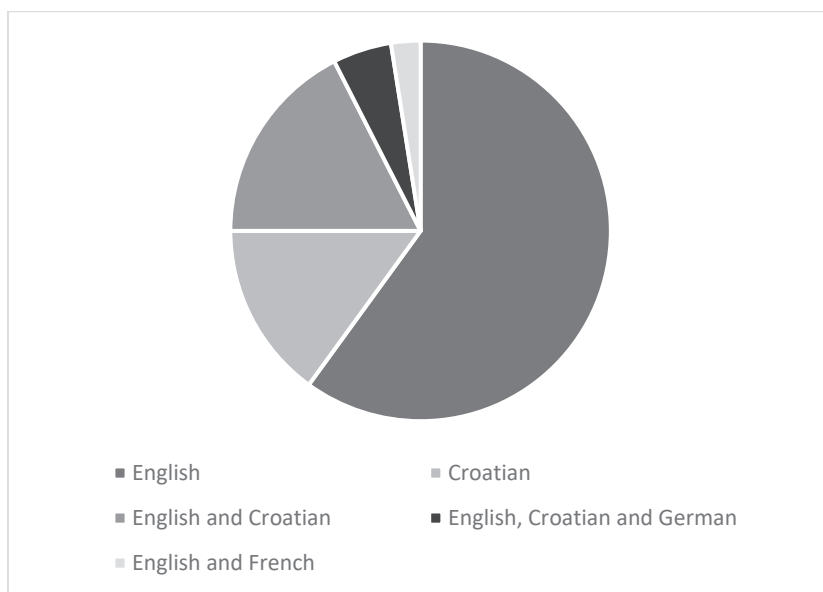


Figure 5. Language of publications in 2006-2011 inclusion period



E-editorial; Prof P-professional paper; RP-research paper; SC-short communication; R-review; CR-case report; PP- proceeding paper; BR-book review; BI-biographical item; LE-letter to editor; NI-news item; MA- meeting abstract

