

Systematization of Ukrainian journals specialized in the fields of natural sciences, engineering, veterinary and agriculture

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Abstract. We suggest a new approach for ranking Ukrainian scientific journals and proceedings. According to a number of criteria, all the journals specialized in the fields of natural sciences, engineering, veterinary and agriculture are divided into seven categories termed as A to G. The analysis of their Pareto distributions shows that, among the overall number of 819 items, 14 can be referred to the category A, 25 to the category B, 13 to the category C, 30 to the category D, and 11 to the category E. The remaining categories F and G contain respectively 641 and 85 items. Issuing from our analysis, we state that only the journals belonging to the categories A to E, with the total scores higher than or equal to 25, meet at least 87% of all the criteria.

Keywords: specialized journals, natural sciences, engineering

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1. Introduction

The analysis of state-of-the-art in the field of Ukrainian journals in physics has started in 2005, after the Expert Council in Physics of the Higher Attestation Commission of Ukraine has stated its requirements [1, 2]. The analysis has revealed that only a small part, about 20%, of the journals specialized in physics meets the commonly accepted standards, whereas only five journals have an impact factor (IF) and are considered by Web of Science. One year later, the analysis performed within the project of the State Fund of Fundamental Researches in Ukraine has resulted in extended conclusions concerning the journals specialized in all the fields of natural sciences and engineering. The fulfilment of this project has yielded in development of the approach for systematizing specialized journals [3, 4] and an attempt to introduce a National citation index ('an Index of Ponderability and Integration'), with its further relation to the IF [5]. Almost simultaneously with the works of one of the present authors, the other researchers have also scrutinized the Ukrainian specialized journals (see Refs. [6, 7]). Although these works have not triggered Governmental decisions concerning the systematization of the specialized journals, they have given rise to development of the Ukrainian scientific-information space. Since then, the founders and the editorial boards of many journals have put a lot of effort to promote their editions to the International scientometric databases.

At present, Scopus contains 65 Ukrainian journals and Web of Science (Emerging Sources Citation Index) 27 Ukrainian journals and proceedings [8]. Nonetheless, only 15 journals among those included in Web of Science have been given IF [9]. Moreover, some of these scientific editions are published by International publishing houses such as, e.g., Springer and Begell House. Therefore they are not truly 'Ukrainian', though they have indeed been founded initially by the

Ukrainian institutions. A valuable contribution to ordering the Ukrainian scientific-information space has been made by the Vernadsky National Library [10], which concerns depositing on-line versions of scientific articles. A lot of work has also been done by the Publishing Scientific Council of the National Academy of Sciences of Ukraine regarding republication of the Ukrainian journals by the International Publishing Houses such as Springer. The Ministry of Education and Science of Ukraine have also initiated the inclusion of 27 Ukrainian journals to Web of Science (Emerging Sources Citation Index). In spite of all those efforts, most of the Ukrainian scientific editions, which are mainly published by the educational institutions, have seen almost no improvement. For example, only 6 of the 65 Ukrainian journals included in the Scopus database are published by the educational institutions [11]. Moreover, only 1 of the 15 journals with IF has institution of the Ministry of Education and Science of Ukraine as a founder [12]. On the other hand, most of the 27 journals included recently in Web of Science (Emerging Sources Citation Index) are published by the educational institutions. The data presented above is very poor against the background of thousands of specialized journals officially registered in Ukraine. Thus, the scientific periodical editions in Ukraine are in clear need of modernizing and improving. In the present study we launch reconsideration of the specialized Ukrainian journals, beginning with those associated with the fields of natural sciences, engineering, veterinary and agriculture.

2. Methods of analysis

The main criteria testifying a quality of scientific articles published in a journal is their novelty and high level of the scientific information. For the best of our knowledge, scientometric indices are the best relevant parameters, since they can be used as quantitative measures of the scientific impact of the articles. Unfortunately, only a small part of the Ukrainian specialized journals in the branch of natural sciences and engineering have scientometric indices prescribed basing on the citations in the frames of Web of Science or Scopus (e.g., an IF or a source-normalized impact per article abbreviated as SNIP [13]). As a consequence, these indices cannot judge a true status of most of the Ukrainian journals. In the present work we will use a temporary system of journal's evaluation, which is based on the criteria that usually precede the process of appointing of scientometric indices based on the citation analysis. Then the journals covered already by Web of Science or Scopus and, in particular, those having the scientometric indices, have to hold the highest positions in the journals' ranking. It is also known that the selection process practiced by the scientific citation-indexing services mentioned above is based on such criteria as timeliness of publication, adherence to the common international editorial conventions, publishing of full texts of articles (or, at least, bibliographical data and abstract) in English, application of peer-reviewing procedures, enriching of the database content or its specific topic by a journal under evaluation, international diversity among the contributing authors, the journal's editors and the Editorial Advisory Board members, and importance of the regional scholarship. We have used all of these criteria when evaluating the Ukrainian specialized journals. Hence, the criteria chosen for our evaluation are as follows:

1. Availability of a digital object identifier (DOI) for the articles published in a journal;
2. Coverage of a journal by Web of Science;
3. Coverage of a journal by Scopus;
4. Coverage of a journal by the databases "Ukrainika Scientific" or "Index Copernicus";
5. Timeliness of publication of a journal;

6. Availability of a web-site with full texts of articles in Ukrainian or other languages that differ from English or Ukrainian abstracts for full text articles in English;
7. Availability of a web-site with abstracts in English;
8. Availability of a web-site with full texts of articles in English.

