

About ethics: Scientometric Research in WoS Core Collection (2011-2021)

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Rezumat: Cercetările actuale despre etică sunt în mare parte punctuale, încercând să identifice o problemă sau să găsească o soluție. Chiar și cercetările scientometrice despre etică urmează acest model. Considerăm că este necesar să aruncăm o privire mai atentă și să avem o imagine de ansamblu asupra a ceea ce reprezintă etica astăzi și spre ce se îndreaptă, în ceea ce privește literatura de specialitate din ultimii ani (2011-2021). Folosind metoda cercetării scientometrice, prin interogarea bazei de date Web of Science (WoS) Core Collection, au fost stabilite două grupuri de cercetare asupra cărora au fost aplicate 10 criterii de analiză aferente noii interfețe WoS (lansată în 2021). Rezultatele studiului sunt prezentate în 22 de tabele care sunt interpretate printr-o abordare calitativă. Noutatea cercetării este evidențiată de interpretarea celor 31 de articole din Tabelul S1, care reprezintă studii scientometrice de etică și care se regăsesc grupate în 7 tabele în cadrul articolului. Concluziile care se desprind ne indică o creștere substanțială a interesului pentru etică, o acoperire aproape generală a domeniilor de cercetare cu subiecte etice, o largă distribuție teritorială (pe țară) și instituțională (pe afiliere) a autorilor, o finanțare substanțială de cercetare în acest domeniu dar și o disponibilitate a revistelor și a autorilor de a acorda acces gratuit la aceste studii. Aceste rezultate pot sta la baza viitoarelor cercetări scientometrice și/sau rafinate calitativ, pe oricare dintre domeniile și subdomeniile de cercetare evidențiate, pentru orice autor care este interesat de etică în propriul domeniu de cercetare.

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Cuvinte cheie: Etică; scientometrie; Clarivate analytics; Web of Science; VOS Viewer

Abstract: Current research on ethics is mostly punctual, trying to identify a problem or find a solution. Even scientometric research on ethics follows this pattern. We consider it necessary to take a closer look and work out an overview of what ethics represents today and what we are heading towards, in terms of specialized literature in recent years (2011-2021). Using the method of scientometric research, by querying the Web of Science (WoS) Core Collection database, we will establish the two research groups on which we will apply 10 analysis criteria, provided by the facilities of the new WoS interface (launched in 2021). The results of the study are presented in 22 figures which are interpreted by means of a qualitative approach. The novelty of the research is highlighted by the interpretation of the 31 articles in the S1 Table, which represent scientometric studies on ethics and are grouped within the article in 7 tables. The conclusions that emerge indicate a substantial increase in the interest in ethics, an almost general coverage of research domains and areas with ethical topics, a wide range of territorial (by country) and institutional (by affiliation) distribution of the authors, a substantial funding of research in this field but also an availability of journals and authors to free access to these studies. These results can be the basis for future scientometrically and/or qualitatively refined research, on any of the highlighted research domains and areas for any author who is interested in the ethics on their own research field.

Keywords: *Ethics; scientometrics; Clarivate analytics; Web of Science; VOS Viewer.*

1. Introduction

The development of society has brought about new challenges in almost all areas. Ethics, which can be defined as a coherent system of values that specify a code of conduct (Goldstein & Kintigh, 1990), has not escaped the changes of society either, thus, having to develop, to reshape and to find new ways to respond to societal challenges. Thus, ethics has had to adapt and to find ways to integrate and shape the human behavior in new fields of research (bioethics, neuroethics, IT ethics, etc.), driven by the emergence of new technologies (Moore, 2005; Swiestra&Rip, 2007; Brey, 2012, 2017) but, at the same time, to ensure its desideratum: a modern society in which ethical values are restored and respected (Shalvi & all, 2011; Shalvi & all, 2015; Jacobs & Hultgren, 2018; Singh & all, 2019; Nadeem & all, 2021).

But where are we heading? What are the current trends in ethics research? What areas are important to the academic community? What topics are particularly noteworthy? These are some of the questions we try to answer.

Hence the present study performs an analysis of the evolution of the research on ethics by reviewing the literature in the field, applying the methods of Scientometry on this literature which can be found in the WoS Core Collection database from the WoS platform (currently owned by Clarivate).

Scientometric research has also been conducted on ethics (Memon, 2016; Negahdary, 2017; Shinyayeva & Tarasevich, 2013; Genova 2016; Borgoyakova & Zemskov, 2018; Qin & all, 2016) especially in the period subjected to analysis (30 of 31 papers,

according to Annex -Table1), taking into account the existing information both in WoS and / or Scopus databases (Negahdary, 2017, Borgoyakova & Zemskov, 2017; Mahieu & all, 2018; Gureev & all, 2019; Patra & Das, 2019; Patra & Das, 2019; Ghazavi, 2019; Balatsky & Yurevich, 2016; Saberi & all, 2019; Guskov & Kosyakov, 2020, Truc & all, 2021) and in specialized databases (Leefmann & all, 2016) or national (Génova, 2016; Ghazavi & all, 2019; Sasvári & Urbanovics, 2019; Zemskov, 2016) databases.

This paper stands out through the analysis performed on the entire field of ethics as a whole, a study that provides information on the dynamics of research endeavours, on the authors' focus on certain fields and topics, the national and institutional affiliation of the authors as well as on the role of funding in this field of research. The time span of the study coincides with the period subjected to scrutiny which is set between 2011-2021 (November 4, 2021). This period was chosen from the perspective of the authors' interest, due to the fact that, in Romania, in the field of ethics, clearer regulations have only been inserted into the legislation on higher education since with January 2011.

Compared to the data obtained and analysed, we state that this is the first scientometric analysis in the field of ethics that uses the facilities of the new interface of (WoS) (launched in 2021).

2. Materials and Methods

In order to highlight the novelty of the study and the specialized literature on the scientometric analysis on the field of ethics, a Boolean-type search was run on the entire WoS Core Collection (1975-04.11.2021) by inserting the ethics and scientometric* topic into the search field. The analysis performed on these results demonstrates the novelty of the study, which also allowed us to carry on the main scientometric research endeavour.

In order to conduct the main study and to determine the initial batch (IB): (i) the Web of Science (www.webofscience.com) informatic scientometric platform was used by querying the Web of Science Core Collection database and (ii) a Boolean search was run, using the word „ethics” as the topic combining it through the AND operator with the Year Published = 2011-2021. The date on which the research was conducted is 4.11.2021, so all results are related to it. All the articles from all editions (WoS All Editions) have been taken into account namely: Social Sciences Citation Index (SSCI), Science Citation Index Expanded (SCI - EXPANDED), Emerging Sources Citation Index (ESCI), Art & Humanities Citation Index (A&HCI), Book Citation Index -Social Sciences & Humanities (BKCI-SSH), Conference Proceedings Citation Index – Social Sciences & Humanities (CPCI-SSH), Conference Proceedings Citation Index – Science (CPCI-S), Book Citation Index – Science (BKCI-S).

In the results report which was generated by the platform, the existence of the Highly Cited Papers (HCP) and Hot Papers (HP) types of articles was highlighted. For the precise establishment of the HCP and HP batch, henceforth referred to as the HCP-HP Batch, the BI filtering was applied through the Cited Paper criterion (Highly Cited Papers or Hot Papers).

A scientometric research was performed on both groups (BI and HCP-HP), by applying the set of criteria (Analyse Results) available on the Web of Science platform, identified according to their denomination on this platform: Publication Years, Document Types, Research Areas, WoSCategories, WoSIndex, Authors, Publication Title (Source), Countries. For a quick visual differentiation between the results of the two batches, the graphs obtained for IB are generated in green and the graphs obtained for HCP-HP are generated in blue. The obtained scientometric results are studied comparatively and interpreted qualitatively.

In addition to the set of 9 common criteria applied to both groups, an additional criterion was applied to the HCP-HP group - the Affiliations criterion. The results were used to identify the most active academic communities in the field of ethics and in the integrated analysis of the results.

An analysis of used words in article titles, keywords and abstracts was performed on the HCP-HP group, by means of the Word Cloud generator (<https://wordart.com/>).

3. Results

The result of the Boolean query of the WoS Core Collection regarding the validation of the research novelty premise by using ethics and scientometric* topic, is represented by the Batch of Scientometric Specialised Literature (BSSL) - S1 Table, and the results of the content interpretation of these data can be found in Table 1 - Table 7.

The result of the Boolean query of the WoS Core Collection, using Topic = ethics AND Year Published = 2011-2021 (4.11.2021), resulted in obtaining the initial batch (IB) of works in the field of ethics that were included in the WoS Core Collection.

By successively applying the criteria „Tagged documents” (Fig. 1) and „Cited Paper” on IB, the second batch of the HCP-HP study is identified (Fig. 2).

The results, which were subsequently analysed and discussed, were obtained by performing a scientometric analysis of the two groups: IB and HCP-HP. Thus, by applying 9 of criteria the entire set of criteria Analyse Results criteria that existing in WoS, a distinct set of results, which are comparatively highlighted in Figs. 3-20, was obtained for each batch.

The authors' affiliation was analysed only on the HCP-HP batch (Fig. 21), result obtained by applying a new criterion, namely Affiliation.

The results of the study on the most used words in article titles, keywords and abstracts, which can be found in the HCP-HP batch documents, generated in the form of a word cloud, can be found in Fig. 22.

According to Pareto's 80/20 principle, in the instances in which results would have required excessively large graphs, in order to present comprehensive as well as reader friendly graphic displays, the rendition of the results was restricted (Figs. 7-10, 13-18, 20-21).

3.1. The novelty of the study

The study of the specialized literature is mandatory for any research. Its identification, in the case of the present study, was made through a Boolean query in the entire WoS Core Collection database of documents that pertain to the field of ethics and contain the term "scientometric*". The result is an unexpected one, because in the entire period subjected to scrutiny, namely 1975-04.11.2021, only 31 scientific papers match the search criteria, the latter forming the BSSL batch (S1 Table). Of the 31 papers, one is from 1994 and the rest are included in the 2013 - 2021 time interval as follows: 2013 - 2 papers; 2015 - 1 paper; 2016 - 6 papers; 2017 - 4 papers; 2018 - 3 papers; 2019 - 7 papers; 2020 - 4 papers; 2021 - 3 papers.

The analysis of their content allows the grouping of the papers on 7 criteria, as follows: the analysis of the scientometric method (Table 1); impact analysis and the proposal of new scientometric indicators (Table 2); scientometric analysis/journal (Table 3); Scientometric analysis on ethics, integrity, responsibility (Table 4); Scientometric analysis of the evolution of a term/expression other than ethics but related to ethics (Table 5); ethics in the subfields of medicine (Table 6) and others (Table 7). The grouping criterion is listed in the headings of the tables. After a content analysis performed on the papers, if an identification of sub-criteria was possible/necessary, the latter were also highlighted.