Figure 6. Type of papers published in 2006-2011 inclusion period

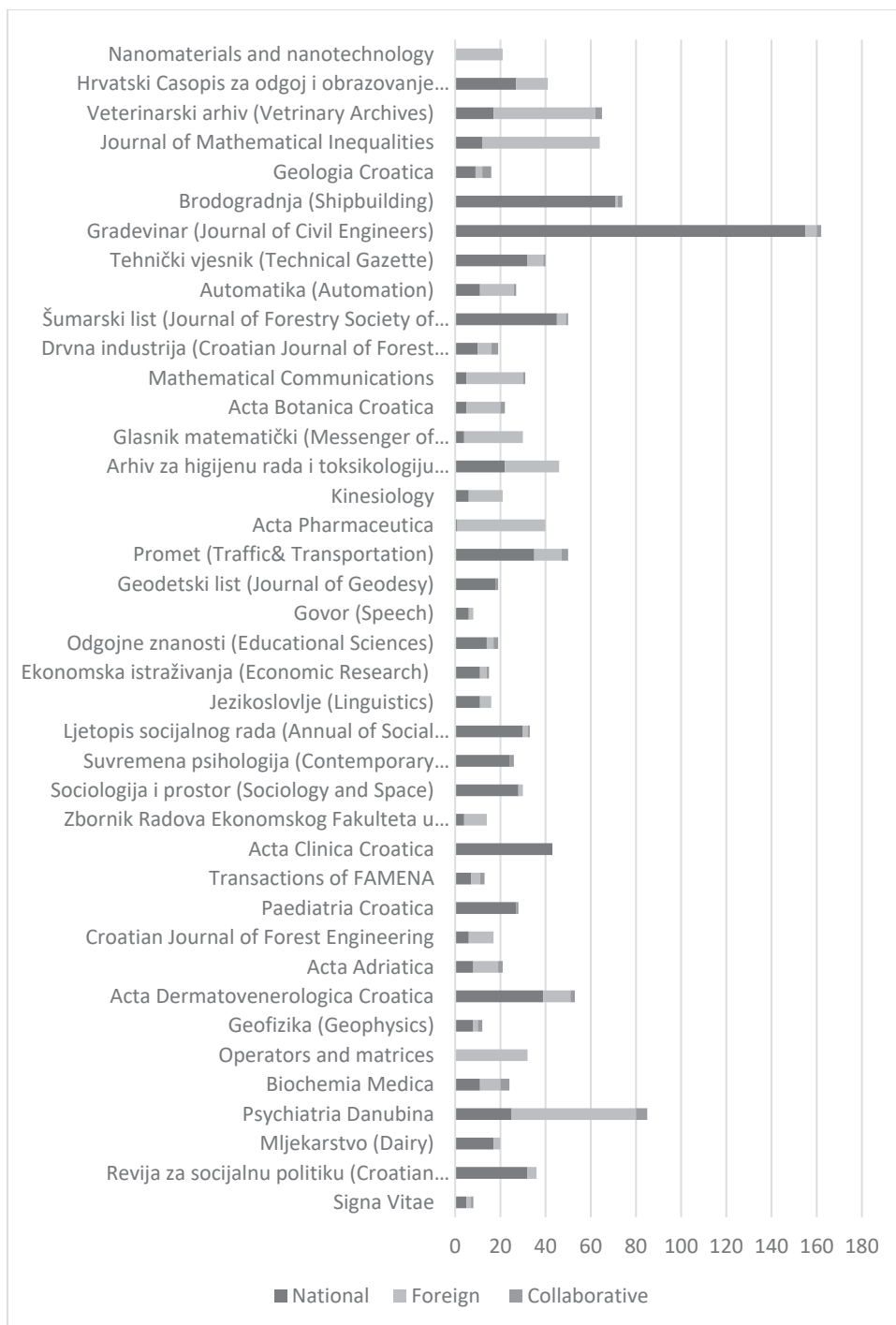


Figure 7. Distribution of papers by author's affiliation

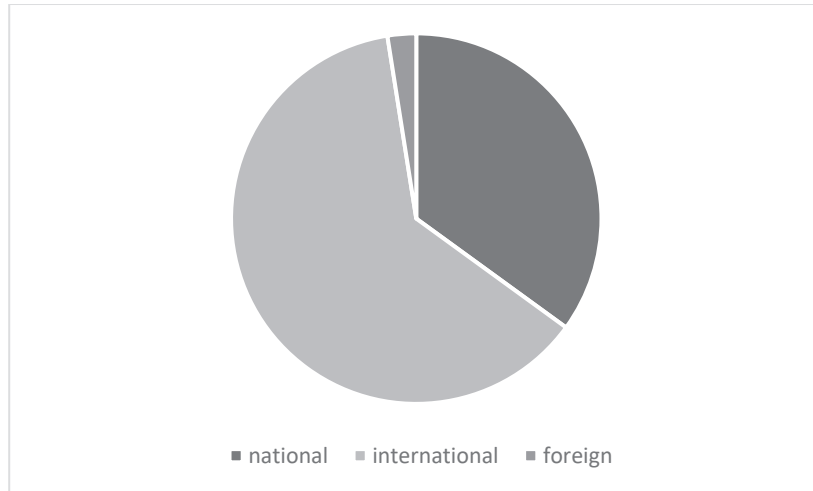


Figure 7. Editorial board structure

In 35 % of Croatian journals, the editorial board members were national, 62.5% of journal had an international editorial board, and 2.5% of them had foreign editorial board (Figure 8).

The analysis of papers by their authors' affiliation showed the prevalence of papers written by domestic authors in 62.5% of journals, and the prevalence of articles written by foreign authors in 37.5% of journals (Figure 7). The percentage of the collaborative papers by authors' affiliation was above average in only three journals: *Biochemia Medica*, *Drvna industrija (Croatian Journal of Forest Engineering)* and *Geologia Croatica*.