Meeting each criterion might have been evaluated quantitatively by adding a single point to the total journal's score. However, different criteria should obviously have different weights. This is accounted for after introducing relevant weighing coefficients. For instance, the availability of DOI for the articles published in a given journal and its inclusion in Web of Science or Scopus are given the weighing coefficient 25. The weights of the remaining criteria (4)–(8) are respectively 2, 7, 3, 3 and 10 points. Then a journal can be given the total score equal to 100 if it satisfies all of the requirements. The journals with IF usually do so. Thus, in order to distinguish further among those journals, their scores are determined as $100+IF \times 10$.

Basing on the above ranking of journals, we have analyzed the dependence of journals' scores versus the quantity of journals with a given score. The corresponding cumulative Pareto distribution function is as follows:

$$F(x) = \begin{cases} 1 - \left(\frac{x_m}{x}\right)^\alpha & \text{if } x \geq x_m \\ 0 & \text{if } x < x_m \end{cases} \quad (1)$$

Here $F(x)$ denotes the relative quantity of journals which make the relative cumulative score contribution x to the total score, x_m is the minimal relative cumulative contribution to the total score, and α the Pareto exponent. Following from this distribution, one can determine the Pareto ratio $(100 - n_1) / n_1$, i.e. the per cent n_1 of journals that meet $(100 - n_1)$ per cent of our criteria.

We have analyzed all the journals linked to the fields of natural sciences, engineering, veterinary and agriculture, as well as the journals from the separate fields. Namely, we have considered separately the journals in veterinary, agriculture, physics and mathematics, biology, chemistry, geography and geology. The list of titles of journals, articles in which are considered when awarding the Degrees of Candidate of Sciences or Doctor of Sciences, has been approved by the Decrees of the Ministry of Education and Science of Ukraine [14, 15].

3. Results and discussion

The full list of specialized journals in the branches of natural sciences, engineering, veterinary and agriculture contains 819 items [13, 14]. Among these, 14 journals have IF and are referred to the category A (see Table 1). Most of these journals meet all of the criteria mentioned above. As seen from Table 2, the next category, B, contains 25 journals with scientometric indices assigned by Scopus. Here both of the scientometric indices, SNIP and SCImago Journal Rank (SJR) [16], are considered. One of these journals, "Algebra and Discrete Mathematics", is included in Web of Science. Hence, 39 journals can be referred to the categories A and B. 13 journals referred to the category C are included in Web of Science (Emerging Sources Citation Index) or Scopus, though the corresponding scientometric indices are still not being calculated (see Table 3). 30 journals of the next category, D, are not present in Web of Science or Scopus, and have no scientometric indices. However, articles published in these journals have DOI assigned (see Table 4). Since the minimal requirements to the scientific journals are to meet the criteria (4)–(8) at the least, we have

singled out the relevant journals into the category E, with the minimal score equal to 25. This group embraces 11 journals and proceedings:

1. Mathematical Modeling and Computing;
2. East European Journal of Physics;
3. Visnyk Ternopilskoho Natsionalnoho Tekhnichnoho Universytetu;
4. Journal for Veterinary Medicine, Biotechnology and Biosafety;
5. Information and Telecommunication Sciences;
6. Cell and Organ Transplantology;
7. Forestry, Forest, Paper and Woodworking Industry;
8. Naukovyi Visnyk Natsionalnoho Universitetu Bioresursiv i Pryrodokorystuvannya Ukrainy. Seriya: Biologiya, Biotekhnologiya, Ekologiya;
9. Naukovyi Visnyk Natsionalnoho Universitetu Bioresursiv i Pryrodokorystuvannya Ukrainy. Seriya: Tekhnika ta Energetyka APK;
10. Proceedings of the National Aviation University;
11. Vegetables and Melon.

The remaining 641 items which have the total scores less than 25 belong to the category F, the journals with the lowest scores. Finally, 85 items which have zero scores and/or have not been published during the last two years belong to the last category, G. Probably, these scientific editions do not exist any longer and should not be taken into account at all.

Histograms of the score distributions calculated using different bin sizes are displayed in Fig. 1. As seen from Fig. 1b, more than 600 journals have the scores less than or equal to 15. Usually, they satisfy only the following criteria: (i) coverage by the databases "Ukrainika Scientific" or "Index Copernicus", (ii) a timely publication, (iii) a web-site with the full texts of articles in Ukrainian available, and (iv) abstracts of articles in English available on the web-site. At the same time, the full versions of articles in English, which is accepted as a language of science, are not available for the international scientific community. Moreover, these journals and proceedings are absent in the largest International scientific-information databases. Finally, all of the relevant articles have no DOI, making them invisible in the specialized Internet space. As a consequence, we reckon that the minimal score of the journals, which have to be taken into consideration when defending Ph.D. theses, should be higher than 15.