Table 1. Papers regarding the analysis of the scientometric method

Grouping criterion	Title	Position in Annex – T 1
Critical analysis	Little Scientometrics, Big Scientometrics ... and Beyond (Glanzel & Schoepflin, 1994)	1
	The Scientometric Bubble Considered Harmful (Génova, 2016)	4
Importance analysis	Identifying Scientific High Quality Journals and Publishers (Negahdary, 2017)	12
	Bibliometrics and hunting the predators (Borgoyakova & Zemskov, 2018)	15

Table 2. Papers regarding the impact analysis and the proposal of new scientometric indicators

Grouping criterion	Title	Position in Annex – T 1
Impact analysis	Research Gate is no longer reliable: leniency towards ghost journals may decrease its impact on the scientific community (Memon, 2016)	8
	Science Online XX Anniversary Conference. Personal impressions (Zemskov, 2017)	10
	Scientometric indicators and collaboration network as a potential tool for gift author detection (Shinyaeva TS, Tarasevich, 2017)	13
	Competences of academic librarians in providing health research services: A qualitative study (Esmailzadeh & all, 2020)	26
	Detecting a network of hijacked journals by its archive (Abalkina, 2021)	31
Comparative analysis	The Misalignment of Russian Economists' Scientometric Indicators in RISC (Balatsky & Yurevich, 2016)	5
Proposal of new indicators	The Editorial Boards of Scientific Journals as a Subject of Scientometric Research: A Literature Review (Mazov & Gureev, 2016)	7
	Article Quality Indicator: Proposing a New Indicator for Measuring Article Quality in Scopus and Web of Science (Ghazavi & all, 2019)	22
	Journals of Musical Art and Education in Scientometric Database Scopus: Netnographic Analysis (Gavrilova & Voronova, 2019)	23
	National fractional calculations and evaluating organization's science efficiency (Guskov A, Kosyakov, 2020)	27
	Publications by editorial board of science journals as translated into bibliometric indicators (library and information science) (Mazov & Gureev, 2020)	28

Table 3. Papers on the scientometric analysis / journal

Grouping criterion	Title	Position in Annex – T 1
Individual analysis	Revista Medica de Chile in the year 2012 (Humberto Reyes & all, 2013)	3
	Journal of Marketing Education: A Retrospective Overview Between 1979 and 2019 (Donthu, 2021)	29
Comparative analysis	The Journals on the Domestic Lists of the IX Section of the Hungarian Academy of Sciences in Light of the Requirements of International Journal Selection (Sasvári & Urbanovics, 2019)	21

Table 4. Papers on the scientometric analysis with respect to ethics, integrity, responsibility

Title	Observations	Position in Annex – T 1
Promoting Virtue or Punishing Fraud: Mapping Contrasts in the Language of 'Scientific Integrity' (Horbach &, Halfman, 2017)	-----	11
From dignity to security protocols: a scientometric analysis of digital ethics (Mahieu, 2018)	publications that are indexed in Web of Science database; 2000 and 2016	16
Unethical Authorship in Scientific Publications (A Review of the Problem) (Gureev & all., 2019)	research conducted in Web of Science Core Collection Database; 1980-2018	18
Finding Facets of Academic Integrity and Plagiarism through the Prism of a Citation Database (Patra, 2019)	research conducted in Scopus database; 2000-2018	19
Evaluating Researchers Based on the Criteria of Reputation Responsibility (Kalachikhin, 2019)	-----	20

Table 5. Papers on the scientometric analysis of the evolution of terms / expressions

Terms/expressions	Title	Position in Annex – T 1
"Corporate Social Responsibility" (CSR)	The focus and frontier of corporate social responsibility A co-word analysis of articles in SSCI, 2001-2014 (Qin & all., 2016)	9
"Competitive Intelligence" (CI)	Evolution of the competitive intelligence based on metric study of its literature (Teixeira & Souza, 2017)	14
economic methodology / philosophy of economics	Economic methodology: a bibliometric perspective (Truc & all., 2021)	30

Table 6. Papers on scientometric analysis in the subfields of medicine

Subdomain	Title	Position in Annex – T 1
Neurology	Publication trends in neuroimaging of minimally conscious states (Garnett & all., 2013)	2
	Neuroethics 1995-2012. A Bibliometric Analysis of the Guiding Themes of an Emerging Research Field (Leeffmann & all., 2016)	6
Bioethics	Research Performance in Stem Cell Science and Regenerative Medicine in Iran: A National Comprehensive Observation [Saberri & all., 2019]	24

Table 7. Other papers on scientometric analysis

Subdomain	Title	Position in Annex – T 1
Negative emission technologies and ethical discourses	Negative emissions-Part 1: Research landscape and synthesis (Minx & all., 2018)	17
Mathematics	Shalosh B. Ekhad: a computer credit for mathematicians (Hu & all., 2020)	25

These results will be taken into account in the discussions on the novelty and importance of this paper.

3.2. Scientometric Analysis of IB and HCP-HP Results according to Web of Science criteria

Following the primary query of the WoS Core Collection database (“ethics” AND Year Published = 2011-2021), it resulted that the number of indexed papers, which constitute IB, is of 106,197 documents.

Within the specialized literature, a percentage is represented by the works with an international scientific recognition and / or on a topic of great interest. The measuring of scientific performance through citation indexes (García-Zorita et al., 2021; Garfield, 2006; Noorhidawati et al., 2017; Noruzi, 2017) has allowed the insertion of two significant categories of papers into the WoS: i.e. Highly Cited Papers (HCP) and Hot Paper (HP). According to Clarivate (2020): (i) Highly Cited Papers (HCP) are papers that perform in the top 1% based on the number of citations received when compared to other papers published in the same field in the same year, and (ii) Hot Papers (HP) are papers published in the last two years that are receiving citations quickly after publication. These papers have been cited enough times in the most recent bimonthly period to place them in the top 0.1% when compared to papers in the same field and added to the database in the same period (<https://clarivate.com/webofsciencegroup/solutions/essential-science-indicators/>).

Figure 1 shows the statistics on: the most cited works in the field; the review papers (very important for information-documentation in a certain subdomain); the papers published in advance (online first); the papers published in Open Access mode (for which there is a direct link from the Web of Science platform to the full text); the works accompanied by the data sets used. These papers are called "Tagged documents" because the labels in the screenshot displayed in Fig. 1 are also found next to the works with that characteristic.



Fig. 1. Statistics Tagged documents (screen shot WoS platform on 4th November 2021)

In order to obtain the HCP-HP batch, the Cited Paper (Highly Cited Papers or Hot Papers) query was applied to the IB, which generated a report showing that there are 272 papers in the HCP-HP category (Fig. 2)

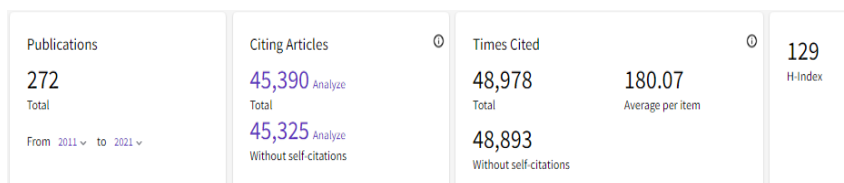


Fig. 2. HCP-HP WoS Raport

These two groups (IB and HCP-HP) are the ones that will be analyzed scientometrically through the set of criteria (Analyze Results) available in the WoS platform. The results of the analyses are presented in parallel, for a better overview of the data and an easier qualitative interpretation.

3.3. Application of the „Publication years” and „Document Types”

A first analysis, pertinent to the present study, is made by applying the criteria:

- „Publication Year”, which reveals the trend of interest manifested by authors and by the scientific and academic community towards ethics, materialized through their conducting research and publishing scientific papers on the topic (Figs. 3 and 4) and

- „Document Types” reveals the authors' interest in specialized paper types (Figs. 5 and 6). This analysis, which establishes the distribution of the types of scientific papers out of the total number of indexed documents examined, considers the classification of specialized papers in the types of documents available in the WoS platform.

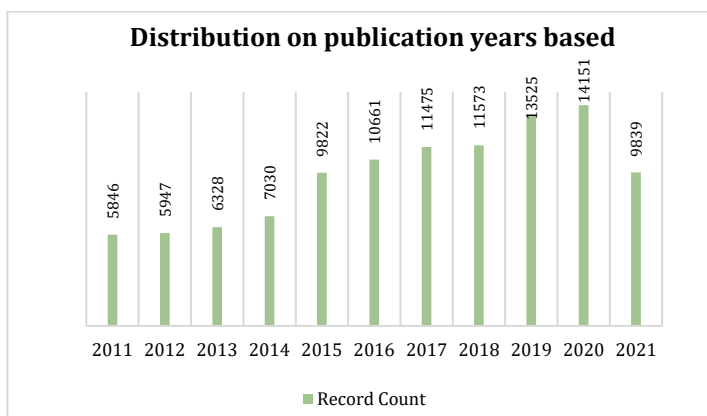


Fig. 3. Distribution in IB according to the criterion „Publication Year”

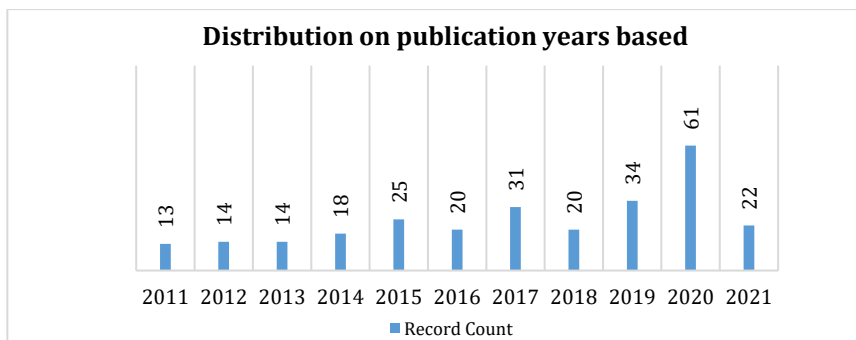


Fig. 4. Distribution in HCP-HP according to the criterion „Publication Year”

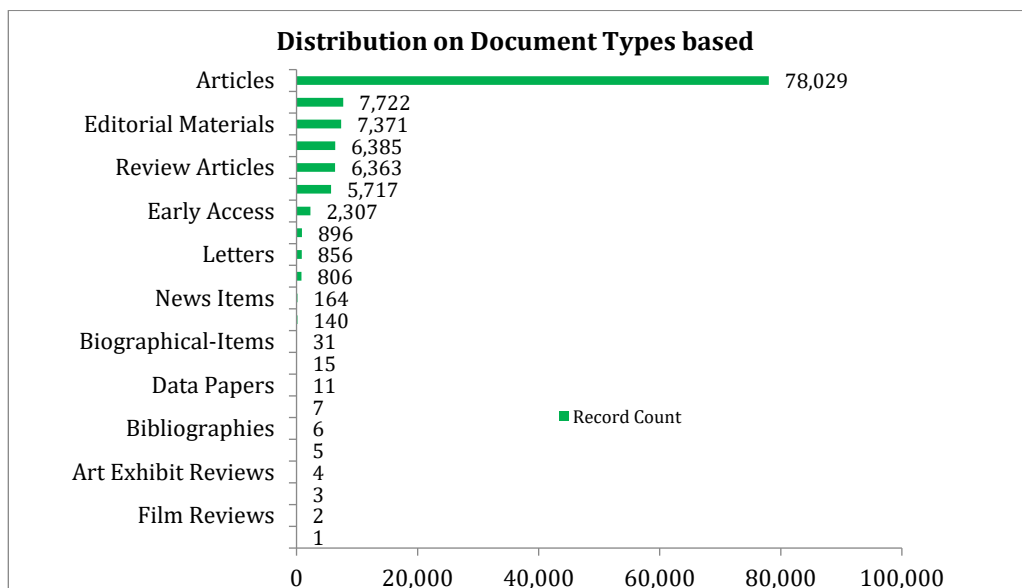
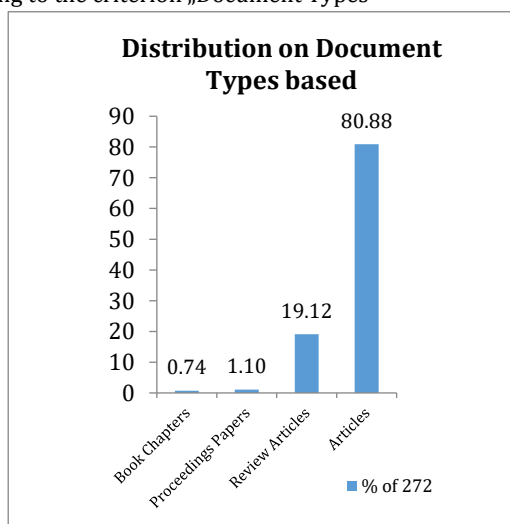


Fig. 5. Distribution in IB according to the criterion „Document Types”

Fig. 6. Distribution in HCP-HP according to the criterion „Document Types”



3.4. Application of WoS „Research Areas”, „Categories” and „Index” criteria

The grouping of the results according to research area criteria, to categories and to WoS Indexes allows for the analysis of the graphical distribution of scientific papers based on authors' interest in certain research areas and then based on the classification of these research areas into research categories and later on into WoS Index categories.

The results of applying the Research Areas criterion, namely the framing of the results obtained in the research areas available on the WoS platform can be found in Figs. 7 and 8, respectively.

In order to devise the graph, the weights of at least 1% of the research areas (Research Areas) in which the obtained results are included, were taken into account.