The start year and the inclusion year was the same for three journals: *Signa vitae* (2006), *Operators and Matrices* (2007) and *Nanomaterials and Nanotechnology* (2011).

Finally, in 2011, there were 50 Croatian journals covered by both indexes. Forty-four Croatian journals had an IF ranging from 0.030 to 1.796. *Croatian Journal of Education* and *Nanomaterials and Nanotechnology* were included in 2011, so they could not have an IF calculated.

Croatian journals in 2011 were categorized into 52 subject categories; in 47 categories they were ranked into quartiles. None of them was ranked into Q1, two were ranked into Q2, eight were ranked into Q3, and 37 were ranked into Q4 (Figure 9).

According to the WoSCC (SCIE/SSCI) databases in 2011, Croatian scientist published most of their papers in the following categories: Anthropology, Medicine General Internal, Chemistry multidisciplinary, Biochemistry molecular biology, Physics particles fields, and Mathematics.

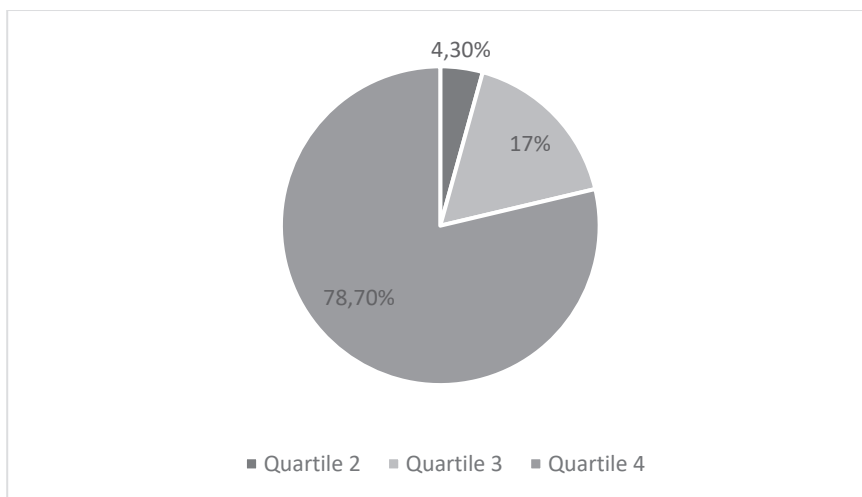


Figure 9. Q ranking in 2011

3.3. The 2011-2015 Exclusion Period

From 2011 to 2015, 12 Croatian indexed journals were excluded from the indexing databases: two were excluded in 2011, four in 2012, four in 2013, one in 2014, and one in 2015 (Table 4).

Journal	Inclusion year	Exclusion year
Strojarstvo (Mechanical Engeneering)	1976	2011
Geodetski list list (Journal of Geodesy)	2007	2011
Tekstil (Textile)	1993	2012
Sociologija i prostor (Sociology and Space)	2007	2012
Jezikoslovlje (Linguistics)	2007	2012
Govor (Speech)	2007	2012
Neurologia Croatica	1992	2013
Paediatrica Croatica	2007	2013
Suvremena psihologija (Contemporary Psychology)	2007	2013
Odgojne znanosti (Educational Sciences)	2007	2013
Collegium Antropologicum	1980	2014
Metalurgija (Metallurgy)	1995	2015

Table 4. Journals excluded in the 2011-2015 exclusion period

In the last five years before being excluded, the journals from the 1975-1999 inclusion period – *Strojarstvo (Mechanical Engineering)*, *Tekstil (Textile)* and *Neurologia Croatica* – had a very low number of cites used in IF calculation. *Tekstil (Textile)* also had a high percent of total self-cites and self-cites used in IF calculation. All journals were ranked in Q4, at the very bottom in their subject categories, with a low IF (Table 5).