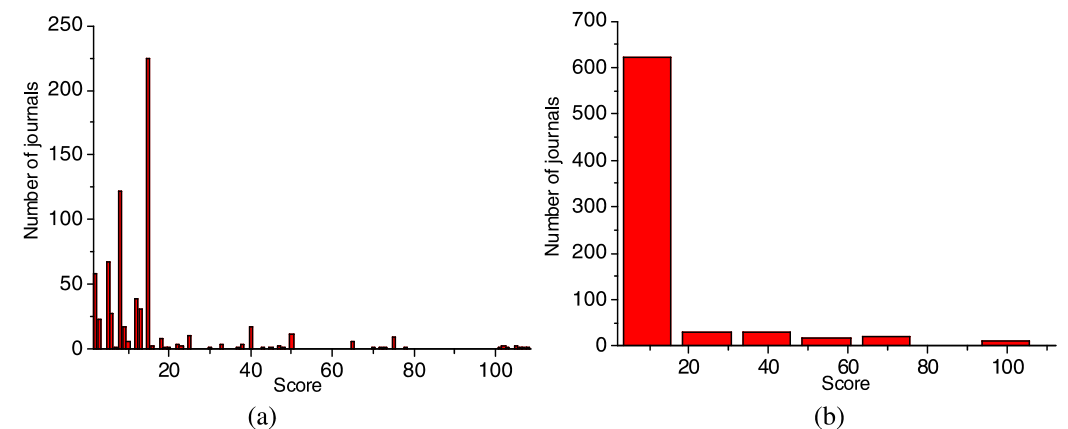


Fig. 1. Histograms of score distributions of the Ukrainian journals, as calculated using the bin sizes equal to 1 (a) and 15 (b).

Table 1. Ukrainian journals with IF specialized in natural sciences and engineering

	Title	IF (2015)	Availa- bility of DOI (x25)	Coverage by Web of Science (x25)	Covera- ge by Scopus (x25)	Coverage by “Ukrainika Scientific” or “Index Copernicus” (x2)
1	Ukrainian Journal of Physical Optics	0.783	1	1	1	1
2	SIGMA (Symmetry, Integrability and Geometry - Methods and Applications)	1.04	1	1	1	0
3	Low Temperature Physics	0.67	1	1	1	1
4	Condensed Matter Physics	0.621	1	1	1	1
5	Strength of Materials	0.462	1	1	1	1
6	Kinematics and Physics of Celestial Bodies	0.343	1	1	1	1
7	Theoretical and Experimental Chemistry	0.637	1	1	1	1
8	Journal of Water Chemistry and Technology	0.258	1	1	1	1
9	Powder Metallurgy And Metal Ceramics	0.235	1	1	1	1
10	Journal of Superhard Materials	0.534	1	1	1	1
11	Ukrainian Mathematical Journal	0.189	1	1	1	1
12	Materials Science	0.143	1	1	1	1
13	Journal of Mathematical Physics, Analysis, Geometry	0.212	1	1	1	1
14	Cytology and Genetics	0.34	1	1	0	1

Timeliness of publication (x7)	Availability of a web-site with full texts of articles in Ukrainian or other languages that differ from English or Ukrainian abstracts for full text articles in English (x3)	Availability of web-site with abstracts in English (x3)	Availability of web-site with full texts in English (x10)	Total score
1	1	1	1	104.83
1	0	1	1	105.4
1	1	1	1	106.7
1	1	1	1	106.21
1	1	1	1	104.62
1	1	1	1	103.43
1	0	1	1	103.37
1	1	1	1	102.58
1	1	1	1	102.35
1	0	1	1	102.34
1	1	1	1	101.89
1	1	1	1	101.43
1	0	1	1	99.12
1	1	1	1	78.4

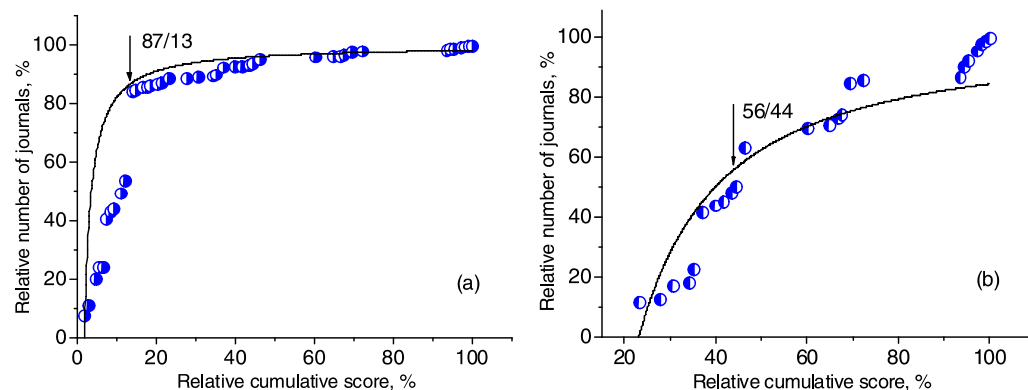


Fig. 2. Cumulative Pareto distributions that rank the Ukrainian journals and proceedings specialized in the fields of natural sciences, engineering, veterinary and agriculture. Panel (a) corresponds to the almost overall set of 734 journals excluding those of the category G and panel (b) to the subset of 95 journals belonging to the categories A–E: points correspond to empirical data and solid curves to fitting with Eq.(1).

Fig. 2a illustrates the cumulative Pareto distribution for all of the Ukrainian journals and proceedings, with the exception of those belonging to the category G. The appropriate Pareto ratio is equal to 87/13, i.e. 13% of the journals satisfy 87% of the conditions used for ranking the journals. These are 95 journals and proceedings with the highest scores. As seen from Tables 1–4, the list of journals having the total scores equal or higher than 25, i.e. those referred to the categories from A to E, includes 93 items. With accounting for the calculation errors, one can regard the 93 journals and proceedings that belong to the categories A–E as those satisfying most of our criteria. The rest of the editions, the total number of which is equal to 641 (the category F, or 87% of all the items), satisfy only 13% of the conditions, or even less. In our opinion, scientific articles published in these editions have not to be taken into account in the Government attestation of Ukrainian scientists and under Governmental consideration of the scientific projects. As seen from Fig. 2b, the Pareto ratio for the subset of 93 journals is equal to 56/44. This means that 44% of journals (about 40 items with the highest scores) satisfy the additional 56% conditions from the

Table 2. Ukrainian journals having scientometric indices assigned by Scopus (the category B).

