

Preferences of the employees of the Polish Academies of Physical Education concerning articles published in Polish journals on sports science and sports medicine, included in the ministerial list – contribution to scientometrics analyses from the perspective of the educational aim and of the process of creation of the knowledge society

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Abstract

Background and Study Aim:

One of the key elements of evaluation of achievements obtained by scientists and scientific institutions are the scientific articles published in journals included in the ‘ministerial list’. In Poland, the evaluation is conducted in two categories: (A) journals listed in Journal Citation Report (10–30 scores), (B) Polish or foreign journals mentioned in the ‘ministerial list’ (1–6 scores). It is hard to reliably estimate motives crucial for the decision on publication of a selected article in a given scientific journal. It is much easier to establish the preferences of authors concerning their choice of journal to publish the article. Pragmatics requires that the author employed at a university of specific type preferred journals of category (A) and those of the highest score in category (B) and corresponding to the type of university at the same time. As far as Polish Academies of Physical Education (APE) are concerned (there are 6 of them), corresponding journals are the ones on sports science and sports medicine. The aim of this paper was to find out whether the employees of the Polish Academies of Physical Education publish their articles in journals on sports science and sports medicine, included in the ministerial list, primarily of the highest value.

Material/Methods:

The study applied the method of documentation analysis. The analysis included original papers, reviews, short communications, editorials and letters to the Editors published by the employees of Polish higher schools in 30 Polish journals concerning sports science and sports medicine. The preference criterion was established on the basis of the number of articles published by authors of one kind of Polish higher schools in a specific, scored journal from the ‘ministerial list’.

Results:

In the year 2008, the employees of 67 Polish higher schools published 751 articles in total (original papers, reviews, short communications, editorials and letters to the Editors) in 30 Polish journals on sports science and sports medicine, included in the ‘ministerial list’. Authors published their articles mainly in 4-score journals (55%) and only 2% of all articles were published in 10-score journals.

Conclusions:

Possibility of deepen analysis of the preferences of the employees of the Polish APEs and other Polish higher schools concerning publication of the articles in Polish journals on sports science and sports medicine from the ministerial list is limited by the lack of access to basic information on authors (scientific speciality, research field, accomplished and implemented grants, publications etc.). Thus, this relatively high publishing activity of the employees of universities, medical universities, non-public higher schools, technical universities and pedagogical universities in journals devoted to the aforementioned subjects should be explained by interesting field of research, not only for APEs’ employees. This interest demonstrated by authors is the proof that the subject of articles published in

sports science and sports medicine journals is being taken at many Polish APEs. However, there are no empirical arguments allowing for a clear statement that articles are written only or mostly by specialists of sports science and sports medicine.

Key words: evaluation • preferences • scientometrics • sports science

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BACKGROUND

The basic product of scientific research is the scientific statements. All scientific statements are partially hypothetical. Thus, all of them could be questioned under some specific circumstances. The above mentioned reasoning belongs to the standards of deliberations on science [1]. Scientific discoveries, inventions and implementations are associated with development. One of the most acceptable indications of development is the perspective of knowledge society, a far-reaching aim of the Bologna Declaration [2–8].

Cold but precise reasoning leads us to a conclusion that science cannot be identified with development only, but surely to progress. However, progress is not a synonym of development in the meaning presented by prominent philosophers and humanists [9]. The best example of technological progress is the production of offensive nuclear and biological weapons, as a consequence of scientific research. This kind of progress is not a proof of human development but its opposition – regress. This perspective usually escapes public discussion on the relevance of evaluation of the field of science, as the laws and theories concerning the technology of mass destruction constitute a closely guarded secret. Disregarding this field of inventions and discoveries, we may feel justified to conclude that the mission of evaluation of the scientific activity is the concern for a widely understood development, from micro- to macro-scale, and not for the narrowly understood progress, which is usually associated with a particular part of reality.

Evaluation of the scientific achievements in fact is the evaluation of individual scientists and institutions employing specific research teams. It would be wrong to limit the process of evaluation of the most important scientific entities – scientists and institutions (universities, research institutes, laboratories etc.) to the last decades. This process has been going on for centuries. Despite limitations of the carriers of scientific information (manuscripts, printed documents), the fame of scientists and universities were the major reason for students (even from distant countries) to start studies at chosen university and under the guidance of a given master and for powerful aristocrats to dispense their

patronage. Currently available carriers of scientific information and a high number of competing universities and other higher schools led to the necessity of system evaluation. In the hierarchy of evaluation of the scientists, the most prestigious award is the Nobel Prize, with an over 100-year-old tradition. Global and local rankings of universities have a considerably shorter tradition [10–16]. The Nobel Prize, other distinctions awarded to the scientists and research teams by the scientific associations, higher schools, governmental institutions etc., as well as rankings of the universities and higher schools always have subjective character. University distinction is an effect of common achievements of the most creative part of a specific academic community.

