

The first ranking of the scientific units of Polish physical education higher schools based on the monographs published in 2009-2012 indexed by the Polish Ministry of Science and Higher Education

Authors' Contribution:

- A Study Design
- B Data Collection
- C Statistical Analysis
- D Manuscript Preparation
- E Funds Collection

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Abstract

Background & Study Aim:

In parallel with the scientific journals, the scholarly monographs are the key driver for the dissemination of scientific achievements. The aim of this article is to present the ranking of scientific units of Polish physical education higher schools based on the scholarly monographs published in 2009-2012.

Material & Methods:

Scholarly monographs and chapters in the monographs reported by 25 scientific units (faculties) of Polish physical education higher schools and related units in 2009-2012 were subjected to analysis. The Spearman's rank correlation identifies the strength of correlation among publications and monographs, publications and chapters of the monographs, monographs and chapters in the monographs published by evaluated scientific units.

Results:

In the evaluated period (2009-2012) all units published 333 monographs, 222 (67%) of which were issued by academies of physical education and 111 (33%) were published by academics from the institutions of other types. In the same period 25 evaluated institutions published 3,139 chapters in monographs, 2,162 (69%) of which were issued by academies of physical education and 977 (31%) were published by academics from the institutions of other types. The analysis of rankings containing scientific units of Polish physical education higher schools evaluated for the monographs and chapters in monographs with ranking developed on the basis of scientific articles published in 2009-2012 in journals by computing the Spearman correlation revealed that the correlation between publications and monographs was 0.264, whereas between publications and chapters in monographs 0.207, indicating poor correlation in both cases. There was a significant correlation (0.658) between monographs and chapters in monographs, that evidences strong relationship.

Conclusions:

Monographs – regardless of other products of scientific activity – constitute a complementary bibliometric criterion measuring the productivity of authors, research groups, institutions and countries. Scientific achievements reported by institutions allowed to compare the scientific performance in the scientific units of Polish physical education higher schools on the unprecedented scale, measured both by the number of scholarly monographs and chapters in monographs, showing their potential, as well as the scientific activities directions and competitive capacity.

Key words:

Academy of Physical Education • bibliometric analysis • chapters in monographs • complementary monographs • evaluation • sports science

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Academy of Physical Education – an institution of university type providing education in the field of sport science, having full academic rights (from bachelor to a professor with the right to confer a "doctor honoris causa"). In Poland, there are six academies of physical education: the Academy of Physical Education in Katowice, Krakow, Poznan, Warsaw, Wroclaw and the Academy of Physical Education and Sport in Gdansk.

Bibliometrics – statistical analysis of books, articles, or other publications [26]

Congress languages – one of the following languages: English, German, French, Spanish, Russian, Italian recognised by the Polish Ministry of Science and Higher Education as the official language of scientific communication [26].

Evaluation – a process of examining parameters applied to methodology

Perceptual sentence – in the methodological meaning it is a constative utterance stated as a result of some observation (result of the measurement) [35]

Polish physical education higher schools – in the article it is the operational term for the Academies of Physical Education and related public or non-public higher schools, that educate at least on one of the units related to sport science (physical education, physiotherapy, recreation, sport).

POL-on – the comprehensive information system collecting the data on higher education and science.

Publications – reviewed articles published in scientific journals.

INTRODUCTION

In modern world of science publications appearing in traditional journals, electronic periodicals, conference proceedings etc. are the principal measure of scientific potential and achievements. Undeniable factors stimulating number of scientific articles comprise development of the Internet, an easiness of creating electronic journals, widespread access to published content and economization of science. The market value of scientific publications in last decade were estimated by various institutions calculated on the basis of revenues of the global scientific publishing market players. The value of the leading part of publishing market – scientific, technical and medical publishing (STM) was estimated in 2006 by the European Commission to amount to \$7-11 billion [1]. In 2012 the International Association of Scientific, Technical and Medical Publishers reported revenues from scientific/technical publishing at the amount of \$12.8 billion and medical at \$10.7 billion, the biggest players include: Elsevier, Thomson Reuters, Springer, Wiley [2].

In parallel with the scientific journals, the scholarly books (monographs) are the key driver for the dissemination of scientific achievements. „*The monograph provides researchers with the finest of stages for sustained and comprehensive – sometimes exhaustive and definitive – acts of scholarly inquiry. A monograph is what it means to work out an argument in full, to marshal all the relevant evidence, to provide a complete account of consequences and implications, as well as counter-arguments and criticisms*” [3]. In 2003 the proportion between journals and books was calculated to be 65% vs. 25% for STM [4]. In 2012 the books global publishing market accounted for 36.9% of the market’s total value [5], the biggest players being: Pearson, Elsevier,

Thomson Reuters, Wolters Kluwer. The e-book market, self-publishing services, multi-author collaborations and lower prices play the substantial role here.

The whole professional publishing market covers not only journals and monographs, but also databases, directories, online services, abstracting and indexing (Figure 1). The last ones are developing rapidly due to availability of the Internet solutions, local demands (ambitions) and relatively open access to the science. The global number of databases, directories, services of abstracting and indexing can be counted in thousands. However, only few of them are truly valuable due to the world-wide scientific recognition i.e. Journal Citation Reports, Scopus or regional / local ones i.e. Journals’ ranking of the Polish Ministry of Science and Higher Education.

At present the model of functioning of the science is strongly related to the aspects of globalization. As a result, products of science are treated as commodity, whereas the science itself is actually being considered in the context of the knowledge economy. Determining values of the scientific knowledge, achievements or potential is a huge challenge, nevertheless creating a lot of problems. The value of the knowledge is changing when new applications appear. Sometimes many decades must pass before pioneering discoveries find an application. Taken activities oriented at the evaluation of the market value of knowledge are repeatedly defeating the purpose.