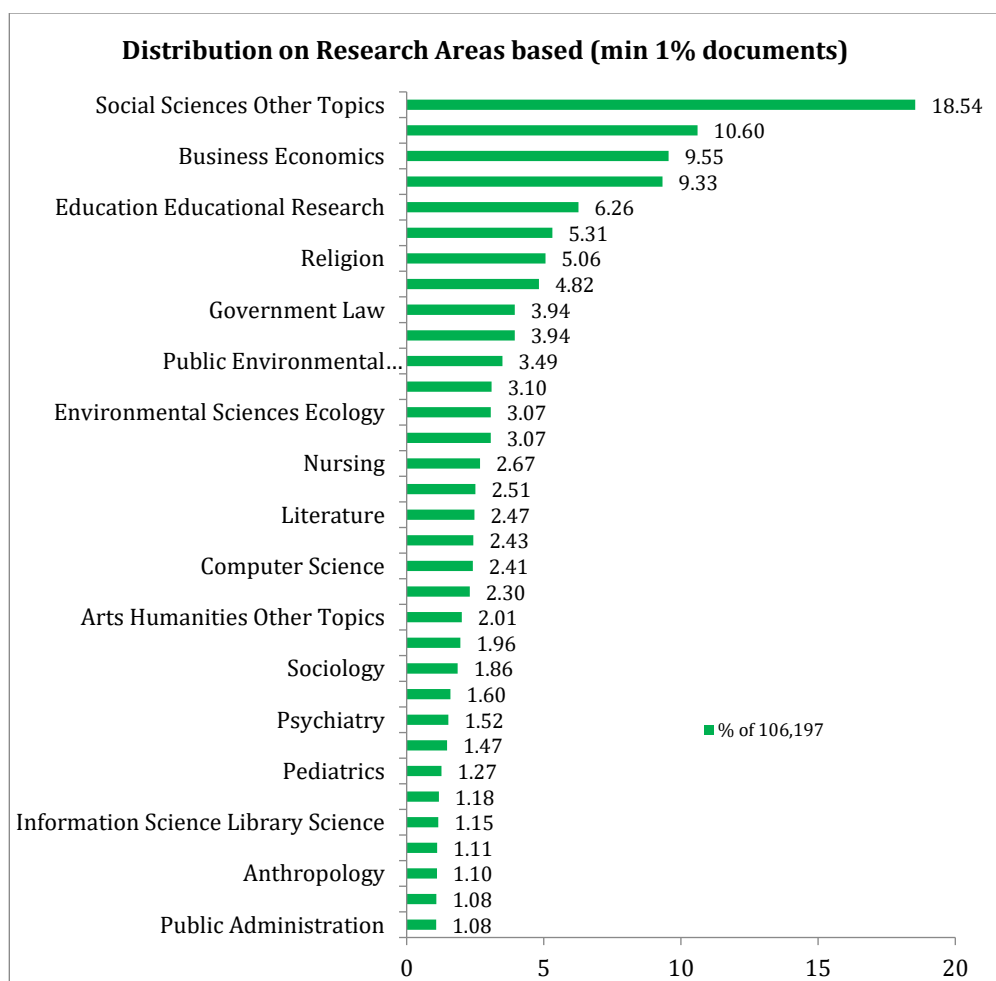


Fig. 7. Distribution in IB according to the criterion „Research Areas”

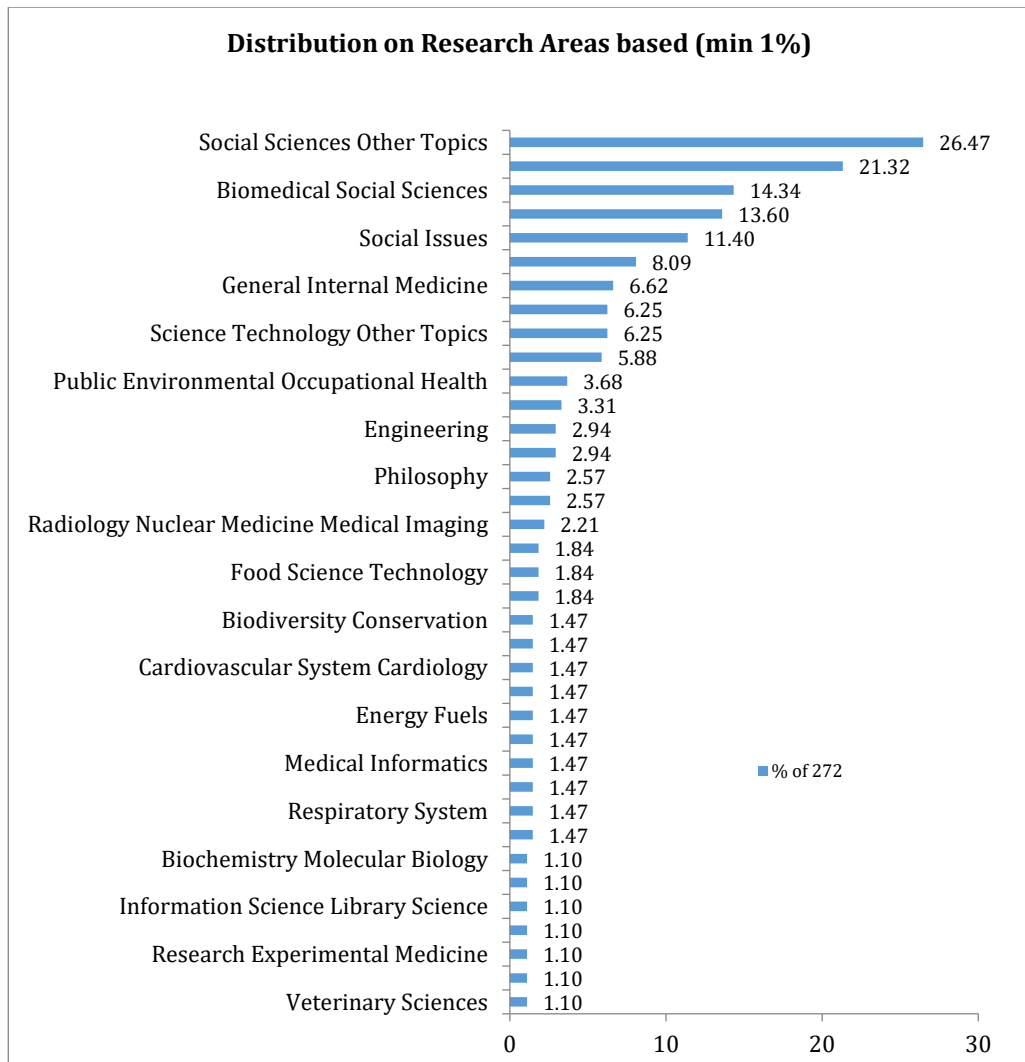


Fig. 8. Distribution in HCP-HP according to the criterion „Research Areas”

The assignment of the obtained results to the domain / sub-domain categories available on the WoS platform is done by applying the criterion "Web of Science Categories" and by applying the minimum limit of 1% of the percentage of papers in a category. Figure 9 shows the results reported in the initial batch of 106,197 documents.

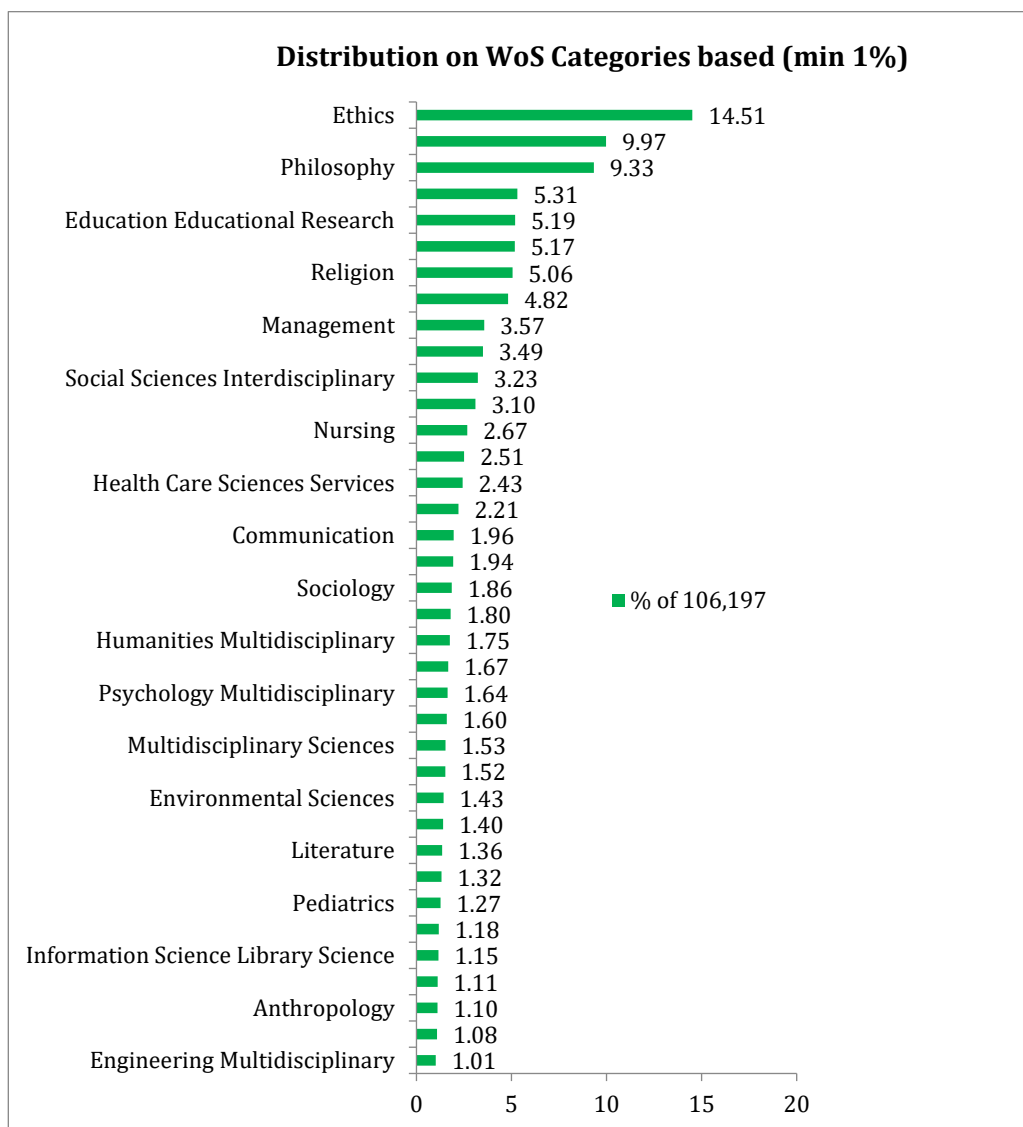


Fig. 9. Distribution in IB according to the criterion „WoS Categories”

The application of the „Web of Science Categories” criterion and the minimum limit of 1% of the percentage of papers from a category is also applied to the HCH-HP group. The results are shown in Fig. 10.