A considerable simplification (although a fragmentary one) of the evaluation of the scientists' and scientific institutions' achievements is a very high number of scientific journals, especially the ones accessible on Internet. Although there is a rising number of scientists who may publish their own scientific achievements relatively quickly, there arises a problem of perception of the scientific information, even if limited to some specific issues. A serious impediment is a significant dispersion of articles on one subject among the journals non-evaluated and evaluated by the best-known literature databases (Thomson Reuters, PubMed, Scopus, etc.). We may not assume a priori that information published in a journal evaluated by a given database is the most valuable one. This rule concerns also the so called journal rank indicator (e.g. Impact Factor, Hirsch Index, Index Copernicus Value). In Poland, the evaluation is conducted within two categories: (A) journals listed in Journal Citation Reports (10–30 scores), (B) Polish or foreign journals included in the 'ministerial list' (1–6 scores).

Interesting are the motives influencing the final decision on publication of a given article in a specific scientific journal. This issue is too difficult in many aspects to be subjected to a reliable scientific analysis. It is much easier to establish the preferences of authors concerning publication of articles in different journals. In Poland, the key parameter of evaluation of a scientific institution [17] are the scientific articles published in the journals from the 'ministerial list', so the pragmatic requires that the author employed at a specific type of

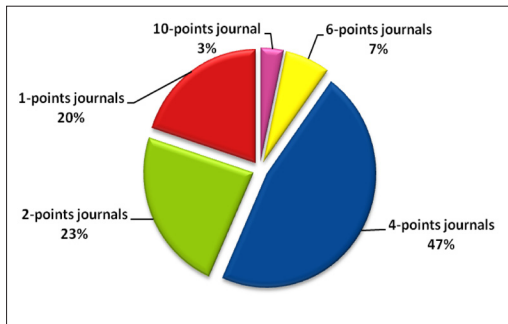


Figure 1. Proportions of the Polish journals on sports science and sports medicine classified on the basis of the 'ministerial list' scores.

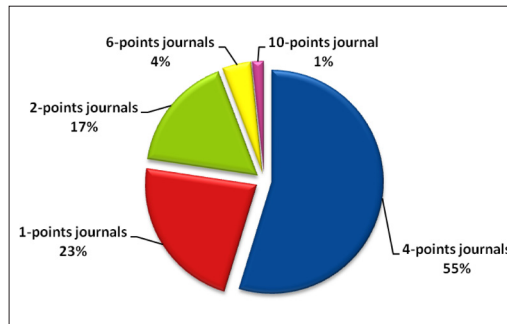


Figure 2. Proportions of the Polish journals on sports science and sports medicine classified according to the preference criterion.

Evaluation – a process of examining parameters applied to methodology.

Preferences – favouring of one journal or category of journals on the basis of emotional or rational selection criteria.

Scientometrics – the science of measuring and analysing science.

Sports science – a discipline that deals with human activity aimed to improve sporting abilities or performance.

university preferred journals of category (A) and those of the highest score in category (B) and corresponding to the type of university at the same time. For all 6 Academies of Physical Education (APE) in Poland, corresponding journals concern sports science and sports medicine. An important premise for studies that constitute the substantial basics of this article was the ranking of Polish higher schools (PHS) [18]. It turned out that in 2008, employees of 67 Polish higher schools (classified into 10 types of universities) published their articles in 30 Polish journals from the field of sports science and sports medicine. Although first six positions in that ranking were occupied by academies of physical education, there does not have to occur a simple interrelation – i.e. scores accumulated by the leaders being the result of a higher number of articles published in the journals of a higher index value.

The aim of this paper was to find out whether the employees of the Polish Academies of Physical Education publish their articles in the journals on sports science and sports medicine from the ministerial list, with the highest score.

MATERIAL AND METHODS

The study applied the method of documentation analysis. The results were documented in an Excel database designed especially for that purpose. The analysis included original papers, reviews, short communications, editorials and letters to the Editors published by the employees of Polish higher schools in 30 Polish journals concerning sports science and sports medicine and included (on the basis of the methodology presented in the previous article [18]) in the 'ministerial list'. The highest number of journals included in the list were the 4-score journals (47%), while the least numerous journals (3%) were the 10-score ones (Figure 1).