Entrusting the scientific community with the mission of the evaluation of scientific achievements is a solution developed in many countries around the world. In cooperation with the professional partners and

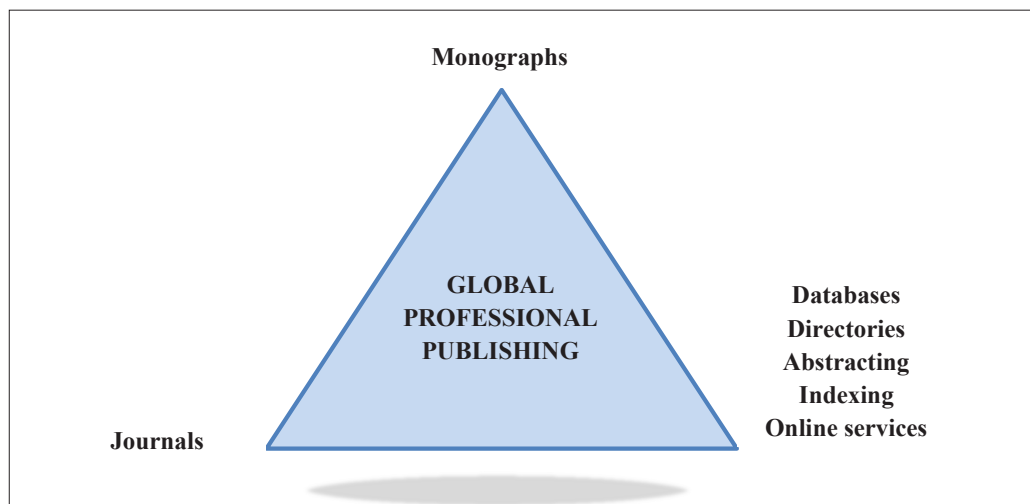


Figure 1. The global professional publishing market.

available advanced technologies an adequate assessment can be performed that focuses on the specificity, intensity, range, social and economic usefulness of applications, possible in the scientific knowledge. This approach was used in the evaluation of scientific institutions and universities in Poland¹ implemented by the project POL-on [6].

The entire project aimed to assess Polish science, which comprises the following components: the scientific community consultation, bottom-up initiatives, researches, expertise, decision-makers' meetings, changes in the law (reforms), independent committees, creation of an information system collecting comprehensive data on higher education and science (POL-on), trainings, peer review of collected data, presentation of results, feedback, further improvements to the project [7-25].

Almost entire scientific community participated in the evaluation, whose representatives have developed a set of parameters incl. measures, scoring, values, metrics, indices and methodology of assessment. On this basis, the Polish Ministry of Science and Higher Education published regulation of 1 August 2012 on the criteria and procedure for assigning scientific categories to scientific units (in reference to the Act of 30 April 2010 on the Principles of Financing Science [19]) for purposes of the parametric evaluation of scientific units [26], where scholarly monographs were the sole element strongly associated with the publications (number of monographs constituted the determined percentage of the number of publications). Thus, this article constitutes an important complement to the previous article „Ranking of Polish physical education higher schools based on the articles published in 2009–2012 indexed by the Polish Ministry of Science and Higher Education” [27], whereas its goal is to present the ranking of the scientific units of Polish physical education higher schools based on the scholarly monographs published in 2009–2012.

According to the definition of the above mentioned

1. The evaluation covered 963 institutions (higher education institutions, the Polish Academy of Science, scientific institutes, and other scientific units) applying for subsidies from the governmental budget. Each unit was assigned to one of 4 scientific fields (social & humanistic, science & technology, life science, art) differentiating some of the parameters and metrics. Within 9 months in 2013 the Polish Ministry of Science and Higher Education collected data from scientific institutions concerning years 2009–2012 and with support of the Committee for Evaluation of Scientific Units classified them to 60 groups with common assessment. They were assessed by 160 experts, who compared them pair wise and categorised into category A, B or C. Within the best category (A) the best of the best units were selected and granted category A+.

regulation the following can be treated as monographs: editions of source texts, lexicographies, atlases and multi-faceted maps, translations of foreign publications together with editorials, thematic encyclopaedias and lexicons, commentaries to the acts, critical studies of literary texts, biographical and bibliographical dictionaries, bibliographies, catalogues of monuments as well as scientific studies comprised of thematically coherent papers presented at a scientific conference or conferences if they fulfil the following conditions: they are thematically coherent, peer-review scientific papers; they include references; they are at least 6 publisher's sheets long; they are published as books or separate volumes; they present a particular issue in an original and creative manner. This group does not include monographic articles published in journals, textbooks and academic books, novels, collections of poetry, collections of short stories and reportages, memoirs and journals as well as reprints of scientific monographs [26].

On the basis of the ISBN and the above mentioned definition of scholarly monograph, the monographs can be classified into three main types with two subtypes each:

Scholarly monograph: it may be written by one or more authors entirely in one of the following languages: English, German, French, Spanish, Russian, Italian (25 points), or in Polish (20 points).

Chapter in the monograph: it may be written by one or more authors in one of the following languages: English, German, French, Spanish, Russian, Italian (5 points), or in the Polish language (4 points).

Scientific editing of the monograph written by multiple authors: it may have one or more editors and is entirely written in one of the following languages: English, German, French, Spanish, Russian, Italian (5 points), or in the Polish language (4 points) [26].