	Title	SNIP/ SJR (2015)	Availabi- lity of DOI (x25)	Coverage by Web of Science (x25)	Coverage by Scopus (x25)	Coverage by “Ukrainika Scientific” or “Index Coper- nicus” (x2)
1	2	3	4	5	6	7
.15	Biopolymers and Cell	0.252/ 0.169	1	0	1	1
16	Functional Materials	0.472/ 0.248	1	0	1	1
17	International Applied Mechanics	0.778/ 0.248	1	0	1	1
18	Journal of Nano- and Electronic Physics	0.612/ 0.211	1	0	1	1
19	Theory of Probability and Mathematical Statistics	0.259/ 0.155	1	0	1	1
20	Ukrainian Journal of Physics	0.424/ 0.232	1	0	1	1
21	Ukrainian Biochemical Journal	0.096/ 0.132	1	0	1	1
22	Cybernetics and Systems Analysis	0.626/ 0.254	1	0	1	0
23	Journal of Automation and Information Sciences	0.266/ 0.256	1	0	1	1
24	Radioelectronics and Communications Systems	0.198/ 0.171	1	0	1	1
25	Algebra and Discrete Mathematics	0.507/ 0.33	0	1	1	1
26	Vestnik Zoologii	0.421/ 0.266	1	0	1	1
27	Metallofizika i Noveishie Tekhnologii	0.395/ 0.229	1	0	1	1
28	Chemistry and Chemical Technology	0.44/ 0.168	0	0	1	1
29	Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu	0.542/ 0.208	0	0	1	1
30	Problems of Atomic Science and Technology	0.575/ 0.233	0	0	1	1
31	Technical Electrodynamics	0.65/ 0.19	0	0	1	1
32	Metallurgical and Mining Industry	2.465/ 0.192	0	0	1	1
33	Nonlinear Dynamics and Systems Theory	0.652/ 0.266	0	0	1	0

Timeliness of publication (x7)	Availability of a web-site with full texts of articles in Ukrainian or other languages that differ from English or Ukrainian abstracts for full text articles in English (x3)	Availability of web-site with abstracts in English (x3)	Availability of web-site with full texts in English (x10)	Total score
8	9	10	11	12
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	1	1	1	75
1	0	1	1	72
1	0	1	1	72
1	0	1	1	72
1	1	1	0	65
1	1	1	1	50
1	1	1	1	50
1	1	1	1	50
1	1	1	1	50
1	0	1	1	47
1	0	1	1	45

1	2	3	4	5	6	7
34	Theory of Stochastic Processes	0.109/ 0.102	0	0	1	0
35	Nuclear Physics and Atomic Energy	0.673/ 0.209	0	0	1	1
36	Problems of Radiation Medicine and Radiobiology	0/ 0.11	0	0	1	1
37	Journal of Physical Studies	0.087/ 0.109	0	0	1	0
38	Mikrobiolohichni Zhurnal	0/ 0.115	0	0	1	0
39	Nuclear and Radiation Safety	0/ 0.1	0	0	1	0

8	9	10	11	12
1	0	1	1	45
1	1	1	0	40
1	1	1	0	40
1	1	1	0	38
1	1	1	0	38
1	1	1	0	38

Table 3. Ukrainian journals and proceedings of the category C.

1	Title	Availability of DOI (x25)	Coverage by Web of Science (x25)	Coverage by Scopus (x25)	Coverage by "Ukrainika Scientific" or "Index Copernicus" (x2)
1	2	3	4	5	6
40	Biological Bulletin of Bohdan Chmelnytsky Melitopol State Pedagogical University	1	1	0	1
41	French-Ukrainian Journal of Chemistry	1	1	0	0
42	Bulletin of Dnipropetrovsk University – Series Chemistry	1	1	0	1
43	Uspehi Fiziki Metallov	1	0	1	1
44	Visnyk of Dnipropetrovsk University – Biology MEDICINE	1	1	0	1
45	Visnyk of Dnipropetrovsk University – Biology Ecology	1	1	0	1
46	Algologia	1	1	0	1
47	Journal of Numerical and Applied Mathematics	0	1	0	1
48	Advances in Astronomy and Space Physics	0	1	0	1
49	Methods of Functional Analysis and topology and Topology	0	1	0	1
50	Nanosistemy, Nanomaterialy, Nanotekhnologii	0	0	1	1
51	Visnyk NTUU KPI – Seriya Radiotekhnika Radioaparaturbuduvannia	0	1	0	0
52	Visnyk of Taras Shevchenko National University of Kyiv – Geology	0	1	0	1

Timeliness of publication (x7)	Availability of a web-site with full texts of articles in Ukrainian or other languages that differ from English or Ukrainian abstracts for full text articles in English (x3)	Availability of web-site with abstracts in English (x3)	Availability of web-site with full texts in English (x10)	Total score
7	8	9	10	11
1	1	1	1	75
1	0	1	1	70
1	1	1	0	65
1	1	1	0	65
1	1	1	0	65
1	1	1	0	65
1	0	1	0	62
1	1	1	1	50
1	0	1	1	47
1	0	1	1	47
1	1	1	0	40
1	1	1	0	38
0	1	1	0	33

Table 4. Ukrainian journals and proceedings of the category D.