Journal	Year	Total Cites	Total self-cites	Cites used in IF calculation	Self cites used in IF calculation	IF	IF without self-cites	Q
Strojarstvo (Mechanical Engineering)	2010	45	3 (7%)	16	3 (19%)	0.222	0.018	Q4 (107/122)
	2009	50	21 (42%)	4	1 (25%)	0.048	0.035	Q4 (114/116)
	2008	-	-	-	-	-	-	Q4 (105/105)
	2007	18	10 (56%)	2	0	0.045	0.045	Q4 (105/107)
	2006	35	22 (63%)	9	8 (89%)	0.281	0.031	Q3 (79/106)
Neurologia Croatica	2012	8	-	-	-	-	-	Q4 (192/193)
	2011	31	1 (3%)	4	-	0.174	0.174	Q4 (187/192)
	2010	21	1 (5%)	2	1 (50%)	0.125	0.062	Q4 (181/185)
	2009	26	-	3	-	0.077	0.077	Q4 (164/167)
	2008	18	-	4	-	0.069	0.069	Q4 (152/156)
Tekstil (Textile)	2011	101	58 (57%)	12	6 (50%)	0.086	0.043	Q4 (21/21)
	2010	114	72 (63%)	7	4 (57%)	0.05	0.021	Q4 (21/21)
	2009	115	64 (56%)	25	17 (68%)	1.171	0.054	Q4 (18/19)
	2008	136	59 (43%)	23	3 (13%)	0.137	0.119	Q4 (16/16)
	2007	81	37 (46%)	22	6 (27%)	0.107	0.077	Q4 (15/15)

Table 5. Bibliometric indicators of 3 excluded journal five years before the exclusion

Three years before the exclusion, *Metalurgija (Metallurgy)* was permanently in Q2, but the percent of self-cites used in IF calculation increased significantly from 13% in 2010 to 54% in 2014 (Table 6). *Collegium Antropologicum* was continuously in Q3 with a high number of total cites and cites used in IF calculation, but self-referencing

rate increased 2.5-fold in only two years, from 22% in 2009 to 57% in 2011 (Table 9).

Journal	Year	Total Cites	Total self-cites	Cites used in IF calculation	Self-cites used in IF calculation	IF	IF without self-cites	Q
Metalurgija (Metallurgy)	2014	517	*	256	138 (54%)	0.959	0.442	Q2 (29/74)
	2013	380	*	142	64 (45%)	0.755	0.415	Q2 (31/75)
	2012	263	*	80	30 (38%)	0.690	0.431	Q2 (29/76)
	2011	145	*	29	7 (24%)	0.259	0.196	Q3 (56/75)
	2010	166	*	39	5 (13%)	0.348	0.304	Q3 (48/76)
Collegium Antropologicum	2013	1632	427 (26%)	402	148 (37%)	0.609	0.384	Q3 (48/82)
	2012	1441	344 (24%)	291	79 (27%)	0.414	0.301	Q3 (52/83)
	2011	1326	459 (25%)	388	221 (57%)	0.614	0.264	Q3 (41/81)
	2010	1127	381 (34%)	269	111 (41%)	0.491	0.288	Q3 (47/76)
	2009	865	265 (31%)	251	56 (22%)	0.503	0.39	Q3 (41/68)

Table 6. Bibliometric indicators five years before the exclusion

From 2011 to 2013, seven journals from the 2006-2011 inclusion period were excluded: Sociologija i prostor (Sociology and Space), Geodetski list (Journal of Geodesy), Jezikoslovlje (Linguistics), Govor (Speech), Paediatrica Croatica, Suvremena psihologija (Contemporary Psychology), and Odgojne znanosti (Educational Sciences). Periodicum Biologorum was suppressed from 1993 to 1997 and re-index in 1998 and Mljekarstvo (Dairy) was suppressed from 2010 to 2011 and included again in 2012.

4. Discussion and Conclusion

There were only four Croatian journals covered by SCIE/SSCI while Croatia was part of Yugoslavia. After the independence, within a five-year period their number tripled. The efforts of the Croatian academic community to create a larger number of journals with the international visibility were successful. The academic community was aware that internationally visible journals contribute to national recognition and culture promotion.