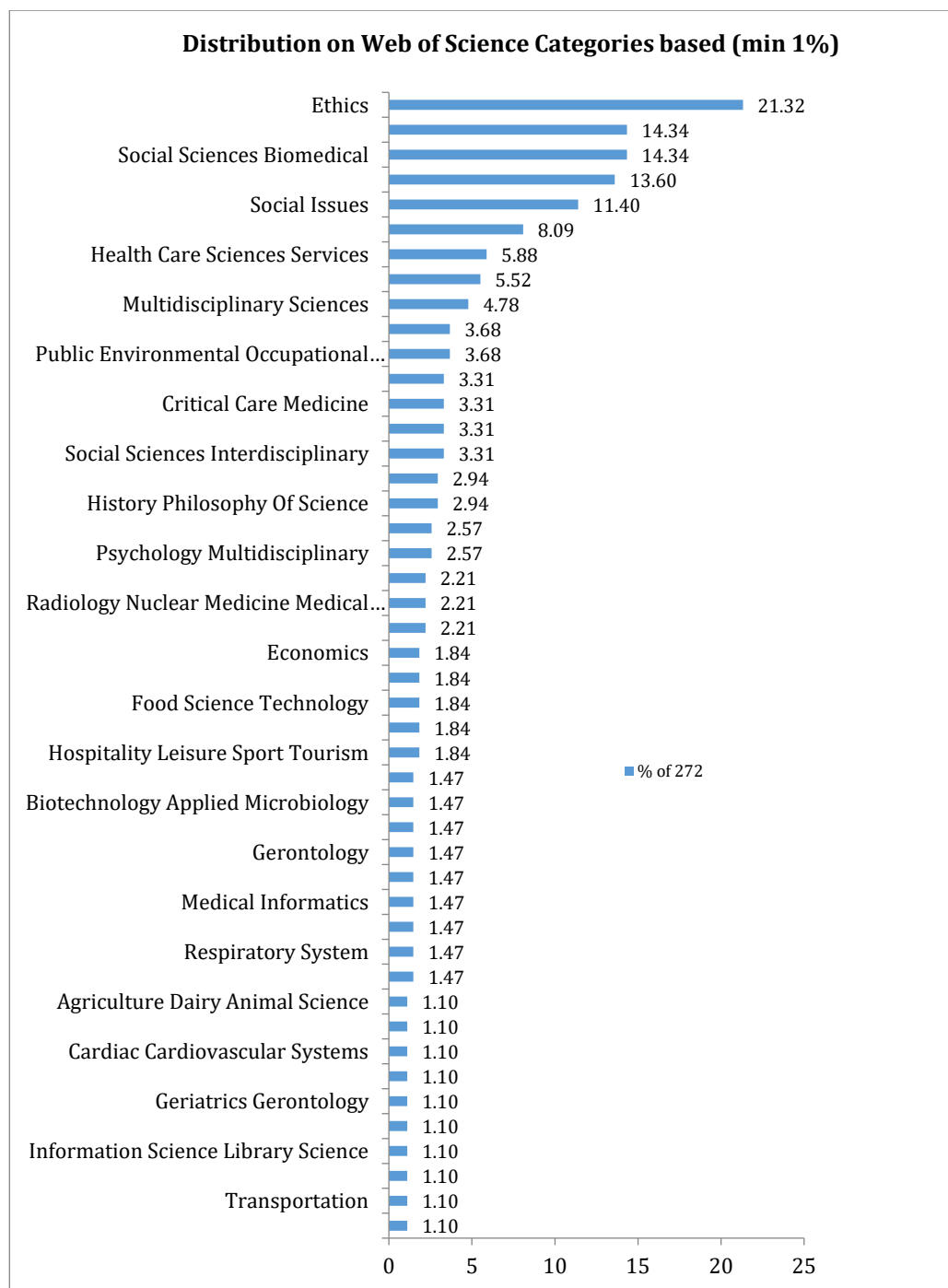


Fig. 10. Distribution in HCP-HP according to the criterion „WoS Categories”

The distribution of the papers analyzed through the indexes available on the Web of Science platform is expressed by percentages and in relation to every batch. These results were obtained by applying the Web of Science Indexes criterion, as shown into Figs. 11 and 12.

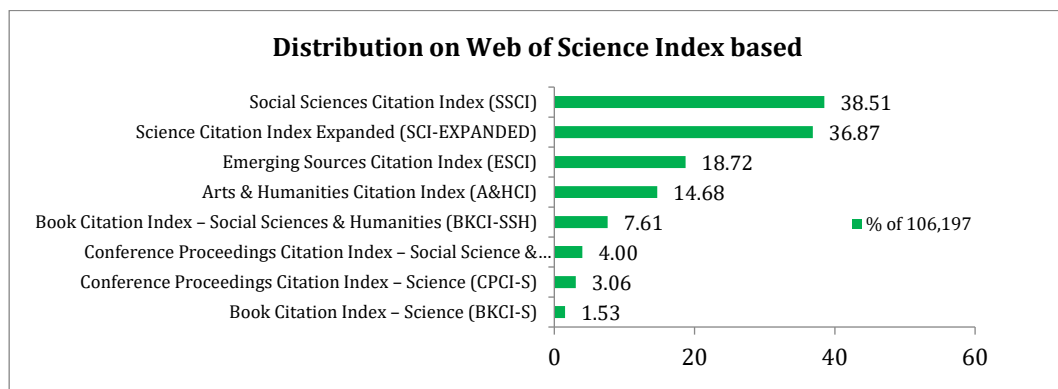


Fig. 11. Distribution in IB according to the criterion „Web of Science Indexes”

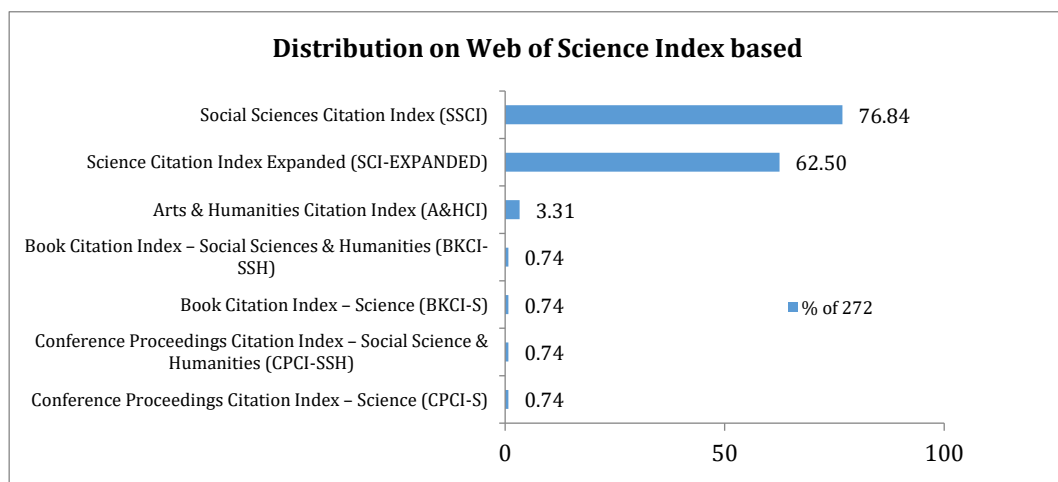


Fig. 12. Distribution in HCP-HP according to the criterion „Web of Science Indexes”

3.5. Applying of „Authors”, „Publication Titles (Sources)” and „Countries” criteria

Which are the most prolific authors in the studied period, and which are the journals in which the most is published in the field of ethics, are results that we obtained by applying the criteria "Authors" and "Publication Titles (Sources)" on the two batches.

The analysis according to the Authors criterion has as lower limit for the inclusion in the results, namely the existence of a minimum number of 50 published

papers / author for the IB batch and of at least 3 published papers / author for the HCP-HP batch. The obtained results can be found in Figs. 13 and 14.

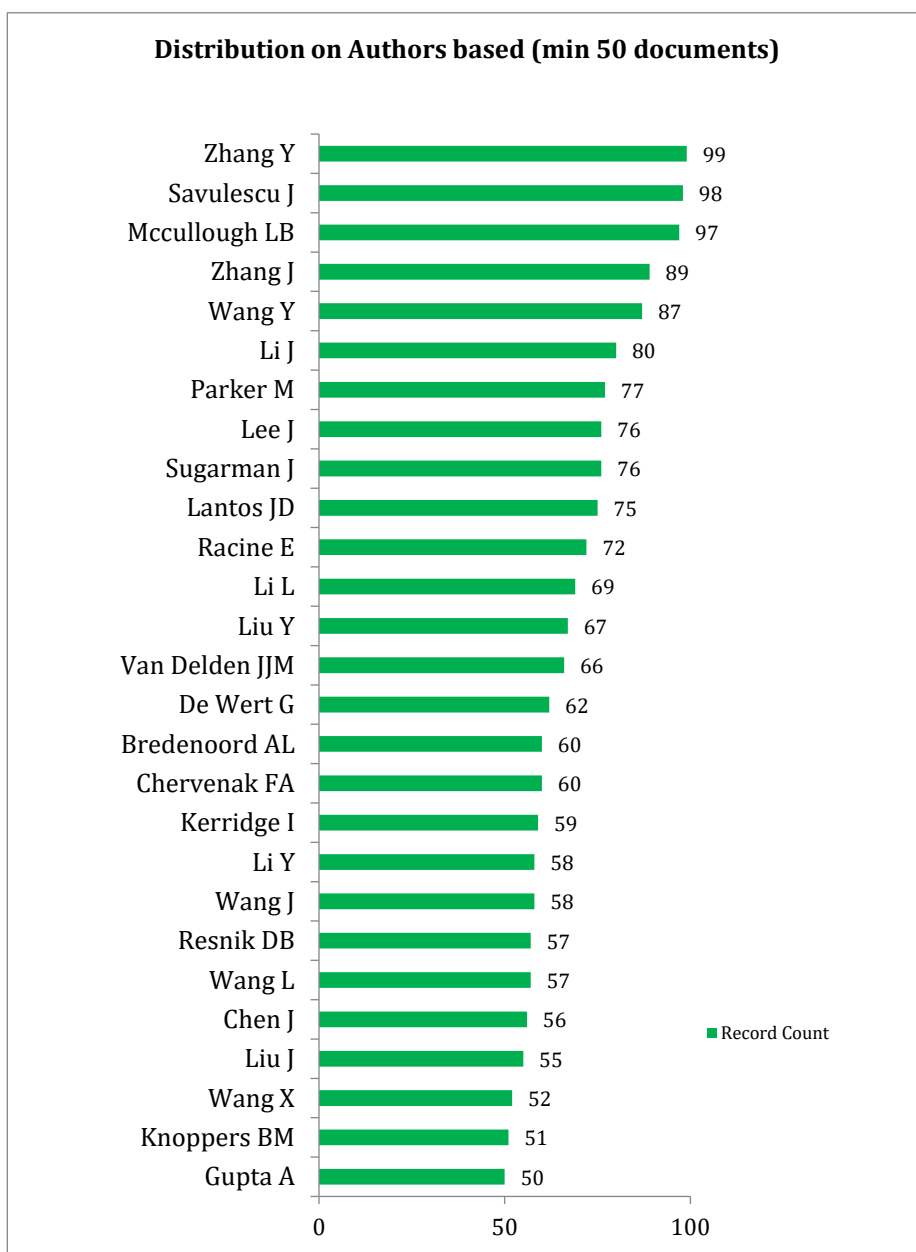


Fig. 13. Distribution in IB according to the criterion „Authors”

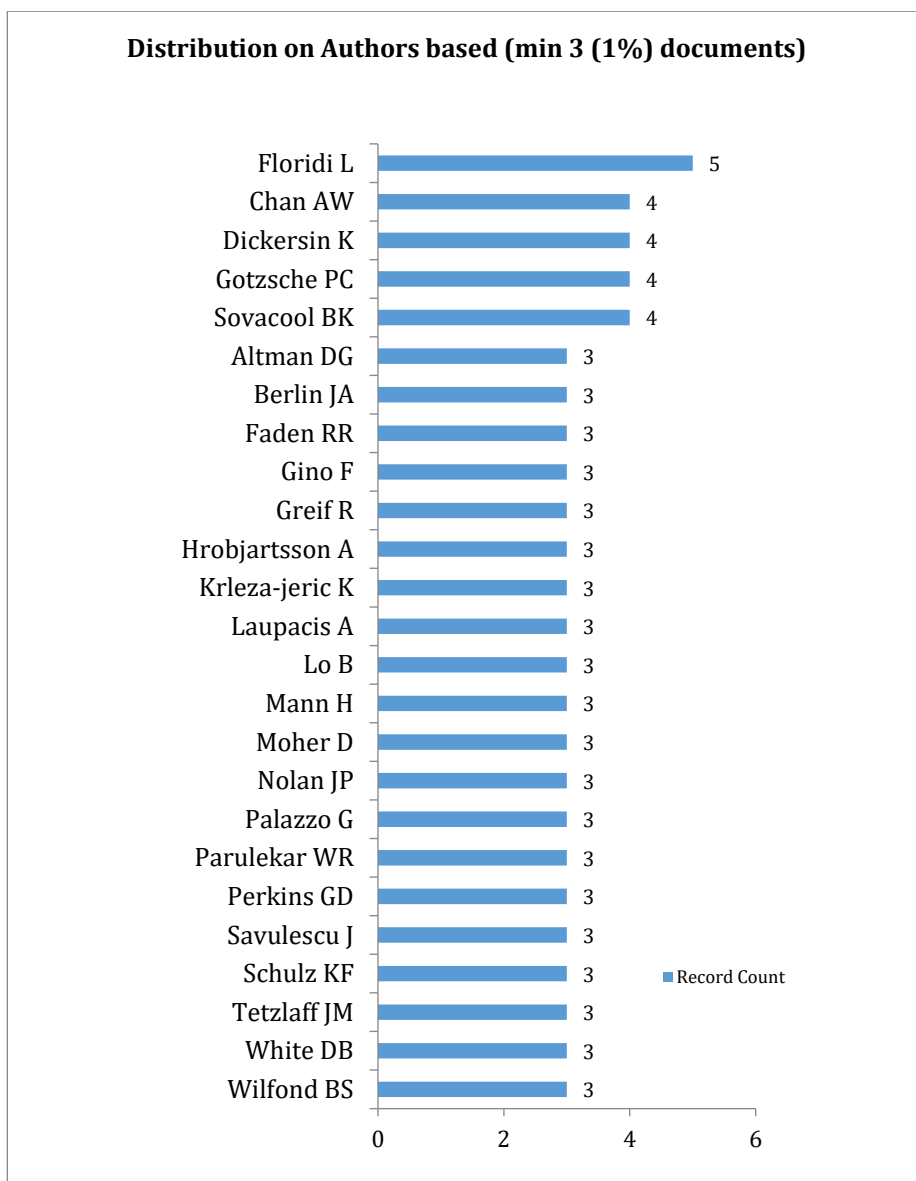


Fig. 14. Distribution in HCP-HP according to the criterion „Authors”

The assignment of the obtained results, both to the IB and to the HCP-HP, in the sources (journals, conference volumes, books) available in the WoS platform is performed by applying the criterion „Publication Titles (Sources)” for which the minimum limit of: (i) at least 200 papers published for sources belonging to IB, Fig. 15; and (ii) at least 3 papers published for sources belonging to HCP-HP, Fig. 16 was imposed.