Author's preferences were established on the basis of the number of articles published by the employees of

one kind of Polish higher school in journals of two categories on the 'ministerial list'. In category A, there was only one, 10-score journal. In category B, there were all the remaining journals, scored 6, 4, 2, and 1 point (in descending order). In order to facilitate the comparison of the articles published in the journals of a specific score used indicator of the proportion expressed in the percentage. This indicator was used as a more or less precise criterion of preference (also the level of identification of the phenomenon). At the most general level of such identification, the examination of proportions concerns the number of publications in the scored journals in comparison to the general number of articles published by the employees of the Polish higher schools. The next level concerns the proportion of the articles published by the academies of physical education in comparison to the total number of articles contained in the analysed periodicals, by the employees of the Polish higher schools. Further level of identification includes the number of publications of the employees of different types of Polish higher schools in comparison to the number of scored publications. The most detailed criterion of preference concerns the number of articles published by the employees of different types of Polish higher schools in a given type of scored journals.

Affiliation was the basis for qualifying the authorship of a publication as an achievement of an employee(s) of different types of Polish higher schools. Every article was counted once, as an achievement of the whole university, irrespective of the number of authors from the same university. This rule also applied to co-authorship of the employees of different Polish higher schools. However, in such cases, publication was counted as an achievement of each of the affiliated higher schools.

The above presented indices apply solely for the purposes of the scientific analysis and are not strictly compatible with the ministerial criteria of parametric evaluation of the Polish higher schools.

Table 1. Types of Polish higher schools ranked in terms of the number of articles published in a 10-score journals, in 2008.

10-point journal	Total articles [N]	pr - place in the ranking ; HS - type of institution in Polish higher education system; n - number of articles of employees of the given HS; % - n proportion to N								
		pr	1		2		3		3	
Biology of Sport	12	HS	APE		MED. UNI		TECH UNI		UNI	
		n (%)	8	67%	2	17%	1	8%	1	8%

Academies of physical education (APE), medical universities (MED UNI), technical universities (TECH UNI), universities (UNI).

Table 2. Types of Polish higher schools ranked in terms of the number of articles published in 6-score journals, in 2008.

6-point journals	Total articles [N]	pr - place in the ranking ; HS - type of institution in Polish higher education system; n - number of articles of employees of the given HS; % - n proportion to N										
		pr	1		2		3		3			
Folia Turistica	7	HS	APE		PEDAG. UNI							
		n (%)	6	86%	1	14%						
Journal of Human Kinetics	24	pr	1		2		3		3		4	
		HS	APE		MED. UNI		NPHS		TECH UNI		UNI	
		n (%)	14	58%	5	21%	2	8%	2	8%	1	4%

Academies of physical education (APE), medical universities (MED UNI), non-public higher schools (NPHS), pedagogical universities (PEDAG. UNI), technical universities (TECH UNI), universities (UNI).

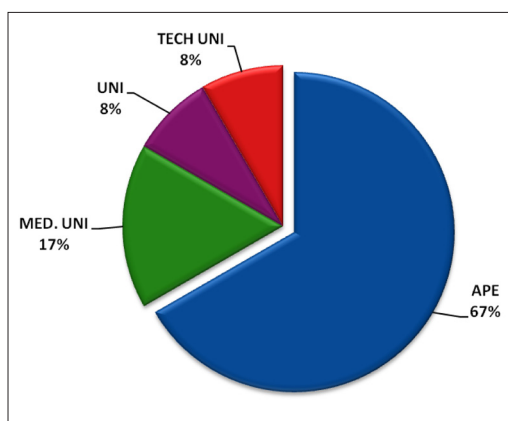


Figure 3. Types of Polish higher schools ranked in terms of the percentage of points obtained in 2008 for articles published in a 10-score journal

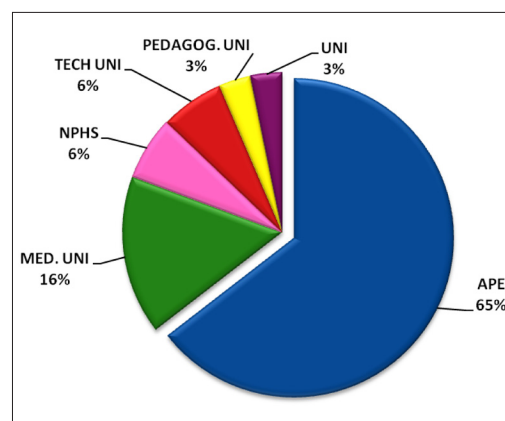


Figure 4. Types of Polish higher schools ranked in terms of the percentage of points obtained in 2008 for articles published in 6-score journals

RESULTS

In the year 2008, the employees of 67 Polish higher schools published 751 articles in total (original papers, reviews, short communications, editorials and letters to the Editor) in 30 Polish journals on sports science and sports medicine, from the ministerial list (Tables 1–5). Authors published their articles in 4-score journals mostly (55%). The lowest number of articles (2%) was published in 10-score journals (Figure 2).