	Title	Availability of DOI (x25)	Coverage by Web of Science (x25)	Coverage by Scopus (x25)	Coverage by "Ukrainika Scientific" or "Index Copernicus" (x2)
1	2	3	4	5	6
53	Electrical Engineering & Electromechanics	1	0	0	1
54	Carpathian Mathematical Publications	1	0	0	1
55	Medical and Clinical Chemistry	1	0	0	1
56	Odeskyi Politekhichniy Universytet. Pratsi	1	0	0	1
57	Eastern-European Journal of Enterprise Technologies	1	0	0	0
58	The Paton Welding Journal	1	0	0	1
59	Biotechnology. Biotechnologia Acta	1	0	0	1
60	Semiconductor Physics, Quantum Electronics & Optoelectronics	1	0	0	1
61	Food Science and Technology	1	0	0	1
62	Chemistry, Physics and Technology of Surface	1	0	0	1
63	Bulletin of the University of Dnepropetrovsk. Geology, Geography	1	0	0	1
64	Journal of Mechanical Engineering the National Technical University of Ukraine "Kyiv Polytechnic Institute"	1	0	0	1
65	Odesa National University Herald. Biology	1	0	0	1
66	Microbiology & Biotechnology	1	0	0	1
67	Naukovyi Visnyk Lvivskoho Natsionalnoho Universytetu Veterynarnoyi Medytsyny ta Biotekhnolohiyi imeni S. Z. Hzhyskoho	1	0	0	1
68	Reports of the National Academy of Sciences of Ukraine	1	0	0	1
69	Achievements of Clinical and Experimental Medicine	1	0	0	1
70	Physics and Chemistry of Solid State	1	0	0	1
71	Ukrainian Botanical Journal	1	0	0	1
72	Ukrainian Geographical Journal	1	0	0	1
73	Fisheries Science of Ukraine	1	0	0	1
74	Space Science and Technology	1	0	0	1
75	Tekhnologiya i Konstruirovani v Elektronnoi Apparature	1	0	0	1

Timeliness of publication (x7)	Availability of a web-site with full texts of articles in Ukrainian or other languages that differ from English or Ukrainian abstracts for full text articles in English (x3)	Availability of web-site with abstracts in English (x3)	Availability of web-site with full texts in English (x10)	Total score
7	8	9	10	11
1	1	1	1	50
1	1	1	1	50
1	1	1	1	50
1	1	1	1	50
1	1	1	1	48
1	0	1	1	47
1	0	1	1	47
1	0	1	1	47
0	1	1	1	43
0	1	1	1	43
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40
1	1	1	0	40

1	2	3	4	5	6
76	Bulletin of the National Technical University "Kharkiv Polytechnic Institute", Series "Power and Heat Engineering Processes and Equipment"	1	0	0	0
77	"Matematychni Studiyi" Proceedings of the Lviv Mathematical Society	1	0	0	0
78	The Bulletin of Dnipropetrovsk University. Series "Communications in Mathematical Modeling and Differential Equations Theory"	1	0	0	1
79	Economic and Social Geography	1	0	0	1
80	Refrigeration Engineering and Technology	1	0	0	1
81	Methods and Objects of Chemical Analysis	1	0	0	1
82	Visnyk Natsionalnoho Universytetu Korablebuduvannya	1	0	0	1

7	8	9	10	11
1	1	1	0	38
0	0	1	1	38
1	1	0	0	37
0	1	1	0	33
0	1	1	0	33
0	0	1	0	30
0	1	0	0	30

initial 13% conditions, which have not been satisfied with the Pareto approximation shown in Fig. 2a. Thus, these journals satisfy in fact 94% of all our conditions. Accounting for the approximation errors, one can refer to this group the journals that belong to the categories A and, partly, B, C and D. These are the items with the total scores higher than 50 (see Tables 1–4).

Now we consider separately the Pareto cumulative distributions for the journals associated with the natural sciences (Fig. 3a), engineering (Fig. 3b), veterinary (Fig. 3c), and agriculture (Fig. 3d). The Pareto ratio for the journals corresponding to the natural sciences is equal to 80/20, with the total number of the journals being equal to 310. Hence, 62 journals satisfy 80% of the conditions. It is worthwhile that these items belong to a small subset, 12%, of all the journals. In fact, consideration of the calculation error (~ 2%) implies that one can refer 68 items, with the scores higher than or equal to 33, to the corresponding 20% of the journals and proceedings. The conditions necessary to reach such a score include meeting at least one of the three following demands: (i) availability of DOI, (ii) coverage of a journal by Web of Science, or (iii) its coverage by Scopus. It is interesting to notice that 20% of those 68 items approximately correspond to the journals with an ascribed IF. As seen from Fig. 3b, among the journals and proceedings related to the engineering (449 items), only 12% (i.e., 54 items) satisfy 88% of the necessary conditions, while the rest 88% of the journals satisfy only 12% of the conditions. The minimal score for these 54 items is equal to 15, and there are only 27 items (~ 7%) with the total score 25 or higher.