Although one of the three broad criteria for journal SCI/SSCI coverage was the citation data [17], the results showed that the journals with a low number of citations

in SCIE/SSCI before the inclusion were still indexed. The lack of citations was not the reason for journal exclusion. The time between the journal's start year and inclusion year did not affect the citation rates. For example, *Croatian Medical Journal* received 1422 citations in SCIE in seven years and *Strojarstvo (Mechanical Engineering)* received only 11 citations in SCIE in 17 years. Nevertheless, *Strojarstvo* was covered by SCIE because its value was obviously recognized regardless of the low citedness.

The start year and the inclusion year was the same for four Croatian journals. No information could be found on the exact year when these journals were accepted for indexing by SCIE. If they were indexed from the first volume, editors had to guarantee high journal standards required by ISI. We can only speculate that ISI experts based their decision on the evaluation of papers previously published by the editorial board members. In other words, editor's reputation was crucial. The fact that *Mathematical Inequalities & Applications* had an IF calculated from one year only speaks in favour of this speculation.

Research papers dominated in volumes published in the two inclusion periods; however, there was a lack of review papers, especially in the volumes in the 1975-1999 inclusion period. Although original research papers are regarded more highly than reviews in scientific terms, the studies investigating the relationship between the article type and number of citations received showed that review papers receive more citations than other types of articles [18].

Book reviews were covered by SSCI, but not by SCIE, which is not unusual because the book as a scholarly communication in social sciences is more important than in science and technology [19]. Book reviews, editorials, and letters to the editor also receive a certain number of citations, which are included in the numerator of the IF, but not in the denominator [10]. Theoretically, if these items are highly cited and original articles and reviews receive less cites, the journal's IF can increase. Golubić et al. [20] confirmed that IF decreased when only citations to original research articles and reviews were used for IF calculation.

Considering the publication language and national composition of editorial boards, most Croatian journals in the inclusion periods had an international orientation. Authors' affiliation showed prevalence of domestic authors in the 2006-2011 inclusion period, which was expected, since the regional studies published by domestic authors were in the focus. On the other hand, there was a balance in the representation of domestic and foreign authors in journals from the 1975-1999 period.

Only 25% of journals from the 1975-1999 period and 15% of journals from the 2006-2011 period were published exclusively in Croatian. This may be interpreted as a trend towards greater international orientation at the time. During the 2006-2011 period, journals were chosen by their regional relevance, and papers were mostly written in English.

The editorial board is viewed as a body with decision-making authority, and editors even more so. Greater internationalisation of editors and editorial boards of academic journals is desirable for the evolution of knowledge [21]. Most editorial boards of indexed Croatian journals were ethnically diverse. This certainly had a positive effect on the reputation of the journals.

The number of journals covered by SCIE/SSCI has gradually grown over the years. For example, in the period from 1998 to 2005, their number increased by 649 journals. During the Thomson Reuters' Regional Expansion Programme from 2006 to 2011, the number of journals increased by 3358 journals. During that period, a total of 40 Croatian journals were covered by SCI/SSCI, accounting for 1.2% of the total number of indexed journals in that period.

In 1999, Croatian journals accounted for 0.17% of the total number of journals indexed in SCIE/SSCI (0.18% in SCIE and 0.12% in SSCI). In 2011, as a result of the Regional Expansion programme, Croatian journals accounted for 0.46% of all journals indexed in SCIE/SSCI (equal percentage in both databases). For a small country like Croatia, it was a significant progress. The study carried out by Sambunjak et al. [16] in 2005, which explored representation of journals from Italy, Hungary, Slovenia, Croatia, and Serbia in JCR, found a disproportionately strong representation of Croatian journals in JCR, especially with regard to the gross domestic product and scientific productivity. A quarter of Croatian articles were published in 12 Croatian journals covered by JCR. When comparing the representation of these countries in JCR in 2011 and 2018, the status of Croatian journals remained the same (Table 7).