Employees of the academies of physical education published in total 63% of those articles and are the leaders in every category of journals (Tables 1–5; Figures 3–7).

The analysis showed that the higher the score of a given group of journals, the higher the proportion of articles published by the employees of APEs. In 170 articles

published in 1-score journals by the employees of PHS, there were 55% of articles written by (authorship or co-authorship) scientists employed at APEs (Figure 7). In 12 articles published in 10-score journals by the employees of PHS, 67% were authored or co-authored by the scientists from APEs (Figure 3).

In the group of 6-score articles (Table 2), most of the authors preferred the *Journal of Human Kinetics* (24 articles) but authors from APEs is a little bit over the half (58%). Only 7 articles were published in *Folia turistica* but as much as 86% of them were of (co-)authorship of the APEs' employees.

In the group of 4-score articles (Table 3), most of the authors of the 411 articles preferred such journals as *Fizjoterapia Polska* (16%), *Polish Journal of Sport and Tourism* (12%). The most detailed criterion of preference showed

Table 3. Types of Polish higher schools ranked in terms of the number of articles published in 4-score journals, in 2008.

4-point journals	Total articles [N]	pr - place in the ranking ; HS - type of institution in Polish higher education system; n - number of articles of employees of the given HS; % - n proportion to N														
		pr	1		2		2		3		3					
Antropomotoryka	35	HS	APE		NPHS		UNI		MED. UNI		TECH UNI					
		n (%)	27	77%	3	9%	3	9%	1	3%	1	3%				
Archives of Budo	17	pr	1		2		3									
		HS	UNI		APE		NPHS									
		n (%)	9	53%	6	35%	2	12%								
Fizjoterapia	42	pr	1		2		3		4		4		5			
		HS	APE		TECH UNI		MED. UNI		NPHS		UNI		SHVS			
		n (%)	21	50%	7	17%	5	12%	4	10%	4	10%	1	2%		
Fizjoterapia Polska	64	pr	1		2		3		4		5		6		7	
		HS	APE		MED. UNI		PEDAG. UNI		NPHS		TECH UNI		UNI		SHVS	
		n (%)	18	28%	16	25%	13	20%	7	11%	5	8%	3	5%	2	3%
Human Movement	19	pr	1		2		3		3							
		HS	APE		TECH UNI		NPHS		UNI							
		n (%)	15	79%	2	11%	1	5%	1	5%						
Medicina Sportiva Supplement	55	pr	1		2		2									
		HS	APE		MED. UNI		UNI									
		n (%)	49	89%	3	5%	3	5%								
Medycyna Sportowa	33	pr	1		2		3		4		4					
		HS	APE		MED. UNI		UNI		ECON. UNI		MMHS					
		n (%)	24	73%	5	15%	2	6%	1	3%	1	3%				
Official Journal of Polish Society of Sports	19	pr	1		2		3		3		3		3			
		HS	APE		MED. UNI		NPHS		TECH UNI		UNI		PEDAG. UNI			
		n (%)	10	53%	5	26%	1	5%	1	5%	1	5%	1	5%		
Polish Journal of Sport and Tourism	51	pr	1		2		3		3							
		HS	APE		UNI		SHVS		PEDAG. UNI							
		n (%)	42	82%	5	10%	2	4%	2	4%						
Post py Rehabilitacji	19	pr	1		2		3		4		4					
		HS	MED. UNI		APE		UNI		NPHS		SHVS					
		n (%)	7	37%	6	32%	4	21%	1	5%	1	5%				
Studies in Physical Culture & Tourism	13	pr	1		2											
		HS	APE		UNI											
		n (%)	11	85%	2	15%										
Turystyka i Rekreacja	17	pr	1		2											
		HS	APE		NPHS											
		n (%)	16	94%	1	6%										
Turyzm	5	pr	1													
		HS	UNI													
		n (%)	5	100%												
Wychowanie Fizyczne i Sport (Physical Education and Sport)	22	pr	1		2		2		2		3		3			
		HS	APE		MED. UNI		NPHS		TECH UNI		THS		UNI			
		n (%)	14	64%	2	9%	2	9%	2	9%	1	5%	1	5%		

Academies of physical education (APE), economic universities (ECON UNI), medical universities (MED UNI), maritime and military higher schools (MMHS), non-public higher schools (NPHS), pedagogical universities (PEDAG. UNI),state higher vocational schools (SHVS), technical universities (TECH UNI), theological higher schools (THS), universities (UNI).

that as much as 82% of articles published in *the Polish Journal of Sport and Tourism* were written by the employees of APEs, while in *Fizjoterapia Polska* these were only 28%.