MATERIAL AND METHODS

Scholarly monographs and the chapters in the monographs reported by 25 scientific units of Polish physical education higher schools with a sport science or related profile in 2009–2012 were subjected to analysis. Selection of scientific units was analogical to the analysis of publications described in previous article [27]. The monographs and chapters in the monographs could not be duplicated in order to avoid multiple quantification. The study covered 333 monographs and 3,139 chapters in the monographs. For the ordinal

Scientific units – units that continuously engage in research or development work:

- a) basic organisational units of higher education institutions within the meaning of the Charters of those higher education institutions;
- b) scientific units of the Polish Academy of Sciences within the meaning of the Act of 30 April 2010 on the Polish Academy of Sciences (Journal of Laws [Dz. U.] No. 96/2010, Item 619);
- c) research institutes;
- d) international scientific institutes established pursuant to separate regulations, operating in the territory of the Republic of Poland;
- e) the Polish Academy of Arts and Sciences;
- f) other organisational units not listed in Letters a to e, which are legal persons and have registered offices in the Republic of Poland, including entrepreneurs with a status of a research and development centre granted pursuant to the Act of 30 May 2008 on Certain Forms of Support for Innovative Activities (Journal of Laws [Dz. U.] No. 116/2008, Item 730 and No. 75/2010, Item 473); [19]

Ranking – a classification of performance arranged in descending order

variable, a descending order of points assigned to them was adopted. The sum of the points resulting from the accumulated number of monographs obtained by the institutions (academies of physical education, universities, technical universities and non-public higher schools) was adopted as the major index of ranking of scientific units. Regardless of the co-authorship from the same or different institutions, evaluated units received points assigned to given monographs. The same principles were applied to the chapters of the monographs. If at least two scientific units obtained equal number of points, higher ranking positions were determined by the sum of points received for lower number of monographs (chapters in monographs). If both variables (points and number of monographs) are identical, those scientific units are classified on the same ranking position in alphabetical order. Analogous principle was applied in the ranking of publications.

Statistical analysis was performed with the use of MS Excel 2013 and SAP Lumira (v.1.15.1). The Spearman's rank correlation identifies the strength of correlation among publications and monographs, publications and chapters of the monographs, monographs and chapters in the monographs. The source data was the scholarly monographs and chapters in the monographs reported by institutions to the POL-on system for the purposes of parametric evaluation of scientific units provided by the Polish Ministry of Science and Higher Education. However, the analysis does not mimic the evaluation conducted by the Ministry. In order to simplify the analysis contained herein the category of „scientific editing of the monographs written by multiple authors” has not been taken into account.

Due to the specificity of the research issues, the chapter „Results” is not solely the collection of perceptual sentences (as well as figures and accompanying tables). It also includes conclusions, commentaries and explanations.

RESULTS

In case of the monographs the leader in the ranking of Polish physical education higher schools is Uniwersytet Rzeszowski; Wydział Wychowania Fizycznego (930 pts). The next places are occupied by the representatives of the scientific units of Polish physical education higher schools from: Katowice, Kraków, Gdańsk, Poznań and Warszawa (Table 1).

In case of the chapters of monographs the leader in ranking of scientific units of Polish physical education higher schools is *Wydział Wychowania*

Fizycznego, Sportu i Rehabilitacji Akademii Wychowania Fizycznego im. Eugeniusza Piaseckiego in Poznan (1,595 pts). What is significant this Academy is also the leader in the publications rank (Table 2, Table 3). This proves that scholars from this unit are the undisputed leader of the scientific units Polish physical education higher schools in 4-year assessment (2009-2012). The vice leader of this ranking, with fewer number of points is *Uniwersytet Rzeszowski; Wydział Wychowania Fizycznego* (1,581 pts). An example of this unit shows that in a four-year assessment period efforts of its academics have been concentrated on limited promotion of own scientific potential and achievements. The other places (with a score above 1,000 points) were occupied by *Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Wychowania Fizycznego and Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Wychowania Fizycznego i Sportu*. It is worth to emphasize that all these units provide education based on specific research methodology for the profession of the graduates of physical education.

Importantly, the last four institutions closing the ranking of the chapters in monographs are: *Wyższa Szkoła Administracji w Bielsku-Białej; Wydział Fizjoterapii, Wyższa Szkoła Zarządzania i Administracji w Zamościu; Wydział Fizjoterapii i Pedagogiki, Akademia Wychowania Fizycznego we Wrocławiu; Wydział Fizjoterapii and Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach; Wydział Fizjoterapii*. All these units deliver education in physiotherapy, the field strongly related to the medical science, where typical model of dissemination of the knowledge and building scientific potential are publications in journals, rather than chapters in monographs.

Rankings of scientific units of Polish physical education higher schools presented in Table 1 and Table 2 have been compared with ranking developed on the basis of publications published in 2009-2012 (Table 3) by computing the Spearman correlation and revealed the following. The Spearman correlation of the scientific units that expressed position in the ranking of publications and ranking of monographs was 0.264 (Figure 2), and between ranking of publications and ranking of chapters in monographs 0.207 (Figure 3), indicating poor correlation in both cases. There was a significant correlation (0.658) between scientific units that expressed position in the ranking of monographs and ranking of chapters in monographs, what evidences strong relationship.

Table 1. Ranking of scientific units of Polish physical education higher schools on the basis of monographs published in 2009-2012 (the criterion of order is "total points" for the number of monographs) and comparatistics with the chapters in monographs and the publications.