As seen from Fig. 3c, the Pareto ratio is equal to 71/29 for the journals specialized in veterinary sciences. The total number of journals amounts to 19. Then 29% of them are only 5 or 6 items, with the minimal score being equal to 15. Only two journals in this field of science manifest the scores exceeding 25. These are "Naukovyi Visnyk Lvivskoho Natsionalnoho Universytetu Veterynarnoyi Medytsyny ta Biotekhnolohiyi imeni S. Z. Hzhyskoho. Seriya: Veterynarni Nauky" (the score 40) and "Journal for Veterinary Medicine, Biotechnology and Biosafety" (the score 25). The Pareto ratio for the journals and proceedings specialized in the agriculture is equal

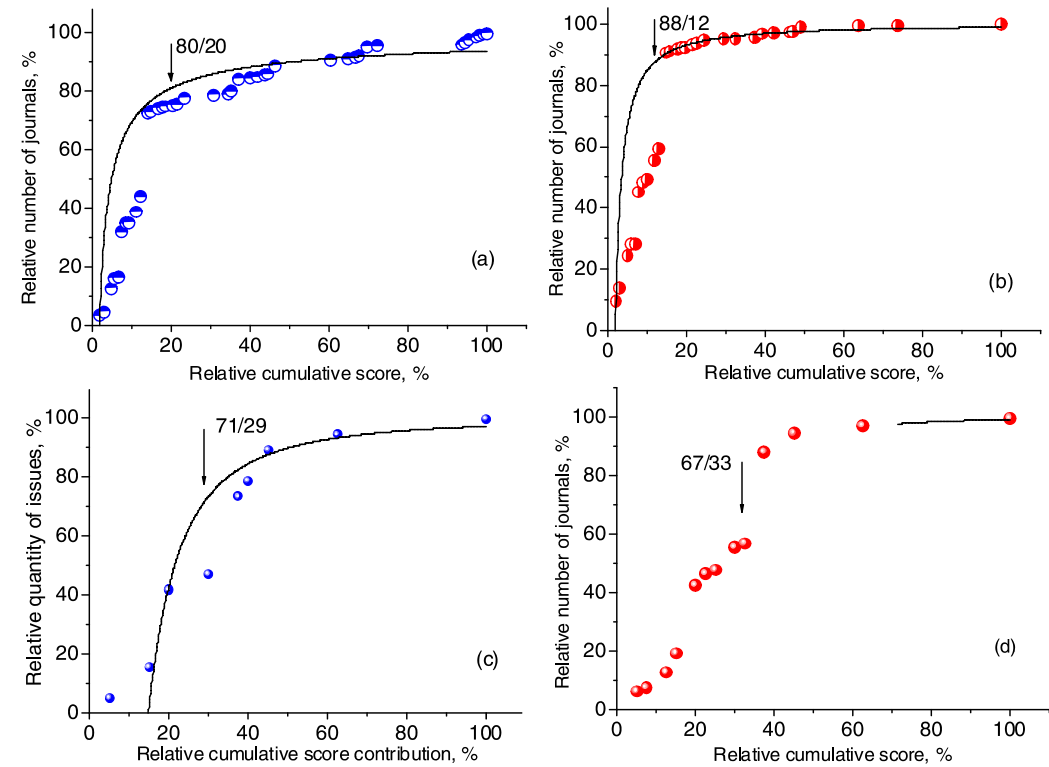


Fig. 3. Pareto cumulative distributions calculated for the journals referred to natural sciences (a), engineering (b), veterinary (c) and agriculture (d): points correspond to empirical data and solid curves to fitting with Eq.(1).

to 67/33, so that the corresponding Theil-index entropy measure is close to zero. The total number of items in this field is equal to 77, so that 33% correspond to the 25 journals, with the minimal score amounting to 15. At the same time, the number of journals with the scores equal to or higher than 25 is only 4. These are “Fisheries Science of Ukraine” (the score 40), “Naukovyi Visnyk Lvivskoho Natsionalnoho Universytetu Veterynarnoi Medytsyny ta Biotekhnolohiyi imeni S. Z. Hzhyskoho” (40), “Forestry, Forest, Paper and Woodworking Industry” (25) and “Vegetables and Melon” (25).