In the group of 2-score journals (Table 4), the employees of PHS preferred the *Sport Wyczynowy* (33%), where 69% of those authors affiliated APEs.

In the group of 1-score journals (Table 5), most of the authors of 170 articles preferred such journals as *Aktywność*

Ruchowa Ludzi w Różnym Wiek (28%) and *Zeszyty Metodyczno-Naukowe AWF Katowice* (19%). Basing on the most detailed criterion of preference we may conclude that the authors of 60% of the articles published in *Aktywność Ruchowa Ludzi w Różnym Wiek* were the employees of APEs, while 94% of the articles published in *Zeszyty Metodyczno-Naukowe AWF Katowice* were of APE employee's authorship.

A relatively high number of authors publishing their articles in journals concerning sports science affiliates also

Table 4. Types of Polish higher schools ranked in terms of the number of articles published in 2-score journals, in 2008.

2-point journals	Total articles [N]	pr - place in the ranking ; HS - type of institution in Polish higher education system; n - number of articles of employees of the given HS; % - n proportion to N												
		pr	1		2		2		2		3			
Chirurgia Kolana, Artroskopia, Traumatologia Sportowa	5	HS	MED. UNI		TECH UNI									
		n (%)	4	80%		1	20%							
Medicina Sportiva Practica	24	pr	1		2		2		2		3			
		HS	APE		NPHS		SHVS		UNI		PEDAG. UNI			
		n (%)	15	63%		2	8%		2	8%		1	4%	
Research Yearbook. Studies In Physical Education and Sport	15	pr	1		2		2							
		HS	APE		NPHS		UNI							
		n (%)	11	73%		2	13%		2	13%				
Rocznik Naukowy Id6 - Ruch dla Kultury	22	pr	1		1		2		2					
		HS	APE		UNI		ECON. UNI		NPHS					
		n (%)	10	45%		10	45%		1	5%		1	5%	
Rocznik Naukowy - Studia o Wychowaniu Fizycznym i Sportowym	13	pr	1		2		3							
		HS	APE		NPHS		UNI							
		n (%)	8	62%		4	31%		1	8%				
Rozprawy Naukowe AWF we Wrocławiu	6	pr	1		2		2							
		HS	APE		MED. UNI		TECH UNI							
		n (%)	4	67%		1	17%		1	17%				
Sport Wyczynowy	42	pr	1		2		3		3		3			
		HS	APE		UNI		ECON. UNI		THS		TECH UNI			
		n (%)	29	69%		9	21%		1	2%		1	2%	

Academies of physical education (APE), economic universities (ECON UNI), medical universities (MED UNI), non-public higher schools (NPHS), pedagogical universities (PEDAG. UNI), state higher vocational schools (SHVS), technical universities (TECH UNI), theological higher schools (THS), universities (UNI).

Table 5. Types of Polish higher schools ranked in terms of the number of articles published in 1-score journals, in 2008.

1-point journals	Total articles [N]	pr - place in the ranking ; HS - type of institution in Polish higher education system; n - number of articles of employees of the given HS; % - n proportion to N												
		pr	1		2		3		4					
Aktywno Ruchowa Ludzi w R6nym Wieku	47	HS	APE		UNI		PEDAG. UNI		NPHS					
		n (%)	28	60%		12	26%		6	13%		1	2%	
Kultura Fizyczna. Edukacja, Zdrowie, Olimpizm, Sport	26	pr	1		2		3							
		HS	APE		UNI		NPHS							
		n (%)	21	81%		3	12%		2	8%				
Przegl d Naukowy Kultury Fizycznej Uniwersytetu Rzeskiego	28	pr	1		2		3		3					
		HS	UNI		APE		TECH UNI		SHVS					
		n (%)	24	86%		2	7%		1	4%		1	4%	
Roczniki Naukowe Wy szej Szkoły Wychowania Fizycznego	30	pr	1		2		3							
		HS	NPHS		APE		MED. UNI							
		n (%)	23	77%		6	20%		1	3%				
Sporty Wodne i Ratownictwo	6	pr	1											
		HS	APE											
		n (%)	6	100%										
Zeszyty Metodyczno-Naukowe AWF Katowice	33	pr	1		2		2							
		HS	APE		MED. UNI		SHVS							
		n (%)	31	94%		1	3%		1	3%				