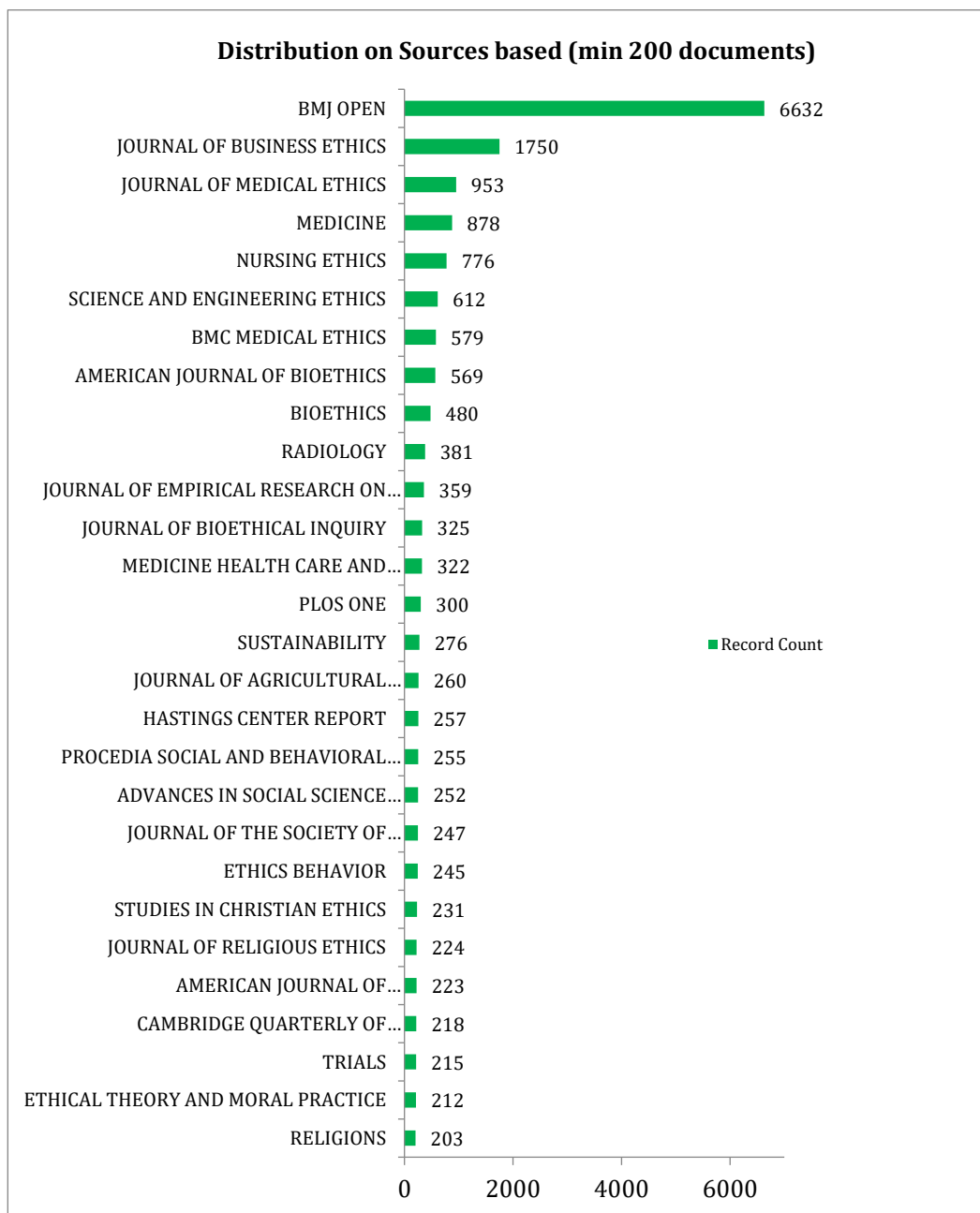


Fig. 15. Distribution in IB according to the criterion „Publication Titles (Sources)”

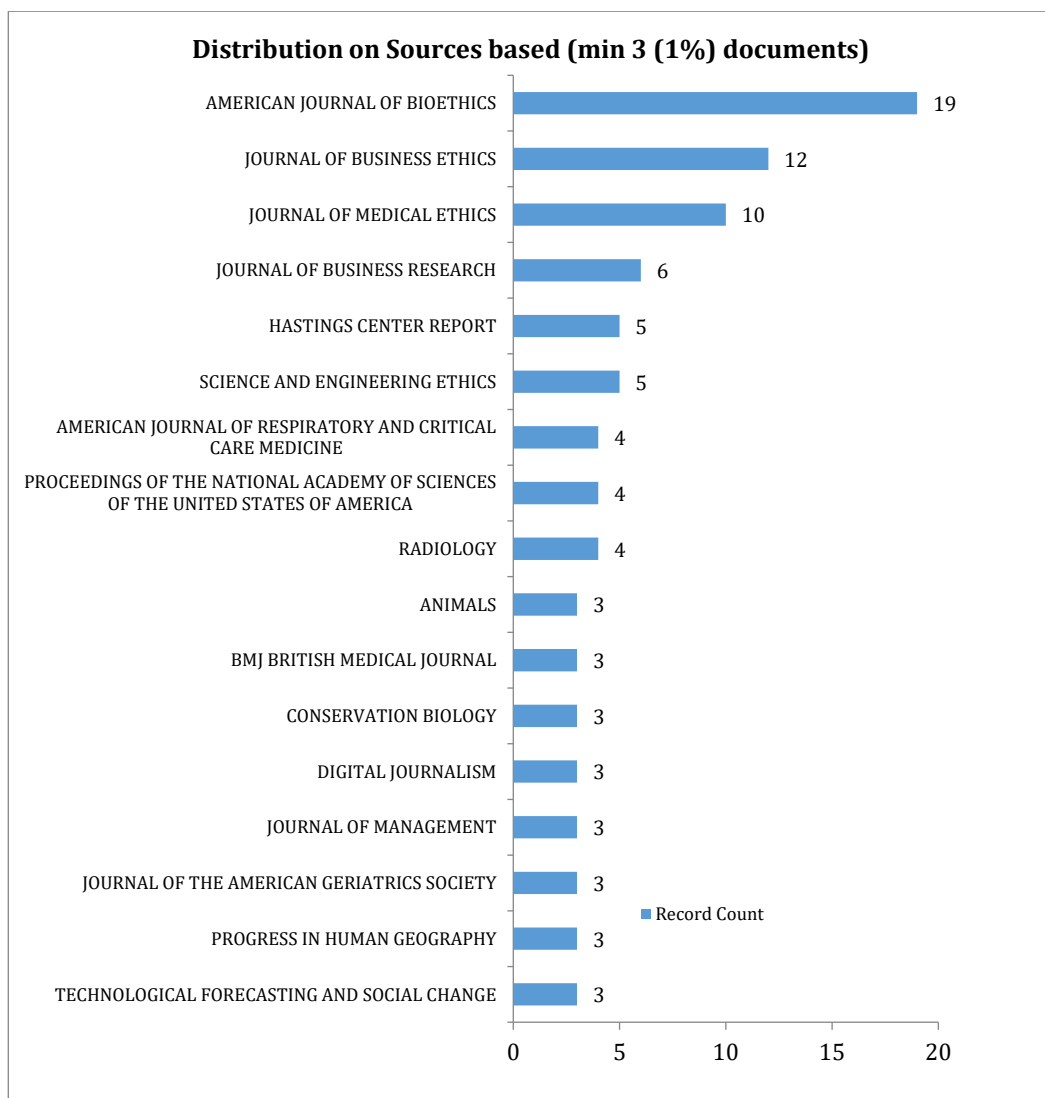


Fig. 16. Distribution in HCP-HP according to the criterion „Publication Titles (Sources)”

It was also important to research the country of origin of the previously identified authors, results that were obtained by applying the criterion "Countries", according to Fig. 17 for IB and Fig. 18 for HCP-HP respectively. The graphs present the weights of the countries starting from: (i) at least 1000 papers published by authors who have declared the same affiliation in the case of IB; (ii) at least 3 papers published by authors who have declared the same affiliation in the case of HCP-HP.

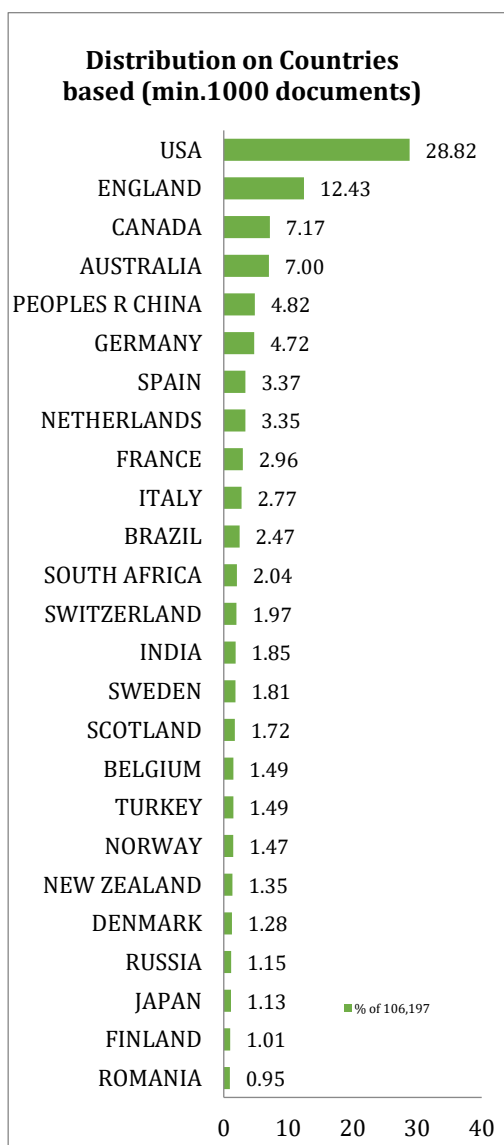


Fig. 17. Distribution IB according to the criterion „Countries”

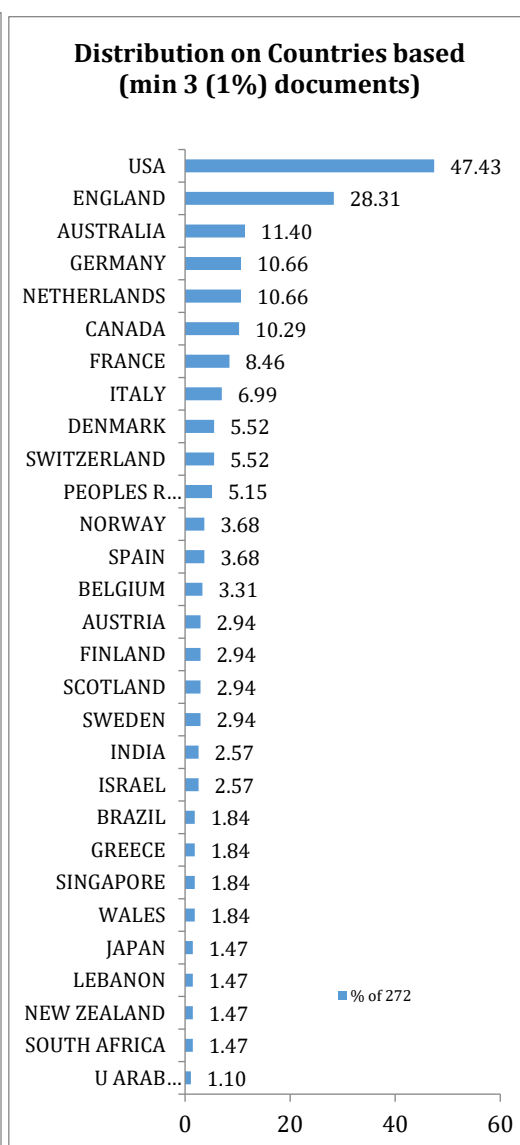


Fig. 18. Distribution in HCP-HP according to the criterion „Countries”

3.6. Research funding

In ethics, as in any other field of research, there is the possibility of funding. Considering the importance of establishing the existence or non-existence of a link between the research funding and the distribution of specialized papers according to the previously presented criteria, an analysis was made by applying the „Funding Agencies” criterion on the two batch. The results are found in Figs. 19 and 20.