Country	Number of journals in JCR		
	2005	2011	2018
Serbia	0	20	22
Slovenia	4	21	19
Hungary	15	35	37
Italy	64	140	125
Croatia	12	47	38

Table 7. Representation of journals in JCR

From 1999 to 2011, the number of Croatian indexed journals increased from 12 to 50. However, according to the bibliometric indicators, Croatian journals were not highly ranked, like most of the journals from the scientific periphery.

More than a few studies tried to reveal why journals from the scientific periphery and from non-English speaking countries have lower citation counts although they publish in English. Bordons et al. [22] suggested that scientists prefer to cite research from mainstream countries rather than from the periphery. Liu [19] investigated the association between the number of citations and the language of publication and found that most papers in languages other than English suffer from lower citation counts in WoS indexes. Skopec et al. [23] suggested that geographic bias in some form was impacting peer review and that reviewers and editors preferred sources from high-income countries.

Jokić [8] analysed bibliometric indicators of Croatian journals covered by JCR and found that Croatian scientists did not publish their best papers and most cited ones in Croatian journals. González-Alcaide et al. [24] confirmed that, despite publishing in international journals in English, authors from some non-English speaking countries have fewer citations in WoS than authors from the USA. They also

concluded that the journals of Anglo-American origin occupy the top ranks in all disciplines or fields of knowledge.

Croatian journals show lack of international collaborations in the 1999-2011 period. Low et al. [25] and Tuan V. Nguyen et al. [26] showed that papers with more coauthors attracted more citations. They highlighted a linear correlation between the proportion of international collaboration and the journal impact factor, suggesting that papers with international authorship were of higher quality than those without such collaborations.

The results from both inclusion periods suggests that Croatian scientists in the field of chemistry, anthropology and general medicine (second inclusion period) published most papers in national journals.

WoS Editorial statement about dropped journals [27] suggests that journal coverage is constantly under review and journals must maintain high standards and relevance to the WoS. The reasons for deselecting a journal are usually poor performance (delayed publishing, poorly cited by other journals, etc.), high self-citing rate, and very high volume of material, which is not a positive trait. Self-citation rate of 20% or less is characteristic of the majority of high-quality journals in JCR.

In the period of four years, from 2011 to 2015, 12 Croatian journals were excluded from SCIE/SSCI. The reasons for exclusion usually were low number of cites used in IF calculation, high self-citing rates, low IF, and consistent ranking into Q4, at the very bottom of the subject category. The exceptions were *Metalurgija (Metallurgy)* and *Collegium Antropologicum*, which were also delisted, although they had relatively good bibliometric indicators and stable position in JCR. According to the bibliometric indicators, it is not entirely clear why these two journals were excluded. We can only assume that self-referencing rate was too high in both journals.

In 2018, there were 38 Croatian journals covered by SCIE/SSCI, 7 of them in SSCI and 33 in SCIE (Kinesiology and Psychiatria Danubina were indexed in both SCIE and SSCI). Journals were categorized into quartiles in 51 JCR subject categories (Figure 10).