Higher schools (n=25)	METRICS		COMPARATISTICS (ranking)		
	Total points	Number of monographs	Monographs	Chapters in monographs	Publications
Uniwersytet Rzeszowski; Wydział Wychowania Fizycznego	930	46	1	2	21
Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach; Wydział Wychowania Fizycznego	760	38	2	10	10
Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Wychowania Fizycznego i Sportu	465	22	3	4	5
Akademia Wychowania Fizycznego i Sportu im. Jędrzeja Śniadeckiego w Gdańsku; Wydział Wychowania Fizycznego	450	22	4	14	12
Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Wychowania Fizycznego, Sportu i Rehabilitacji	390	19	5	1	1
Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Wychowania Fizycznego i Sportu w Białej Podlaskiej	370	18	6	8	7
Uniwersytet Szczeciński; Wydział Kultury Fizycznej i Promocji Zdrowia	355	17	7	16	8
Politechnika Opolska; Wydział Wychowania Fizycznego i Fizjoterapii	345	16	8	13	9
Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Zamiejscowy Wydział Kultury Fizycznej w Gorzowie Wielkopolskim	345	17	9	7	20
Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Turystyki i Rekreacji	310	15	10	6	15
Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Turystyki i Rekreacji	300	19	11	11	19
Akademia Wychowania Fizycznego we Wrocławiu; Wydział Wychowania Fizycznego	265	13	12	9	4
Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Wychowania Fizycznego	185	9	13	3	6
Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach; Wydział Fizjoterapii	160	8	14	25	16
Uniwersytet Technologiczno-Humanistyczny im. Kazimierza Pułaskiego w Radomiu; Wydział Nauk o Zdrowiu i Kultury Fizycznej	150	9	15	19	24
Wyższa Szkoła Zarządzania i Administracji w Zamościu; Wydział Fizjoterapii i Pedagogiki	140	7	16	23	18
Uniwersytet Kazimierza Wielkiego w Bydgoszczy; Wydział Kultury Fizycznej, Zdrowia i Turystyki	140	9	17	5	23
Akademia Wychowania Fizycznego i Sportu im. Jędrzeja Śniadeckiego w Gdańsku; Wydział Turystyki i Rekreacji	130	6	18	15	17
Akademia Wychowania Fizycznego we Wrocławiu; Wydział Fizjoterapii	120	6	19	24	2
Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Rehabilitacji	100	5	20	17	14
Wyższa Szkoła Informatyki i Zarządzania w Rzeszowie; Wydział Turystyki i Nauk o Zdrowiu	100	6	21	12	11
Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Rehabilitacji Ruchowej	45	2	22	18	3
Akademia Wychowania Fizycznego we Wrocławiu; Wydział Nauk o Sporcie	45	2	22	21	13
Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Turystyki i Rekreacji	20	1	23	20	25
Wyższa Szkoła Administracji w Bielsku-Białej; Wydział Fizjoterapii	20	1	23	22	22

Table 2. Ranking of scientific units of Polish physical education higher schools on the basis of chapters of monographs published in 2009-2012 (the criterion of order is "total points" for the number of chapters of monographs).

Ranking position	Higher schools (n=25)	Total points	Number of chapters
1	Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Wychowania Fizycznego, Sportu i Rehabilitacji	1595	375
2	Uniwersytet Rzeszowski; Wydział Wychowania Fizycznego	1581	385
3	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Wychowania Fizycznego	1257	303
4	Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Wychowania Fizycznego i Sportu	1018	237
5	Uniwersytet Kazimierza Wielkiego w Bydgoszczy; Wydział Kultury Fizycznej, Zdrowia i Turystyki	806	187
6	Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Turystyki i Rekreacji	702	172
7	Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Zamiejscowy Wydział Kultury Fizycznej w Gorzowie Wielkopolskim	635	149
8	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Wychowania Fizycznego i Sportu w Białej Podlaskiej	610	140
9	Akademia Wychowania Fizycznego we Wrocławiu; Wydział Wychowania Fizycznego	601	135
10	Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach; Wydział Wychowania Fizycznego	591	142
11	Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Turystyki i Rekreacji	565	139
12	Wyższa Szkoła Informatyki i Zarządzania w Rzeszowie; Wydział Turystyki i Nauk o Zdrowiu	557	132
13	Politechnika Opolska; Wydział Wychowania Fizycznego i Fizjoterapii	410	96
14	Akademia Wychowania Fizycznego i Sportu im. Jędrzeja Śniadeckiego w Gdańsku; Wydział Wychowania Fizycznego	366	87
15	Akademia Wychowania Fizycznego i Sportu im. Jędrzeja Śniadeckiego w Gdańsku; Wydział Turystyki i Rekreacji	343	84
16	Uniwersytet Szczeciński; Wydział Kultury Fizycznej i Promocji Zdrowia	321	74
17	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Rehabilitacji	262	63
18	Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Rehabilitacji Ruchowej	254	59
19	Uniwersytet Technologiczno-Humanistyczny im. Kazimierza Pułaskiego w Radomiu; Wydział Nauk o Zdrowiu i Kultury Fizycznej	247	52
20	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Turystyki i Rekreacji	132	32
21	Akademia Wychowania Fizycznego we Wrocławiu; Wydział Nauk o Sporcie	114	27
22	Wyższa Szkoła Administracji w Bielsku-Białej; Wydział Fizjoterapii	113	28
23	Wyższa Szkoła Zarządzania i Administracji w Zamościu; Wydział Fizjoterapii i Pedagogiki	90	23
24	Akademia Wychowania Fizycznego we Wrocławiu; Wydział Fizjoterapii	52	13
25	Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach; Wydział Fizjoterapii	21	5




In 2009-2012 all units published 333 monographs, 222 of which (67%) were issued by academies of physical education and 111 (33%) were published by academics from the institutions of other types. As for the language of monographs: 292 were written in Polish (88.7%), 24 in English (7.2%), 7 in Russian

(2.1%), 5 in Ukrainian (1.5%), 2 in Slovakian (0.6%), 1 in Bulgarian (0.3%), 1 in Czech (0.3%), and 1 in Spanish (0.3%). Language proportions indicate a predominance of the monographs in Polish and regional cooperation of the Polish academics with colleagues from neighbouring countries. The low number of

Table 3. Ranking of Polish physical education higher schools on the basis of scientific articles published in 2009-2012 in journals from the ministerial list (the criterion of order is "total points" for the number of articles in individual journals).