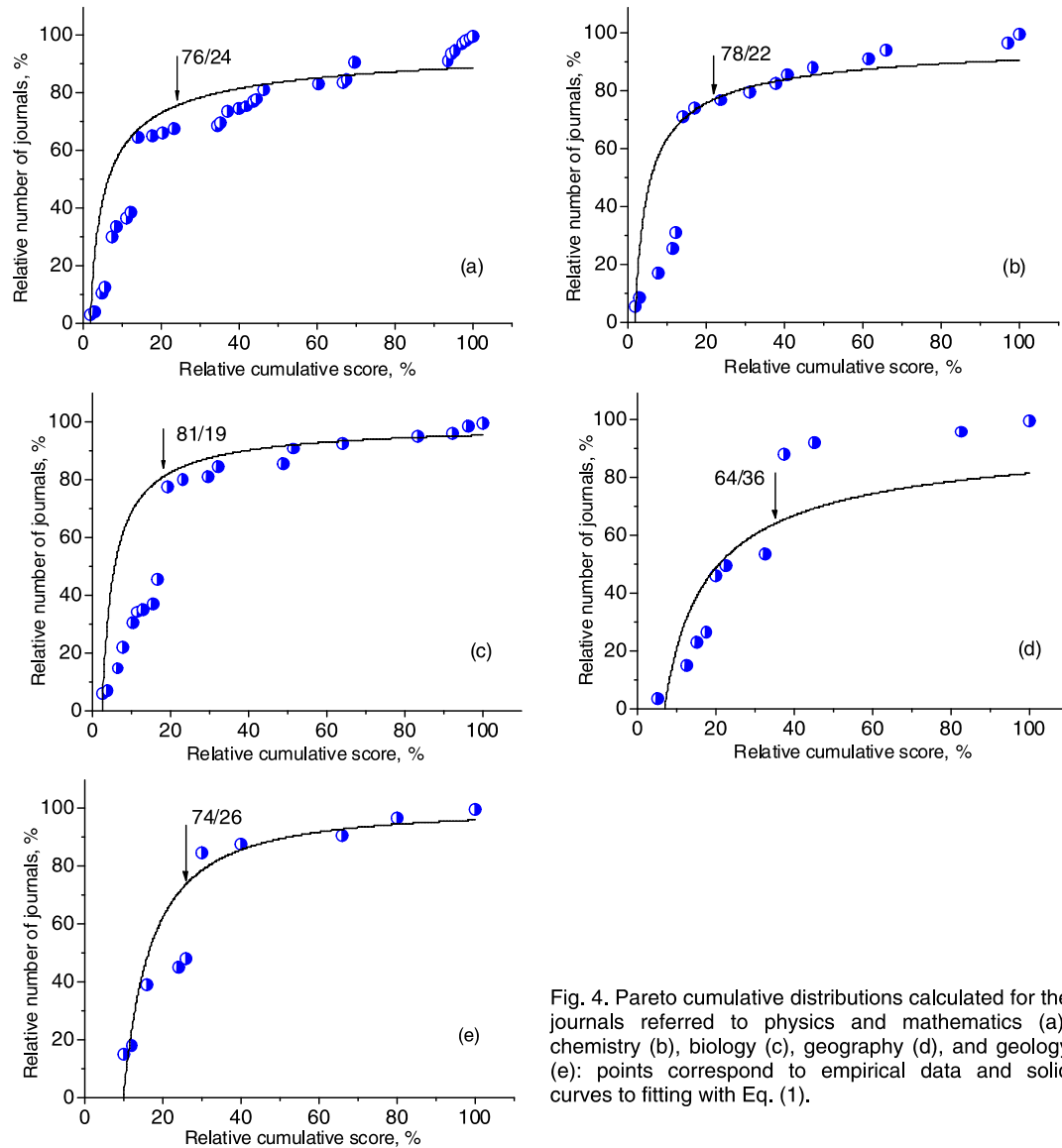


Fig. 4. Pareto cumulative distributions calculated for the journals referred to physics and mathematics (a), chemistry (b), biology (c), geography (d), and geology (e); points correspond to empirical data and solid curves to fitting with Eq. (1).

Now we proceed to consideration of the journals and proceedings specialized in the separate fields of physics and mathematics, chemistry, biology, geography, and geology. The appropriate cumulative Pareto distributions are presented in Fig. 4. As seen from Fig. 4a, the Pareto ratio for the journals in physics and mathematics is equal to 76/24. Among 119 journals and proceedings,

24% correspond to 28 or 29 items having the minimal score 47. These journals belong to the category A and, partly, to the categories B and C. For the journals specialized in chemistry, the Pareto ratio is equal to 78/22 (see Fig. 4b), with 22% corresponding to 7 journals (the minimal score 40). These are “Theoretical and Experimental Chemistry”, “Journal of Water Chemistry and Technology”, “Chemistry and Chemical Technology”, “French-Ukrainian Journal of Chemistry”, “Bulletin of Dnipropetrovsk University. Series: Chemistry”, “Chemistry, Physics and Technology of Surface” and “Reports of the National Academy of Sciences of Ukraine”. As seen from Fig. 4c, the Pareto ratio for the journals in biology is equal to 81/19. Here 19% of the total number of 113 journals correspond to 21 or 22 items, with the minimal score 25. These are the same journals as we have earlier evaluated basing on our general analysis. Since the Pareto ratio for the 26 Ukrainian journals specialized in geography is equal to 64/36, these 36% correspond to 9 items (see Fig. 4d). Their minimal score is equal to 15. Only two journals, “Ukrainian Geographical Journal” (the score 40) and “Economic and Social Geography” (the score 33), reveal the scores higher than 25.

Finally, among the journals and proceedings specialized in geology, 26% (i.e., 8 items) are in agreement with the Pareto ratio equal to 74/26 (see Fig. 4e). The minimal score for these editions is equal to 15. Only 4 journals have the scores equal to or larger than 25. These are “Naukovyi Visnyk Natsionalnoho Hirnychoho Universytetu” (the score 50), “Reports of the National Academy of Sciences of Ukraine” (the score 40), “Bulletin of the University of Dnepropetrovsk. Geology, Geography” (the score 40) and “Visnyk of Taras Shevchenko National University of Kyiv – Geology” (the score 33). In other words, only the journals and proceedings representing the fields of physics and mathematics, biology and chemistry, have the minimal scores higher than 25, according to the Pareto distribution. The minimal score for all the other scientific fields that satisfies the Pareto ratio is less than 25.

4. Conclusions

In the present work we have developed the approach for ranking Ukrainian scientific journals. It is based on assigning scores due to quantitative evaluation of different factors. The relevant criteria are as follows: availability of DOI of the articles published in a journal, its coverage by Web of Science, Scopus or “Ukrainika Scientific” and “Index Copernicus” databases, timeliness of publication, as well as availability of a web-site with the full texts of articles in either English or Ukrainian, and their English abstracts. According to these criteria, the journals have been divided into the following categories: (A) the journals with assigned IF, (B) the journals with scientometric indices assigned by Scopus, (C) the journals included in Web of Science (Emerging Sources Citation Index) or Scopus, although with no scientometric indices, (D) the journals which are absent in Web of Science and Scopus, have no scientometric indices, but their articles have assigned DOI, (E) the journals meeting only such criteria as coverage by the databases “Ukrainika Scientific” or “Index Copernicus”, timely publication and availability of web-sites with the Ukrainian and/or English full texts of articles and their English abstracts, (F) the journals with the total scores less than 25, and (G) those with a zero total score, of which issues have not been published during the last two years.