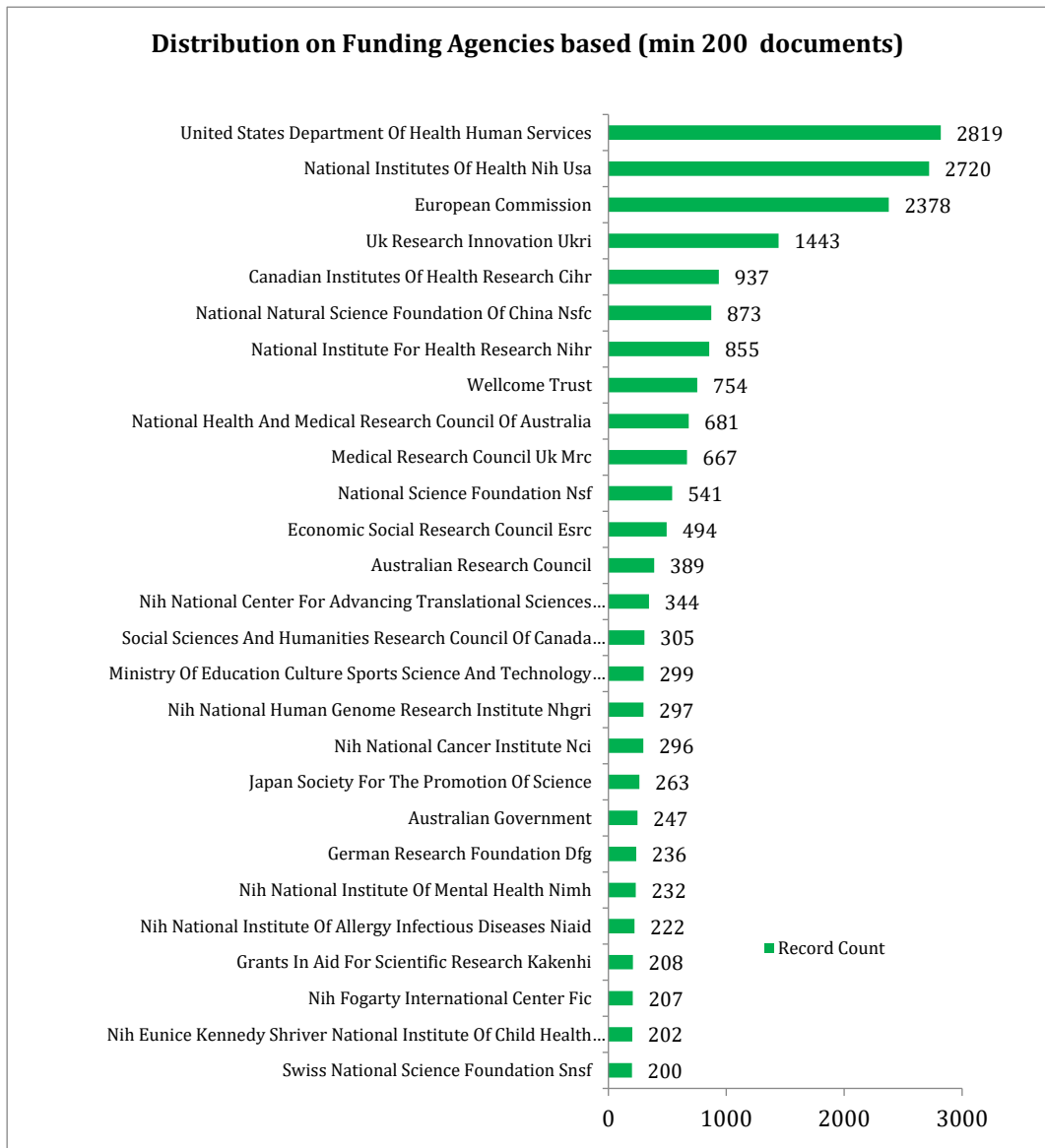


Fig. 19. Distribution in IB according to the criterion „Funding Agencies”

The graph in Fig. 19 shows the agencies (denomination variant) that funded at least 200 funded papers, compared to the results obtained for IB. The results provided by interrogating the WoS, before applying the criterion of minimum 200 funded documents, shows that the weight of the funded documents (27,511) of the results (106,197) is 25.91% and the weight of funded documents in section WoS Core Collection in the same period is 42.67%.

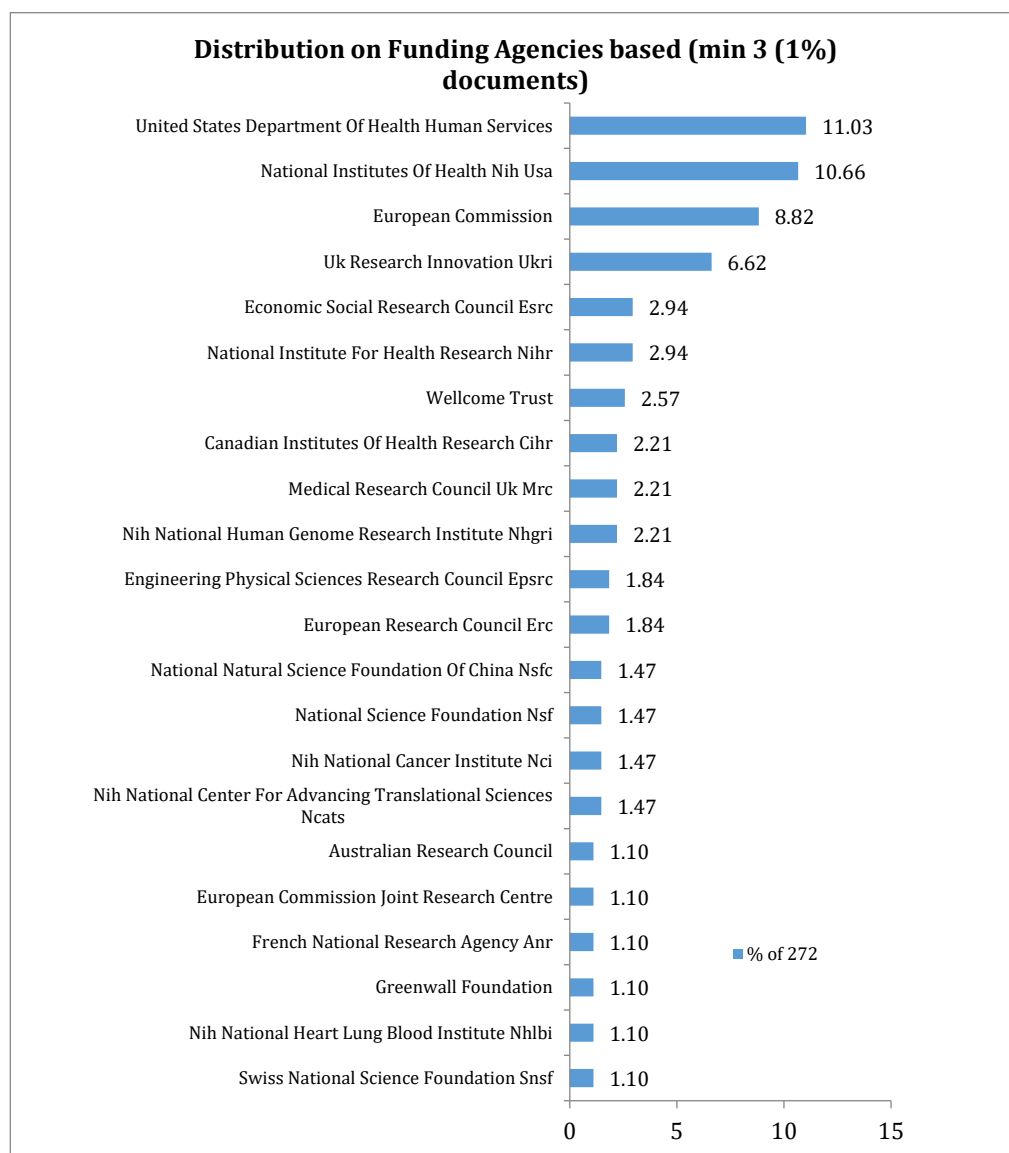


Fig. 20. Distribution in HCP-HP according to the criterion „Funding Agencies”

The graph in Fig. 20 shows the agencies (denomination variant) that have at least 3 funded documents, compared to the results obtained for HCP-HP.

The results provided by the WoS platform to the query, before applying the criterion of at least 3 funded documents, show that the weight of the funded documents (135) of the re-fined results (272) is 49.63% and the weight of the funded initial documents is 25.91 %, the weight of funded documents in section Web of Science Core Collection in the same period is 42.67%.

3.7. Affiliation of HCP-HP authors

Figure 21 shows the results obtained by applying the criterion „Affiliation” to the HCP-HP batch. They are useful in identifying the academic communities whose members are more interested in ethics research and in the integrated analysis of the results obtained by applying the other previously identified criteria.

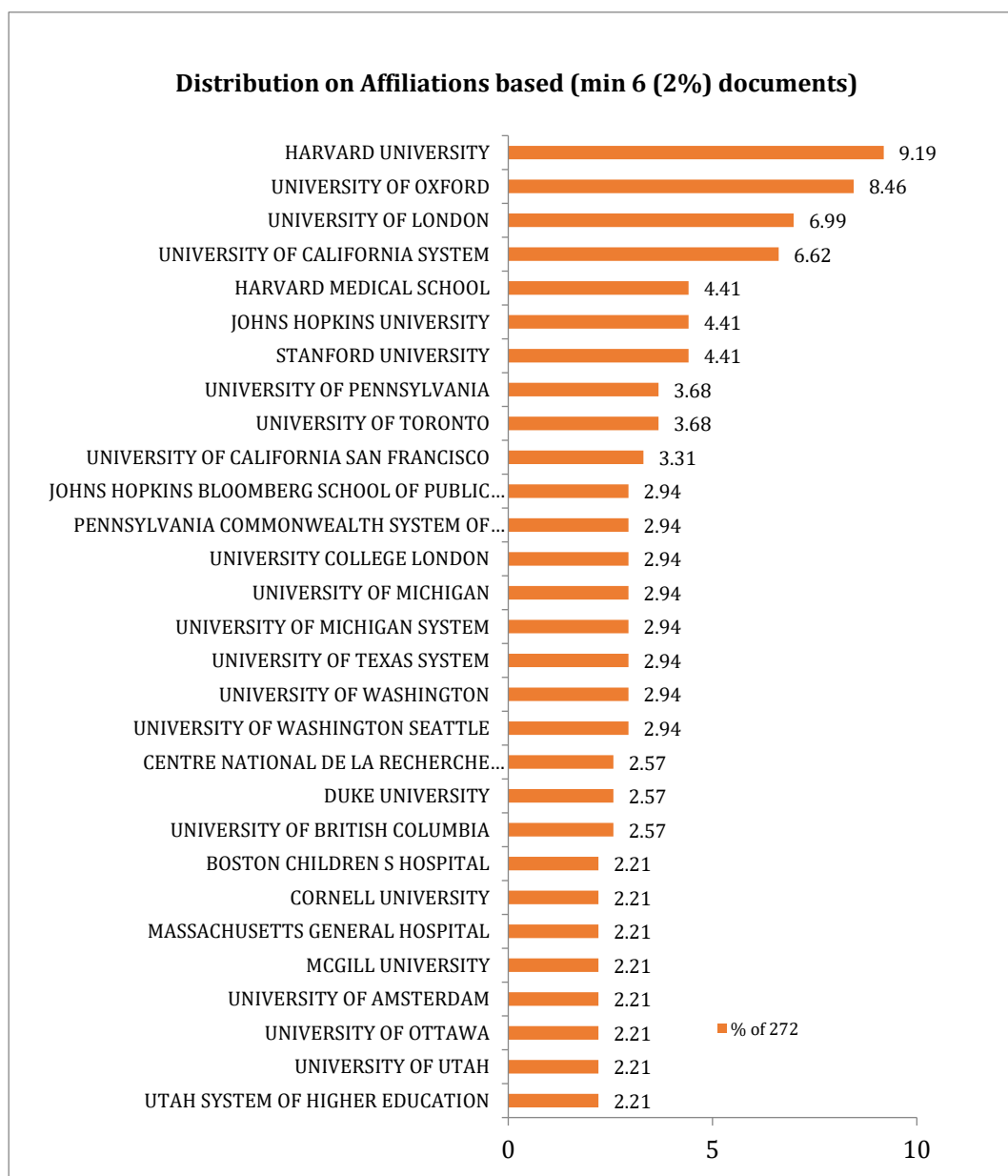


Fig. 21. Distribution in HCP-HP according to the criterion „Affiliations”

4. Word Cloud representation

ICT technologies for semantic interpretation are also used in scientometric/bibliometric analyzes (Avram et al., 2014). In our study we used a Word Cloud Generator available at <https://wordart.com/>. Word Cloud provides a visual representation of word frequency. The bigger font and the graphic emphasis placed on the word, the more frequent it's rementioning in a given text and the more significant its prominence. The results of applying this method of quantitative analysis on the article titles, keywords and abstracts of the 272 HCP-HP documents can be found in Fig. 22.