Academies of physical education (APE), medical universities (MED UNI), non-public higher schools (NPHS), pedagogical universities (PEDAG. UNI), state higher vocational schools (SHVS), technical universities (TECH UNI), universities (UNI).

other types of higher schools. From among 10 types of higher schools, the most active employees (apart from APEs' employees) were first of all the ones from universities, medical universities, non-public higher schools, technical universities and pedagogical universities (Figure 8).

DISCUSSION

In my own previous studies [18] I established that the employees of Polish APEs are the most frequent authors in the ranking of articles published in the journals on

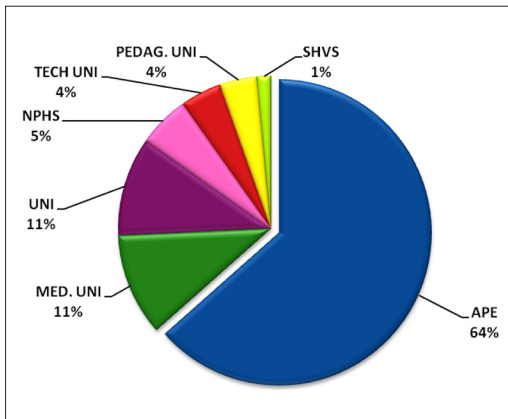


Figure 5. Types of Polish higher schools ranked in terms of the percentage of points obtained in 2008 for articles published in 4-score journals.

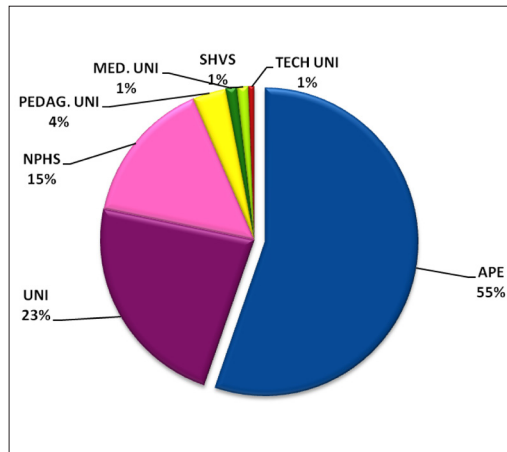


Figure 7. Types of Polish higher schools ranked in terms of the percentage of points obtained in 2008 for articles published in 1-score journals.

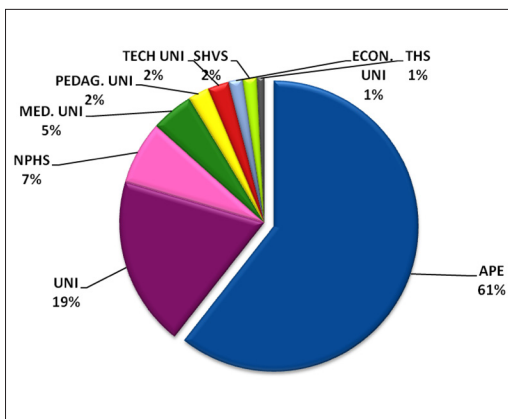


Figure 6. Types of Polish higher schools ranked in terms of the percentage of points obtained in 2008 for articles published in 2-score journals.

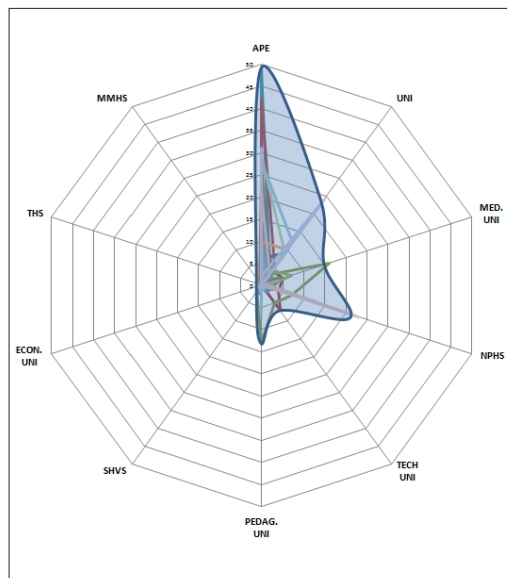


Figure 8. Accumulation of articles published in Polish journals on sports science and sports medicine by authors from different types of Polish higher schools.

sports science and sports medicine. They are employed at 6 public APEs educating PE teachers, sports coaches and managers, specialists in physiotherapy, tourism and recreation. Employees of such higher schools are also obliged to conduct statutory studies from the field of sports science. Herein presented results of the studies provide us with significant empirical arguments in favour of the previously verified hypothesis that APEs fulfill their statutory mission [18]. Employees of those higher schools published the highest number of articles in Polish journals on sports science and sports medicine (62.5%).