Our analysis of the Ukrainian journals and proceedings specialized in the fields of natural sciences, engineering, veterinary and agriculture has revealed that, among the total number of 819 journals, 14 journals belong to the category A, 25 journals to the category B, 13 to the category C, 30 to the category D, and 11 to the category E. The category F contains 641 items and the category

G 85 ones. Basing on the Pareto analysis, we have found that the journals and proceedings belonging to the categories A–E, for which the total scores are equal to or higher than 25, satisfy 87% of our criteria. It has also been proved that the minimal score is higher than 25 for the journals specialized in the particular scientific fields of physics and mathematics, chemistry, and biology. The other fields manifest lower minimal scores.

References

1. Vlokh R O, 2005. Why scientific journals are published? [Navishcho vydaiutsia naukovi zhurnaly]. Naukovi svit. **6**: 24–25.
2. Suhakov V Y and Vlokh R O, 2005. A rating of scientific journals the articles in which are taken into consideration by the Higher Attestation Commission of Ukraine when awarding scientific degrees and titles in the fields of physics and mathematics [Reitynh ukrainskykh naukovykh zhurnaliv, publikatsii v yakykh zarahovuiutsia VAK Ukrainy pry prysudzhenni naukovykh stupeniv i zvan z fizyko-matematychnykh nauk]. Biuleten Vyshchoyi Attestatsiynoyi Komisiyi Ukrayiny. **7**: 11–16.
3. Vlokh R O, 2008. A system of evaluation of Ukrainian specialized journals. Science in Ukraine in the worldwide scientific space [Systema otsinky ukrainskykh fakhovykh vydan. Nauka Ukrainy v svitovomu informatsiynomu prostori]. Kyiv: NAN Ukrayiny. **1**: 57–94.
4. Vlokh R O, 2009. A system of evaluation of Ukrainian specialized journals [Systema otsinky ukrainskykh fakhovykh vydan]. Biuleten Vyshchoyi Attestatsiynoyi Komisiyi Ukrayiny. **1**: 21–26.
5. Vlokh R O, 2010. Bibliometric and statistical analyses of Ukrainian scientific journals. Physics journals. Ukr. J. Phys. Opt. **11**: Suppl.1, S11–S25.
6. Huz A N, 2008. About formation of information scientific space [O stanovleniyi informatsyonnoho nauchnogo prostranstva]. Nauka Ukrayiny u Svitovomu Informatsiynomu Prostori. Kyiv: NAN Ukrayiny. **1**: 23–56.
7. Mryhlo O I, 2012. Ukrainian academic periodic literature: a degree of ‘visibility’ [Ukrainska naukova akademichna periodyka: stupin “vydymosti”]. Nauka Ukrayiny u Svitovomu Informatsiynomu Prostori. Kyiv: NAN Ukrayiny. **6**: 36–44.
8. <http://ip-science.thomsonreuters.com/mjl/>
9. http://ip-science.thomsonreuters.com/mjl/publist_sciex.pdf
10. http://www.irbis-nbuv.gov.ua/cgi-bin/irbis_nbuv/cgiirbis_64.exe?C21COM=F&I21DBN=UJRN&P21DBN=UJRN&S21CNR=20&Z21ID=
11. <https://www.scopus.com/home.uri>
12. http://usj.org.ua/short_list
13. Moed H F, 2010. Measuring contextual citation impact of scientific journals. J. Informetrics. **4**: 265–277.
14. <http://mon.gov.ua/activity/nauka/atestacziya-kadriv-vishhoyi-kvalifikacziyi/perelik-vidan/perelik-naukovix-faxovix-vidan.html>
15. <http://mon.gov.ua/activity/nauka/atestacziya-kadriv-vishhoyi-kvalifikacziyi/perelik-vidan/perelik-elektronnix-faxovix-vidan.html>
16. González-Pereira B, Guerrero-Bote V P and Moya-Anegón F, 2010. A new approach to the metric of journals’ scientific prestige: The SJR indicator. J. Informetrics. **4**: 379–391.

Vasylyk Yu., Mys O. and Vlokh R. 2017. Systematization of Ukrainian journals specialized in the fields of natural sciences, engineering, veterinary and agriculture. Ukr.J.Phys.Opt. **18**: 28 – 45

Анотація. В роботі запропоновано підхід для оцінювання рівня українських наукових журналів та збірників наукових праць. На основі відповідності запропонованим критеріям всі видання, які спеціалізуються в галузях природничих і технічних наук, ветеринарії і сільського господарства були віднесені до семи категорій - від А до G. На основі аналізу розподілу Парето було встановлено, що з 819 видань 14 можуть бути віднесені до категорії А, 25 до категорії В, 13 до категорії С, 30 до категорії D і 11 до категорії Е. Решта категорій: F і G містять 641 та 85 видань, відповідно. На основі нашого аналізу можна стверджувати, що лише журнали, які відносяться до категорій - від А до Е, з загальним показником вищим або рівним 25, задовольняють щонайменше 87% всіх критеріїв.