Fig. 22. HCP-HP Word Cloud

5. Discussion

It is indisputable that ethics occupies an important place in any society, at any given time.

A role in maintaining and promoting ethics research on ethics that has been carried out has played a major role, especially since the evolution of society, of interpersonal relations and technological development imposes a paradigm shift.

The preliminary stage in ascertaining the novelty and originality of the study and in the presentation of the evolution of scientometric research in a field, is the research of the quantitative and / or content evaluation of the specialized papers

published in a certain period of time. However, any research, in order to be taken into account, must also have a character of novelty. In this sense, the analysis on the BSSL shows that the present scientometric research on ethics, carried out on the WoS database, has a strong novelty character. In the entire period between 1975 and 4.11.2021, no other paper presented a scientometric research of the entire field of "ethics", with all its forms of theoretical or applied expression. Even when scientometric research on ethics was done, the papers focused on specific issues such as: reputation, integrity, authorship, plagiarism and digital ethics (Table 4). Links between ethics and scientometrics were also established by:

- reference to the role of scientometric in determining the impact factor, the quality of the research and the analysis of related ethical issues (Table 1),
- reference to scientometric indices (Table 2), either in the form of an analysis of the impact on ethical issues, or by proposing new scientometric indices to be taken into account in the Scopus and WoS databases,
- Scientometric analysis of ethics in a particular field, in a specific journal (Table 3),
- Scientometric analysis of the evolution of a term or expression, and in terms of ethics (Table 5),
- Scientometric analysis of ethics in some subfields of medicine (Table 6) or other fields (Table 7).

The establishment of the novelty of the research allowed the transition to the actual realization of the study, by establishing the research batches, the method and instruments used. As mentioned, this study covers a period of 10 years, between January 2011 and November 4, 2021.

The results obtained by applying the "Publication Year" criterion show that the number of papers in the field of ethics has increased steadily, from one year to another, the scientific community showing a growing interest in research and publication of results obtained in this field (Figs. 3 and 4). Although the graphs also show the papers from 2021 indexed until 4.11.2021, in calculating the percentage, the year 2020 was taken into account. This is because the works published in 2021 will be indexed over the years 2021-2022 and thus, only at the end of this period will we know almost exactly this amount.

Regarding the total number of papers published and found in the WoS database comprised in IB, there is an increase of 142.06% from the beginning of the analyzed period, 2010, until the end of 2020 (Fig. 3). HCP-HP also experiences a substantial, even explosive increase of 369.23% (Fig. 4), which shows that the quality of published papers is also important for the authors and the scientific community. Furthermore, such an increase in the number of HCP-HP articles (from 34 articles in 2019 to 61 articles in 2020) shows that the interest of the academic community for ethical issues,

which became a hot topic at the time, raised significantly during the respective year. We cannot help but notice that in 2020 the Covid-19 pandemic triggered major societal changes which manifested themselves in all areas of life and generated ethics-related problems as well. When comparing the difference in annual increase (between 2011 -2020) of the number of IB papers with that of the HCP-HP papers, there is an almost two-fold increase of the number of articles from the HCP-HP as compared to that of articles in the IB batch (HCP-HP amounting to 469% as compared to 242% for IB), which once again demonstrates the raising interest of communities for all information with regard to the leading research on ethical aspects.

Generally speaking, this double increase (quantitative and qualitative) allows us to say that there is a growing interest in ethics research and publication.

Studying the distribution of papers after applying the „Document type” criterion, the authors' concentration on the publication of original research papers (article = original paper) is re-marked, representing:

- (i) 78,029 papers out of a total of 106,197 analyzed (Fig. 5), constituting a percentage of 73.48%, and
- (ii) 80.88% of the total of HCP-HP papers (Fig. 6).

As expected, in the case of HCP-HP papers, the review articles are in a higher percentage (19.12%) compared to their number in IB (percentage calculated of 5.99%, relative to the number of 6363 papers). The importance of review type is underlined both by the specialized articles that describe and analyze this research method (vom Brocke & all., 2009; Chenail & all., 2010), as well as by their existence in different research fields, including ethics (Gureev & all., 2019; Mazov & Gureev, 2020; Donthu & all., 2019; Cook & Leviton, 1980; Chenail & all., 2010; Tsalikis & Fritzsche, 2013). In contrast, there are very few Book Chapter in the HCP-HP category, only 0.74%, compared to the percentage of 6.01% of all existing papers in IB. All these results show that the specific research is much more sought after and appreciated compared to general papers of the type Book or even Book Chapter. It follows that the trend of research and publication of the authors in this field is, and may continue, to focus on this one-time approach to ethical issues (Dawson & Jennings, 2012; Etzioni & Etzioni, 2017; Tzafestas, 2018; Braidotti, 2019; Chang, 2021; Vărzaru & all., 2021).

The analysis of the information extracted from the annual distribution (Figs. 3 and 4) and from the distribution based on Document Types (Figs. 5 and 6) with the data in Fig. 1, a very important aspect is revealed. The weight of the Open Access (OA) documents of these results (i.e. the ratio between the OA documents and total number of documents) is 39.71%, more than the OA weight in the WoS Core Collection database during the same period (31.36%)! The increased percentage of OA publications can be analyzed from various perspectives. From the point of view of the researcher, the significant amount of papers on aspects of ethics covering almost all

scientific domains, indexed on the WoS platform (250 out of 252 WoS Categories, 151 out of 152 Research Areas), cater for all information-documentation demands, and the OA publications, which are obtainable from a single information source (namely from the WoS platform) allow access to a significant amount of specialty literature without requiring other financial resources. From the perspective of journals, given the importance that has been granted to ethics lately, the OA publication ensures a more poignant visibility of the journal through the effortless citing of published articles, thus leading to a boost of influence indicators.

After correlating the large number of articles published as OA papers with the results obtained from applying the Research Funding criterion (Figs. 19 and 20), and taking into consideration the great deal of documents published as a result of funded research projects, we can safely claim that even this latter aspect can be viewed as a sound reason to publish as OA. The basis of this statement is the very obligation to publish the results of research funded by the European Commission as OA. Scientometric research shows that the European Commission is the third largest research funding body in the field, both of IB papers (Fig. 19) as well as of HCP-HP papers (Fig.20), and EU and EEA countries stand for 56% and 55.17%, respectively of the article distribution according to the "Countries" criterion (Figs. 17 and 18). Considering the results obtained with regard to the relationship between OA papers and research teams whose grants in their respective fields were funded, it can be claimed that OA papers can constitute a point of departure for filtering articles or documents elaborated by research teams who achieved substantial results or benefitted from major grants.

Analyzing the reports generated by the WoS platform when applying the "Research Areas" criterion, before establishing the minimum percentage of 1% for generating the graphs according to the Pareto principle, emphasized in Figs. 7 and 8, we find that the involvement of ethics in all aspects of research is also demonstrated by:

- the 106,197 papers of IB cover 151 research areas from 152 available in Web of Science platform, during the analyzed period (2011-2021), i.e. a percentage of 99.34%;
- the 272 papers of HCP-HP cover 71 research areas from 151 covered by IB, i.e. a percentage of 47.02%.

Although it was expected that the percentage of coverage of research areas by HCP-HP will be lower, maintaining it at a high level, shows that high-level topics in the field of ethics are found in at least half of the research areas.

The comparison between the research areas covered by the two categories and their percentages (Figs. 7 and 8) indicates the maintenance of the social sciences among the top research areas but also an increase of the Social Issue research area from 3.10% (Fig. 7) to 11.40% (Fig. 8). Such an increase demonstrates the concern for

solving social problems generated either by the lack of ethical behavior (Burget & all., 2017; Gelinas & all., 2017), or the emergence of new situations, which requires the debate of ethical issues (Laacke & all., 2021; Beskow & Weinfurt, 2019). A similar increase has been shown in the Environmental Science Ecology Area, this field having a percentage of 3.07% in IB (Fig. 7) and 8.09% in the HCP-HP batch (Fig. 8). This interest is more than gratifying, especially since environmental issues are very topical issues and, from the point of view of the scientific approach, it is not only a problem of technical domains, but also a problem of social, professional, political and administrative ethics (Singh & all., 2019; Chang, 2011; Abson & all., 2014). Also in the area of environmental issues, new entries are also ethics in Agriculture Area (Greiner & Gregg, 2011), Energy Fuels (Sovacool & Dworkin, 2015; Sovacool & Hefron, 2016) and Transportation (Taeihagh & Lim, 2019), areas that, although not found in IB, are found in the HCP-HP batch with a percentage of 1.84%, 1.47% and 1.10%, respectively (Fig. 8).

The ethical concern for nonhuman living beings currently returns in the top ethical research, with a percentage of 1.10% from the batch of HCP-HP papers (Sikes & Gannon, 2011; Alonso & all., 2020, Tarazona & all., 2020).

Unfortunately, ethics in the Educational Research Area, although occupying an important place in IB – 6.26% (Fig. 7), is no longer found in the batch of HCP-HP documents. This may be because ethics has been developed in increasingly specialized and restricted areas, which include, intrinsically, this component. The absence of any education-related word in the title, keywords, or abstract, as identified in the HCP-HP Word Cloud (Fig. 22) confirms this.

Investigating the classification of the papers analyzed in the research categories classified WoS, in the reports generated by the WoS platform to this criterion (WoS Category), before establishing the minimum percentage of 1% according to the Pareto principle, for generating the graphs in Figs. 9 and 10, we find that:

- the 106,197 documents of IB are covered by 250 (98.43%) categories from 254 available on the Web of Science platform, in the analyzed period (2011-2021), and
- the refined results (272 papers of HCP-HP) are covered by 102 (40.8%) categories from 250 covered by the initial results.

Corroborating the results obtained by applying the criteria "Research Areas" and "WoS Category", and taking into account that: (i) WoS Category, through the 254 research categories represents a refinement of Research Areas, which includes only 152 areas and that (ii) in the case of IB, the coverage percentages are 99.34% for WoS Category and 98.43% for Research Areas, and in the case of HCP-HP, these percentages are 47.02% and 40.8%, respectively, it turns out that ethics is not a strict field or, in other words, it is not a strict concern that mainly occupies a field.

The scientometric approach to articles with ethical perspectives, by applying all the criteria made available on WoS, lays emphasis on the existence of an integrated, complex development of a classic research field – ethics. Even if ethics per se, as a category, a criterion of WoS, represents only 14.51% of IB (Fig. 9), the presence of ethics is revealed by numerous other categories of the WoS, even if they have much lower percentages. This foreshadows a continuous development of research in the field, especially since categories that are not included in IB are highlighted in HCP-HP.