However, it should be strongly emphasized that APE affiliation by an author or authors of an article in a journal on sports science or sports medicine does not necessarily indicate that these individuals are specialists in sports science in a formal sense [19] or that sports medicine is their specialisation according to formal qualifications of medical sciences. An important result of this paper is the information that in 10 types of higher schools

(apart the employees of APEs), the most active are the employees of universities, medical universities, non-public higher schools, technical universities and pedagogical universities. This result proves the interdisciplinary character of sports science, but with distinct biomedical inclination (which can be concluded from a high number of authors employed at medical universities). Unfortunately (as in the case of the analysis of APE affiliation), affiliation to other types of higher schools, indicated by an author (s), is not automatically proof to author's specialization in the field of sports science or sports medicine. Authors from universities, non-public higher schools, technical universities or pedagogical universities do not always affiliate departments of their employment although in Poland these kind of higher

schools possess departments (institutes) of physical education, physiotherapy, tourism or recreation. Authors employed at those institutions may therefore be specialists in sports science or sports medicine but their formal scientific specialisation may also be different (philosophy, psychology, sociology, etc.). No wonder then that any conclusion drawn from the above presented results of the study is only probabilistic in nature.

As sports science is a relatively new scientific discipline [19], it is obvious then that in comparison to old sciences, it is represented by a nominally and proportionally lower number of scientists with a formal status of 'sport science specialist'. Therefore, such a high number of employees from other types of PHS interested in the subject of sports science and sports medicine is in a way an evidence for sports science being an interdisciplinary branch. However, this is not that obvious as it may seem. First of all, the term 'sports science' is not commonly accepted in the classification of the sciences used for the purposes of management (administration) of the scientific field (and thus for evaluation of scientists, scientific institutions, scientific journals as well as distribution of funds and establishing distinctions for scientific achievements within different groups, domains and disciplines) in different countries or globally. In the majority of countries of so called Eastern Block there exists a term 'physical culture'. A thorough analysis of the article by Čustonja, Milanović and Sporiš [20] may lead us to a conclusion that for some of the scientists 'kinesiology' is the most appropriate synonym for sports science.

Returning to the obtained results of this paper, it may be justified to assume that if the employees of Polish APEs publish the highest number of articles (irrespective of the rank of the journal from the field of sports science or sports medicine), then this is the proof for the fact that sports science is the leading specialisation of the APEs' employees. A high number of articles in journals on physiotherapy do not mean that their authors are mainly the specialists in sports medicine. According to the Polish system of education and promotion of the scientific personnel [21,22], PhD, postdoctoral and professor promotions in the field of physiotherapy are possible in sports science.

The reform of Polish science and higher education system, going on for many years now, is making towards the end. Similarly in other countries the most important problems and considerable dilemmas is the introduction of the system evaluating scientists and scientific institutions [23–26] which would meet the aims of science and of the concept of knowledge society development (perspective of fulfilling one of the most important directives of the Bologna Declaration). The awareness of this double mission stands in opposition

to unconsidered simplifications or formalisms. The diversity of sciences (fields, branches, disciplines, specialities), the diversity of needs and interests of different people and social groups and the multitude of natural languages of the scientific statements (which is extremely important if the knowledge is supposed to be a property of the largest number of people) enhances the freedom of creation in accordance with ethical norms and freedom of access to knowledge, in order to use it reasonably. Therefore the system of evaluation of the scientists and scientific institutions should be consistent (which is obvious) but should not lose its diversity and ethical aspects.

It is commonly known that the prestige of a scientific institution is determined mainly by the achievements of individual employees and scientific teams. Relations with the environment are also of increasing importance. Among the entities of the environment, there are mainly named other scientific institutions and industry. This aspect of cooperation with the environment is reflected by the criteria of evaluation of a scientific institution (scores for participation in international research projects, patents, implementations etc.) [27]. However, it is doubtful, whether scores for publications in scientific journals can be recognized directly as a proof of the most committed fulfilment of the second part of the mission – an actual contribution to the development of the knowledge society and not just widening of the knowledge of a narrow elite of specialists. In practice, the decision centres tend to base their decisions on publications included in Journal Citation Reports, and sometimes enlarge this set by local lists of journals [28–33].