Ranking position	Higher schools (n=25)	Total points	Number of articles
1	Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Wychowania Fizycznego, Sportu i Rehabilitacji	3036	286
2	Akademia Wychowania Fizycznego we Wrocławiu; Wydział Fizjoterapii	2454	260
3	Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Rehabilitacji Ruchowej	2234	212
4	Akademia Wychowania Fizycznego we Wrocławiu; Wydział Wychowania Fizycznego	2226	386
5	Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Wychowania Fizycznego i Sportu	2011	292
6	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Wychowania Fizycznego	1920	302
7	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Wychowania Fizycznego i Sportu w Białej Podlaskiej	1810	281
8	Uniwersytet Szczeciński; Wydział Kultury Fizycznej i Promocji Zdrowia	1564	141
9	Politechnika Opolska; Wydział Wychowania Fizycznego i Fizjoterapii	1491	184
10	Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach; Wydział Wychowania Fizycznego	1467	229
11	Wyższa Szkoła Informatyki i Zarządzania w Rzeszowie; Wydział Turystyki i Nauk o Zdrowiu	1396	143
12	Akademia Wychowania Fizycznego i Sportu im. Jędrzeja Śniadeckiego w Gdańsku; Wydział Wychowania Fizycznego	1387	228
13	Akademia Wychowania Fizycznego we Wrocławiu; Wydział Nauk o Sporcie	1362	191
14	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Rehabilitacji	1215	152
15	Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Turystyki i Rekreacji	1104	161
16	Akademia Wychowania Fizycznego im. Jerzego Kukuczki w Katowicach; Wydział Fizjoterapii	947	141
17	Akademia Wychowania Fizycznego i Sportu im. Jędrzeja Śniadeckiego w Gdańsku; Wydział Turystyki i Rekreacji	744	126
18	Wyższa Szkoła Zarządzania i Administracji w Zamościu; Wydział Fizjoterapii i Pedagogiki	663	109
19	Akademia Wychowania Fizycznego im. Bronisława Czecha w Krakowie; Wydział Turystyki i Rekreacji	660	95
20	Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Zamiejscowy Wydział Kultury Fizycznej w Gorzowie Wielkopolskim	635	76
21	Uniwersytet Rzeszowski; Wydział Wychowania Fizycznego	609	177
22	Wyższa Szkoła Administracji w Bielsku-Białej; Wydział Fizjoterapii	471	77
23	Uniwersytet Kazimierza Wielkiego w Bydgoszczy; Wydział Kultury Fizycznej, Zdrowia i Turystyki	319	47
24	Uniwersytet Technologiczno-Humanistyczny im. Kazimierza Pułaskiego w Radomiu; Wydział Nauk o Zdrowiu i Kultury Fizycznej	309	39
25	Akademia Wychowania Fizycznego Józefa Piłsudskiego w Warszawie; Wydział Turystyki i Rekreacji	268	37

Table 4. Correlations between ranking positions of the scientific units of Polish physical education higher schools (n=25) based on the number of monographs, chapters in monographs and publications published in 2009-2012

pairs of indices	r	95% CI	0	p-value
Monographs- Publications	0.264	-0.158 to 0.605		0.2017
Chapters-Publications	0.207	-0.217 to 0.565		0.3210
Monographs-Chapters	0.658	0.345 to 0.840		0.0003

monographs written in English indicates a strong preference to publish articles in English, as well as the larger effort and time spent to write such a monograph. Most monographs written in English were published by *Politechnika Opolska; Wydział Wychowania Fizycznego i Fizjoterapii* (Figure 4).

During analysed period all units published 3,139 chapters in monographs, 2,162 of which (69%) were

issued by academies of physical education and 977 (31%) were published by academics from institutions of other types. As far as the language of monographs is concerned: 2,382 were written in Polish (75.9%), 723 in English (23%), 14 in German (0.4%), 8 in Slovakian (0.3%), 5 in Czech (0.2%), 5 in Russian (0.2%), 1 in French and 1 in Ukrainian. The predominance of the monographs written in Polish can be observed as well, however, the number of chapters