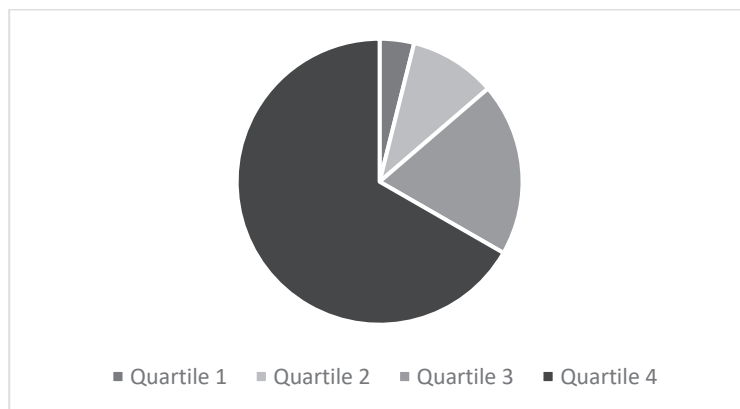


Figure 10. Q ranking in 2018

Table 8 shows a representation of Croatian journals in quartiles for the years 1999, 2011 and 2018. The highest percentage of journals was ranked in Q4 and in Q3, but there was an increase in number of journals in Q2 and Q1 over the years. The analysis of representation of Croatian journals in quartiles for the years 1999, 2011 and 2018 showed that the highest percentage of journals were ranked in Q4 and in Q3, but the distribution of Croatian journals in quartiles in 2018 showed progress when compared to the previous years. It indicated a continuous positive trend in the Croatian scholarly journals publication and efforts in raising the quality of Croatian journals.

	Percentage of indexed Croatian journals		
	1999	2011	2018
JCR quartiles	n=12	n=50	n=38
Q1	-	-	3.9
Q2	-	4.3	9.8
Q3	38.5	17.0	19.6
Q4	61.5	78.7	66.7

Table 8. Representation of Croatian journals in JCR quartiles

References

- [1] L. Pulišelić and J. Petrak, “*Is it enough to change the language? A case study of Croatian biomedical journals,*” *Learn. Publ.*, vol. 19, no. 4, pp. 299 – 306, 2006, doi: 10.1087/095315106778690733.
- [2] B. Macan, A. Pikić and M. Mayer “(Inter)national orientation of Croatian social sciences and arts and humanities journals indexed in the Web of Science database,” *Drustvena istraz.*, vol. 21 no. 116, pp. 505-521, 2010, doi: 10.5559/di.21.2.11.
- [3] I. Hebrang Grgić I, “Scholarly journals at the periphery: the case of Croatia,” *Learn. Publ.*, vol. 27, no.1, pp. 15-20, 2014, doi:10.1087/20140103
- [4] J. Stojanovski, J. Petrak and B. Macan, “The Croatian national open access journal platform,” *Learn. Publ.*, vol. 22, no.4, pp. 263-273, 2009, doi: 10.1087/20090402
- [5] E. J. Huth, “The information explosion,” *Ann. N. Y. Acad. Sci.*, vol. 65, no. 6, pp. 647-61, 1989.
- [6] A. Mišak, J. Petrak and M. Pećina, “Scientific Biomedical Journals in Croatia,” *Croat. Med. J.*, vol. 43, no. 1, pp. 8-15, 2002.
- [7] A. Marušić and M. Marušić, “Small scientific journals from small countries: breaking from a vicious circle of inadequacy,” *Croat. Med. J.*, vol. 40, no. 4, pp. 508-514, 1999.