Moreover, it can be seen that the distribution of the HCP-HP batch by Research Areas and WoS Categories in the results highlighted in Figs. 8 and 10 is higher than the one obtained for the IB batch (Figs. 7 and 9), by 12% respectively (with 4 additional research areas) and 24% (with 9 more WoS Categories). It is widely known that the existence of a hot topic brings about subsequent research which is carried out in the same area or category as well as research in related or complementary areas and categories (Garfield, 2006, 2011; Noruzi, 2017).

Applying the WoS Index criterion, we notice that in the case of IB, the 106,197 papers analyzed cover all WoS indexes (Fig. 11). The first two categories, SSCI and SCI-EXPANDED, have similar percentages (38.51% and 36.87% respectively), being followed by the magazines in the ISI antechamber (ESCI journals), with a percentage of 18.72%. The fact that the ESCI journals are in third place shows that the concern of research in ethics does not only target to obtain recognition by inclusion in WoS, but is a research based on and generated by the current needs of society. Unfortunately, none of the HCP-HP papers are found in ESCI journals (Fig. 12), but that is ultimately normal given the age and visibility of ESCI journals, compared to those already indexed in the WoS.

The analysis of the results that identify the most prolific authors in the studied period, in both batches, highlights a very interesting fact. Only one of the authors of IB can be found in HCP-HP, this being: Savulescu J., who out of a number of 98 papers published in IB has 3 papers in HCP-HP (Al-Shahi Salman & all., 2014; Kahane & all., 2015; Savulescu & all., 2020). Although the existence of a greater correspondence between the two groups was expected, the reality shows us that HCP-HP are not necessarily related to the consistency of the authors in a field, but rather to bringing to the fore a problem or solutions to a problem of actuality.

Examining the distribution of the authors by origin, in both batches, (Figs. 17 and 18) and the affiliation of those in the HCP-HP category, it is observed that:

- in the largest proportion, whether it is IB (28.82%), but especially HCP-HP (47.43%), they come from the USA, and therefore from the universities in them (Figs. 17 and 18);
- states with common-law legislation predominate, legislation that emphasizes the judicial precedent, so that the citizens of these states are

more open to examples of good practice and more inclined to the study and application of the general principles of an ethical society. On the other hand, civil law states have a much lower representation, which we can attribute to the rule of law, including in the field of ethics, so that the importance of interpretations does not have an equally great impact;

- the authors from the United Arab Emirates (1.1%), Lebanon (1.47%), Singapore (1.84%), Greece (1.84%) and Israel (2.57%) appear in the HCP-HP category, but not in the IB which shows that the ethical issues raised by these authors have had a particular impact. It is also important that the results obtained by generating IB by country of origin, before applying the filtering criterion, at least 1000 documents show that „ethics” is covered by 196 (82.35%) countries from 238 available in WoS platform, during the analyzed period (2011-2021);
- the institutional affiliation of the HCP-HP authors (Fig. 21), i.e.: 68.96% USA (20 institutions), 13.79% Canada (4 institutions), 10.34% United Kingdom (3 institutions) and 3.44% France, the Netherlands (with one institution), is consistent with the states that occupy the first percentages of the distribution in the Countries criterion (Figs. 17 and 18).

Researching the links between the distribution of authors by origin and research funding agencies (Figs. 19 and 20) allows us to say that many papers, but also the most cited or displaying a hot topic, are devised by authors whose states or agencies provide research funding. Thus, identifying the affiliation of the financing institutions (FIs) and calculating the percentages of representation / country we found that:

- in IB, the descending order is: USA 37.03% (10 FIs), United Kingdom 18.51% (5 FIs), a percentage of 11.11% each for both Japan and Australia (with 3 FIs each), 7.40% Canada (2 FIs) and a percentage of 3.70 % each for EU, China, Switzerland (with 1 FIs each), and
- in HCP-HP the descending order is: USA 45.45% (10 FIs), United Kingdom 18.18% (4 FIs), 13.63% EU (3 FIs), and a percentage of 4.54% each for Australia, Canada, China, France and Switzerland (with 1 FIs each).

This distribution of the percentages that highlight the funding of research in the field of ethics / country, corroborated with the distribution according to the criterion "Countries", shows that:

- in terms of IB, five of the eight countries of origin of the FIs are in the top 5 of the distribution,
- in terms of HCP-HP, seven of the eight countries of origin of the FIs are in the top 11 of the distribution.

A special situation is the EU funding institutions, which are not to be found in the distribution according to the "Countries" criterion but which occupy a place in both distributions by funding sources, with the specification that in HCP-HP they even occupy the 3rd place.

As a general aspect, the percentage of research funding in the field of ethics (25.91% of the total research funded, published and indexed in WoS) and the percentage of 49.63% of papers funded by HCP-HP, may be the subject of a study on the interest of institutional or national research in ethics. Discussions on the link between funding and the publication of articles can be found in the literature, which sometimes puts forward some critical remarks (Génova, 2016; Funder & all., 2014; Bedessem, 2020).

HCP-HP Word Cloud representation (Fig. 22) confirms the percentage distribution of the literature according to the criteria "Research Areas" and "WoS Category", by taking into account the central and marked positioning of the words used in article titles, keywords and abstracts. It is observed that the word "ethic" is central, which corresponds to the percentages of 26.47% for Research Areas and 21.32% for WoS Category.

6. Conclusions

This research was undertaken as a result of the authors' interest in the field of ethics, with the intention of finding out from the scientometric analysis what are the current trends in ethical research, which fields or areas are of greater interest to the academic community or which topics related to ethics are more prominent.

The results revealed that by covering 151 research areas from 152 available on the Web of Science platform, ethics can be, and is, a promising subject of scientific research. Even if a large percentage of the papers target, in addition to various aspects of medical ethics, ethics in management and business and ethical aspects within the social sciences and philosophy, the highlighting of WoS Categories and research areas that complement the previous distributions is a starting point and reference for research development or for their multidisciplinary connection. It is worth noting the ethical interest in fields such as transport, agriculture, the environment or engineering, demonstrating that the current problems of society, such as environmental protection and sustainable development, seek solutions also through solving some ethical aspects.

The growing interest in research and publishing in the field of ethics, on its various sub-domains, shows us that there are problems related to ethics in any of the forms manifested in social relations, but it also gives us the certainty that the society mobilizes to find the causes of unethical behavior and effective ways to prevent and

fight it. The previous statements are supported by the results indicating that there is an increased interest in funding research in the field of ethics. Thus, the present study is equally useful in identifying the entities and structures that ensure the financing of such research. Beyond the usefulness in terms of future research and publication actions, the research results can be taken into account at the institutional and national level when laying the foundations of new policies or regulations, using available information both in the group of publications pertaining to an area of research as well as in HCP-HP documents.

The year-on-year increase in the number of publications, the coverage of the topics approached, the openness of journals to publish such a topic, the wide coverage of the origin and affiliations of the authors as well as the funding of research and publication in the field of ethics are positive signs of a massive focus of attention on ethics. The presented results can be used as sorting filters, both of the academic and research structures that perform in the field, and which can be involved in future research, as well as of the journals where they can submit their works for publication.

The identification, within the present work, of the authors who have already excelled in the publication of their results in the field of ethics, facilitates the knowledge of the specialized literature in their fields but, at the same time, constitutes a starting point for future scientific collaborations, which are almost mandatory, especially since we are now dealing with multidisciplinary and interdisciplinary research endeavors.

The results obtained through scientometric research on the works in the WoS Core Collection that have ethics as their subject, reveal new research directions, in the sense of dwelling more on some of the results obtained.

Any of the results presented can be refined by applying new criteria and by means of scientific and / or qualitative interpretations in order to obtain in-depth results.

We plastically say that ethics is a tree that has never experienced autumn. Having ancient roots, it has shown that it can grow new branches permanently and that any of its new branches can become a vigorous support for the cradle of humanity.

Acknowledgments

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ANNEX 1 - T1- Batch of Scientometric Specialised Literature

Nr. crt.	Title and reference number	Authors	Publication year
1	Little Scientometrics, Big Scientometrics ... and Beyond	Glanzel, W; Schoepflin, U	1994
2	Publication trends in neuroimaging of minimally conscious states	Garnett, A; Lee, G; Illes, J	2013
3	Revista Medica de Chile in the year 2012	Reyes, H; Bustos-Gonzalez, A; Andresen, M; Palma, J	2013
4	The Scientometric Bubble Considered Harmful	Genova, G; Astudillo, H; Fraga, A	2015
5	The Misalignment of Russian Economists' Scientometric Indicators in RISC	Balatsky, EV; Yurevich, MA	2016
6	Neuroethics 1995-2012. A Bibliometric Analysis of the Guiding Themes of an Emerging Research Field	Leefmann, J; Levallois, C; Hildt, E	2016
7	The Editorial Boards of Scientific Journals as a Subject of Scientometric Research: A Literature Review	Mazov, NA; Gureev, VN	2016
8	Research Gate is no longer reliable: leniency towards ghost journals may decrease its impact on the scientific community	Memon, AR	2016
9	The focus and frontier of corporate social responsibility A co-word analysis of articles in SSCI, 2001-2014	Qin, XZ; Wang, ZS; Zhao, H; Kaspersen, LB	2016
10	Science Online XX Anniversary Conference. Personal impressions	Zemskov, A	2016
11	Promoting Virtue or Punishing Fraud: Mapping Contrasts in the Language of 'Scientific Integrity'	Horbach, SPJM; Halfman, W	2017
12	Identifying Scientific High Quality Journals and Publishers	Negahdary, M	2017
13	Scientometric indicators and collaboration network as a potential tool for gift author detection	Shinyayeva, TS; Tarasevich, YY	2017
14	Evolution of the competitive intelligence based on metric study of its literature	Teixeira, RC; Souza, C	2017
15	Bibliometrics and hunting the predators	Borgoyakova, K; Zemskov, A	2018
16	From dignity to security protocols: a scientometric analysis of digital ethics	Mahieu, R; van Eck, NJ; van Putten, D; van den Hoven, J	2018
17	Negative emissions-Part 1: Research landscape and synthesis	Minx, JC; Lamb, WF; Callaghan, MW; Fuss, S; Hilaire, J; Creutzig, F; Amann, T; Beringer, T; Garcia, WD; Hartmann, J; Khanna, T; Lenzi, D; Luderer, G; Nemet, GF; Rogelj, J; Smith, P; Vicente, JLV; Wilcox, J; Dominguez, MDZ	2018
18	Unethical Authorship in Scientific Publications (A Review of the Problem)	Gureev, VN; Lakizo, IG; Mazov, NA	2019

19	Finding Facets of Academic Integrity and Plagiarism through the Prism of a Citation Database	Patra, SK; Das, AK	2019
20	Evaluating Researchers Based on the Criteria of Reputation Responsibility	Kalachikhin, PA	2019
21	The Journals on the Domestic Lists of the IX Section of the Hungarian Academy of Sciences in Light of the Requirements of International Journal Selection	Sasvari, P; Urbanovics, A	2019
22	Article Quality Indicator: Proposing a New Indicator for Measuring Article Quality in Scopus and Web of Science	Ghazavi, R; Taheri, B; Ashrafi-rizi, H	2019
23	Journals of Musical Art and Education in Scientometric Database Scopus: Netnographic Analysis	Havrilova, L; Voronova, N	2019
24	Research Performance in Stem Cell Science and Regenerative Medicine in Iran: A National Comprehensive Observation	Saberi, S; Karamzadeh, R; Moghadam, P; Kadivari, M; Behbahani, BE; Heydari, Z; Baharvand, H; Aminpour, F; Vosough, M	2019
25	Shalosh B. Ekhad: a computer credit for mathematicians	Hu, ZW; Cui, YP; Zhang, J; Eviston-Putsch, J	2020
26	Competences of academic librarians in providing health research services: A qualitative study	Esmailzadeh, M; Bahrami, M; Soleymani, MR	2020
27	National fractional calculations and evaluating organization's science efficiency	Guskov, AE; Kosyakov, DV	2020
28	Publications by editorial board of science journals as translated into bibliometric indicators (library and information science)	Mazov, NA; Gureev, VN	2020
29	Journal of Marketing Education: A Retrospective Overview Between 1979 and 2019	Donthu, N; Kumar, S; Mills, A; Pattnaik, D	2021
30	Economic methodology: a bibliometric perspective	Truc, A; Claveau, F; Santerre, O	2021
31	Detecting a network of hijacked journals by its archive	Abalkina, A	2021

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