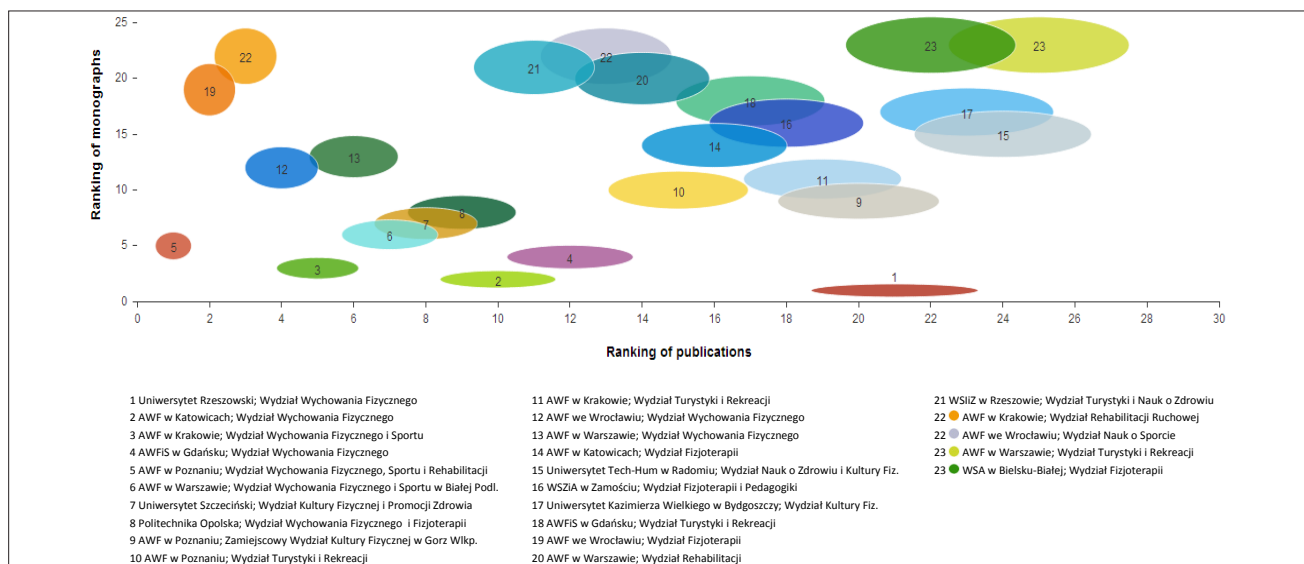


Figure 2. Migration of ranking positions of the scientific units of Polish physical education higher schools (n=25) based on monographs (Table 1) and publications (Table 3) published in 2009-2012 – correlation of both indices $r=0.264$

Legend: numbers in bubbles are the position in the ranking of monographs. The greater the distance of ranking position, the flatter the bubble.

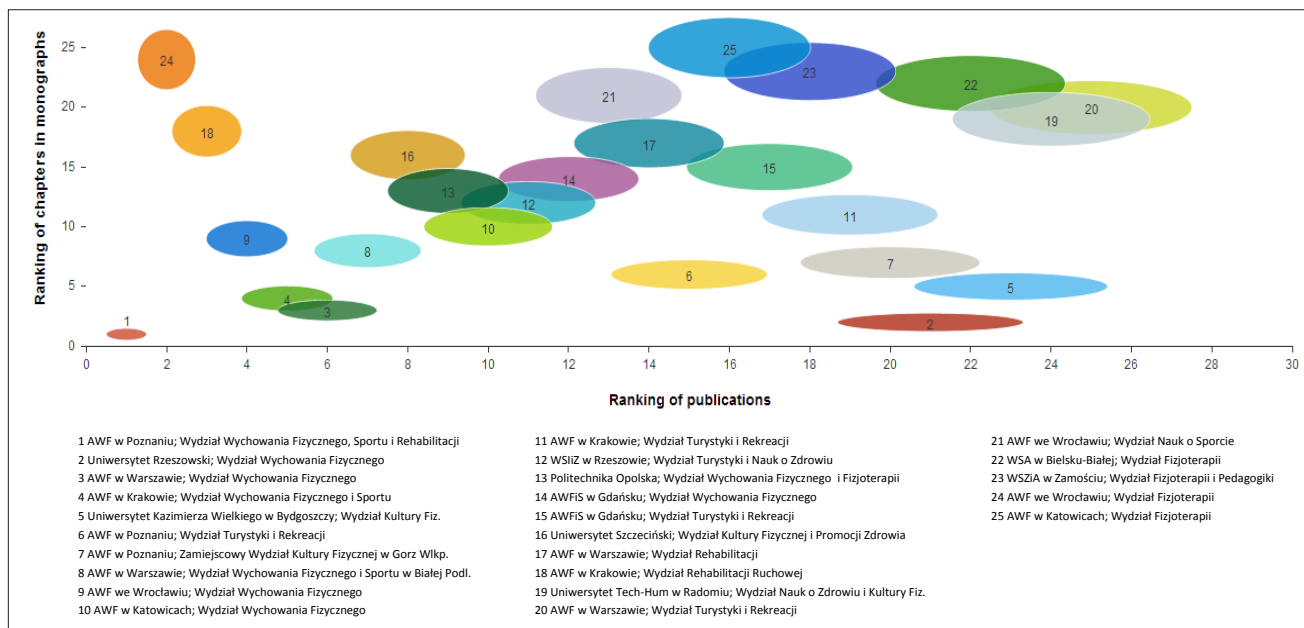


Figure 3. Migration of ranking positions of the scientific units of Polish physical education higher schools (n=25) based on chapters in monographs and publications published in 2009-2012 – correlation of both indices $r = 0.207$

Legend: numbers in bubbles are the position in the ranking of monographs. The greater the distance of ranking position, the flatter the bubble.

in the monographs written in English is higher (in comparison to monographs). This may be the result of the practice of issuing articles in the form of a monograph with ISBN, but also the time and effort needed to write the chapter. The leader of chapters in monographs written in English is *Akademia*

Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Wychowania Fizycznego, Sportu i Rehabilitacji. This unit is undoubtedly the leader among the Polish physical education higher schools, which proves conducting a systematic and consistent strategy.