- [8] M. Jokić, "Evaluation of Croatian journals covered by ISI databases (Institute for Scientific Information)". *Period. Biol.*, vol. 105, no. 1, pp. 95-98, 2003.
- [9] M. Jokić, "Bibliometrijski aspekti vrednovanja znanstvenog rada". Zagreb, Croatia: Sveučilišna knjižara, 2005.
- [10] E. Garfield, "The history and meaning of the journal impact factor," *JAMA*, vol. 295, no. 1, pp. 90–93, 2006, doi: 10.1001/jama.295.1.90.
- [11] A. Martin-Martin, E. Orduna-Malea, M. Thelwall and E. D. Lopez-Cozar, "Google Scholar, Web of Science, and Scopus: a systematic comparison of citations in 252 subject categories," *J. Informetr.*, vol. 12, no. 4, pp. 1160-1177, 2018, doi: 10.1016/j.joi.2018.09.002.
- [12] M. Marušić, A. Mišak, M. Kljaković-Gaspić, K. Fišter, D. Hren and A. Marušić, "Producing a scientific journal in a small scientific community: an author-helpful policy," *International microbiology*, vol. 7, no. 2, pp. 143-147, 2004.
- [13] J. Cross, K and Jansz, "Thomson Reuters' Regional Expansion Programme," *Editors' Bulletin*, vol. 5, no. 2, pp. 64-68, 2009, doi: 10.1080/17521740903336621.
- [14] J. Testa, "Regional content expansion in Web of Science: opening borders to exploration", 2009. [Online]. Available: <https://globalhighered.wordpress.com/2009/01/15/regional-content-expansion-in-web-of-science/>
- [15] A. Marušić and M. Marušić, Znanstveni časopisi u Hrvatskoj: teška pitanja na koja nije teško odgovoriti," in *Hrvatski znanstveni časopisi*, I. Hebrang Grgić, Ed., Zagreb, Croatia: Školska knjiga, 2015, pp. 15-36.
- [16] D. Sambunjak, A. Ivaniš, A. Marušić and M. Marušić, "Representation of journals from five neighboring European countries in Journal Citation Reports," *Scientometrics*, vol. 76, no. 2, pp. 261-271, 2008, doi: 10.1007/s11192007-1915-5.
- [17] E. Garfield, "How ISI selects journals for coverage: quantitative and qualitative considerations," *Essays of an Information Scientist*, vol. 13, no. 22, pp. 185-193, 1990.
- [18] I. Tahamtan, A. Safipour Ashar and K. Ahamdzadeh, "Factors affecting number of citations: a comprehensive review of the literature," *Scientometrics*, vol. 107, no. 3, pp. 1195–1225, 2016, doi: 10.1007/s11192-016-1889-2.
- [19] W. Liu, "The changing role of non-English papers in scholarly communication: Evidence from Web of Science's three journal citation indexes," *Learn. Publ.*, vol. 30, no. 2, pp. 115-123, 2017, doi: 10.1002/leap.1089.

- [20] R. Golubic, M. Rudeš, N. Kovacic, M. Marušić and A. Marušić, "Calculating impact factor: how bibliographical classification of journal items affects the impact factor of large and small journals. *Sci. Eng. Ethics*, vol. 14, no. 1, pp. 41-49, 2008, doi: 10.1007/s11948-007-9044-3.
- [21] A. W. Harzing and I. Metz, "Gender and geographical diversity in the editorial board of the Journal of International Business Studies," *AIB Insights*, vol. 11, no. 3, pp. 3-7, 2011, doi: 10.5465/AMLE.2009.47785472
- [22] M. Bordons, M. T. Fernandez and I. Gomez, "Advantages and limitations in the use of impact factor measures for the assessment of research performance in a peripheral country," *Scientometrics*, vol. 53, no. 2, pp. 195-206, 2002, doi: 10.1023/A:1014800407876.
- [23] M. Skopec, H. Issa, J. Reed and M. Harris, "The role of geographic bias in knowledge diffusion: a systematic review and narrative synthesis," *Res. Integr. Peer Rev*, vol. 5, no. 2., 2020, doi: 10.1186/s41073-019-0088-0.
- [24] G. González-Alcaide, J. C. Valderrama-Zurian and R. Aleixandre-Benavent, "The Impact Factor in non-English-speaking countries," *Scientometrics*, vol. 92, no. 2, pp. 297-311, 2012, doi: 10.1007/s11192-012-0692-y
- [25] W. Y. Low, K. H. Ng, M. A. Kabir, A. P. Koh and J. Sinnasamy, "Trend and impact of international collaboration in clinical medicine papers published in Malaysia," *Scientometrics*, vol. 98, no. 2, pp. 1521-1533, 2014, doi: 10.1007/s11192-013-1121-6
- [26] T. V. Nguyen, T. P. Ho-Le and U. V. Le, "International collaboration in scientific research in Vietnam: an analysis of patterns and impact," *Scientometrics*, vol. 110, no. 2, pp. 1035-1051, 2016, doi: 10.1007/s11192-016-2201-1
- [27] Web of Science: Editorial statement about dropped journals
https://support.clarivate.com/ScientificandAcademicResearch/s/article/Web-of-Science-Editorial-statement-about-dropped-journals?language=en_US
(accessed Apr. 10, 2020)