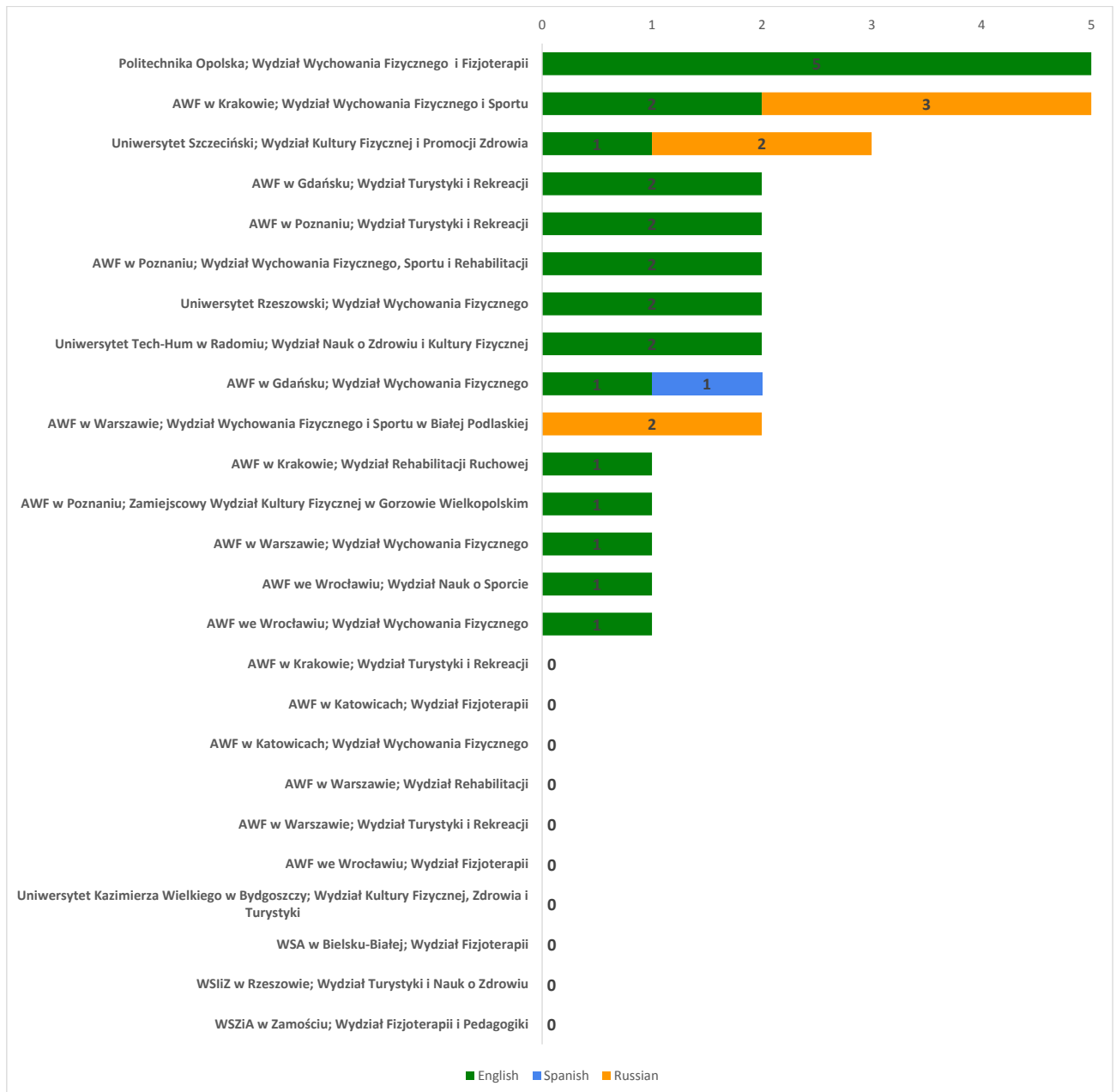


Figure 4. Number of monographs written in congress languages published in 2009-2012 by the scholars from the Polish physical education higher schools.

DISCUSSION

Irrespective of the simplicity of the above mentioned methodology, the bibliometric analysis of Polish physical education higher schools measured by the number of the monographs and the chapters in monographs allows to make a reliable classification of institutions; however, due to editorial limitations and the data use conditions it is focused only on the crucial aspects and results enabling to achieve the aim of the study.

The scope of presented analysis has not been explored up to know in reference to the Polish physical education higher schools. There are some articles concerning publications [28, 29], but none concerned the monographs and chapters in monographs. The main aspect of various bibliometric analyses are articles, journals and citations. Monographs are important way of dissemination, education and organization

of the knowledge. There is an urgent need for a balanced approach to publications and monographs [25]. This is not an expectation arising from the conviction of representatives from certain groups of science, but an important element of structuring knowledge, presented in a comprehensive manner.

Historically, monographs came into existence many centuries before the journals. They retained the valuable content, shaped minds of successive generations, providing a source of knowledge and inspiration. It is undeniable that monographs played and will be playing an important role. Although today they are dethroned by the journals, which became flexible and fast medium popularizing knowledge. Certainly, the journals are easier to analyse with the use of bibliometric methods, because there is an international and reliable multidisciplinary database with citation data. In contrast to monographs the lifetime of publications is limited mostly to a few years (for original articles). In extreme cases, it is the challenging to measure using conventional methods (citation) the impact of such works as the: *Physica* by Aristotle (circa 330 B.C.), *De Revolutionibus Orbium Coelestium* by Nicolaus Copernicus (1543), *Dialogue Concerning the Two Chief World Systems* by Galileo Galilei (1632), *Philosophiae Naturalis Principia Mathematica* by Isaac Newton (1687), *The Origins of Species* by Charles Darwin (1859) or *Relativity: The Special and General Theory* by Albert Einstein (1916). There are solutions concerning monographs (i.e. Book Citation Index, Scopus “Books Expansion Project”) that support bibliometric measuring of scientific achievements.

What advantages speak in favour of monographs? I would go back again to words of John Willinsky who wrote „*The monograph provides researchers with the finest of stages for sustained and comprehensive—sometimes exhaustive and definitive—acts of scholarly inquiry ...*” [3]. Monographs allow for a holistic approach and presentation of the issue with no rigid limitations on the number of words/pages in contrast to journals. In the analysed set of monographs average volume is 17.5 publisher’s sheets (approx. 389 normalised A4 pages) and 1 publisher’s sheet (approx. 22 normalised A4 pages) for chapters in monographs. Among over 100 publishers of monographs the highest number has been published by: *Akademia Wychowania Fizycznego w Katowicach* (42), *Akademia Wychowania Fizycznego w Poznaniu* (27), *Uniwersytet Rzeszowski* (22), *Akademia Wychowania Fizycznego we Wrocławiu* (19), *Akademia Wychowania Fizycznego w Krakowie* (16), *Akademia Wychowania Fizycznego i Sportu w*

Gdańsku (16), *Akademia Wychowania Fizycznego w Warszawie* (15) and *Politechnika Opolska* (11).

As the process of writing a monograph (a few months) lasts longer than writing the article (several weeks), it should be perceived as a positive result of hard intellectual work, which optimally uses time to demonstrate opinions, views, arguments in full. This aspect should be particularly considered in the light of the ongoing evaluation activities.

Such approach confirms the ranking position of *Wydział Wychowania Fizycznego, Sportu i Rehabilitacji Akademii Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu*. The analysed results indicate that academics from this institution have a great potential to generate not only a large number of scientific achievements (publications, monographs, chapters, etc.), but also are still developing innovations and obtaining research grants (in the last ranking of the Polish National Science Centre, the whole Academy of Physical Education in Poznan occupied the highest position among the Polish physical education higher schools receiving a total of 3 projects and the largest amount of funding [30]).

There are two important aspects of the evaluation of scientific units in countries, which native language is different than English on the basis of scientific achievements measured by the number of publications in scientific journals and number of issued monographs (chapters of monographs). Both papers published in journals in native languages and monographs are limited to readers knowing the language. Hence, even the most valuable papers may remain in the minds of limited circles of scholars and entities who could use presented knowledge. Establishment of as many electronic journals publishing papers especially in English in those countries is the first, simplest step to overcome barriers limiting open access to valuable knowledge [31-32].

Optimal criteria to award points in a given evaluation system of scientific achievements for monographs (and chapters) published in English and in other so-called congress languages (French, Spanish, German, Russian, Italian) should be developed. The total number of points for chapters in monographs adopted in Polish evaluation system of scientific units seems to insufficiently show appreciation as well as demotivate. Maximally 25 points for a monograph published in congress language does not encourage a scholar, since this value can be obtained with smaller contribution for publications in journals having

Impact Factor (scoring range 15-50 pts) or other journals scored by the Polish Ministry of Science and Higher Education (scoring range 1-10 pts).

Second aspect indicated the possibility of wider and more effective promotion of national scientific achievements (including countries, where English is the official language) through multidimensional system POL-on. The prestige of the Impact Factor caused the fact that numerous authors from all over the world are willing to wait for a publication even for several months, if they are assured that it will be published in a journal of this category. Nevertheless, the mission of every responsible scientist is to share valuable knowledge as soon as possible [33, 34] and to the broadest audience possible. The POL-on system distinguishes journals from category A (those with Impact Factor) from category B and C, i.e. potential candidates to have Impact Factor. Category B is open for journals from the entire world. It is enough if editorial staff submits application questionnaire in relevant time. High editing standards of a journal (content, international diversity of authors and citations) will translate into a high point value. Such journal will become interesting for numerous Polish scholars. Papers published in those journals will open more opportunities to reach more readers. Thus, the likelihood of citations of those publications will increase also in the most prestigious journals (with Impact Factor) as well as the probability that journals which share the most valuable knowledge as first will be promoted in the rankings. The most important benefit is global – the Knowledge Society will gain a lot. Overcoming the barriers [31] will become more real, the mission of science will be fulfilled in a more clear manner and young scientists will have a chance to publish their achievements in more journals.

CONCLUSION

Complementary to the publications monographs constitute useful bibliometric tool measuring the

productivity of authors, research groups, institutions and countries. Scientific achievements reported by institutions allowed to compare the scientific performance in the scientific units of Polish physical education higher schools on the unprecedented scale, measured both by the number of scholarly monographs and chapters in monographs, showing their potential, directions of scientific activities and competitive capacity. The rankings being the result of evaluation process allowed to determine the position of a unit in relation to the other rated units proving that the academies of physical education fulfil their statutory, social and economic mission. The study also revealed the leadership of the *Akademia Wychowania Fizycznego im. Eugeniusza Piaseckiego w Poznaniu; Wydział Wychowania Fizycznego, Sportu i Rehabilitacji* among Polish physical education higher schools. All scientific units participating in this evaluation system benefit from it. Achievements of the leader constitute a clear frame of reference for the others (subsequent evaluation covers the period from 2013-2016).

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Author declares that he does not have any financial or personal relationships with other people or organisations that could inappropriately influence the development of this paper.

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