In the system of evaluation of both Polish scientists and Polish scientific institutions, in the section 'reviewed publications', such items as supplements, special issues, conference materials, scientific articles for the general public are not considered to be publications [27] and thus these achievements are not scored. If we now refer to a concept that was formed 3 years ago in Poland and aimed at resignation from bachelor's and master's thesis, then all those decisions stand in contradiction to the vision knowledge society. After a stormy discussion and public consultations [34–36], the final decision was left by the legislator to the discretion of university senates. Unfortunately, replacement of the thesis defence with an examination at the bachelor's degree level is becoming more and more popular at Polish universities. The main reason is here believed to be the attempt at lowering educational costs. The most alarming result of such procedures is however the decreasing level of education. Writing a thesis requires first of all in-depth examination of the literature on a given subject matter (it is therefore necessary to understand the

content of publications edited in so called conference languages), mastering of the basics methodology of scientific research, conduction of studies and interpretation of their results. Such experiences cannot be replaced with any lectures or examinations (even the ones conducted by the most demanding commissions). What is more, probably the most far-reaching effect of the reliable completed MA seminars is the aroused need for constant studying of specialised literature and for improvement of one's own qualifications. The number of readers of specialised journals from a given discipline can be well regarded as one of the most reliable indicators of qualification of a given group to knowledge society (the number of authors of a published article is a less reliable indicator). Increasing the number of scientific journals makes sense if the readers are well prepared for the reception of the information published therein and are able to implement it efficiently, especially in their field of professional activity.

System of institutional evaluation (Research Assessment Exercise) used in Great Britain focuses on the quality of research outputs (which usually means articles published in scientific journals and conference proceedings), research environment, and indicators of esteem based on a subject specialist peer review panel. The evaluation applies qualitative and quantitative indicators. Quantitative indicators are of particular importance as they allow for documentation of the knowledge level (which is measurable). However, their purpose is to support and document the qualitative assessments. In result RAE provides quality profiles (modelled on economic ratings, i.e. Standard&Poor's, Moody's) for research across all disciplines, with ratings range from unclassified to 4 [23].

The above presented, brief (out of necessity) discussion of the results of the presented studies, together with the major dilemmas of individual and institutional evaluation of the scientific achievements and with references to the British experiences, shows the complexity of these phenomena that are involved in interactions with many other factors. It is then necessary to increase the number of multifaceted, balanced scientometrics analyses. However, in practice, most of the individual and institutional evaluations of scientific achievements are based on publications and citations [30–33,37–41]. Often this means publishing articles in the hermetic language of a given scientific speciality, however with a great chance of multiple citations in prestigious journals. Such a method of popularisation of one's own scientific achievements helps in the creation of the scientific career (need for coherence between subjects discussed in a journal in which the author publishes own article with his/her formal scientific speciality) but in case of

institutions, the evaluation criteria are not that strict. Neither the current nor the recommended currently in Poland system of parametric evaluation of the statutory activity of the scientific institutions imposes such requirements. Therefore those leaders are useful who scientific speciality is extremely distant from the main statutory activity of the institution but who publish a lot of articles in the journals with Impact Factor or in the journals from the ministerial list, i.e. with the highest rank (6 and 4 points).

However, there arises a dilemma whether such an institution fulfils its statutory mission correctly, especially that the currently applying parametric evaluation indicates to the requirement of maximum 2 N most important publications and monographs (with 'N' meaning the number of people employed in the scientific institution with a statutory obligation to conduct research or developmental works). Thus, the lower number of researchers employed at the scientific institution, the greater role of leaders, irrespective of their scientific speciality. The amendment provides for an increase of the index from 2 N to 3 N. Critics of the current system of parametric evaluation of the scientific institutions suggested (for the higher schools) two best-evaluated publications of each of the employed academics [42]. However, in direct discussions among specialists from different Polish higher schools, there appeared some calls for an index of 5 N or even higher, made by the most radical representatives.

CONCLUSIONS

Possibility of deepen analysis of the preferences of the employees of the Polish APEs and other Polish higher schools concerning publication of the articles in Polish journals on sports science and sports medicine from the ministerial list is limited by the lack of access to basic information on authors (scientific speciality, research field, accomplished and implemented grants, publications etc.). Thus, this relatively high publishing activity of the employees of universities (11.6% of articles), medical universities (10.1% of articles), non-public higher schools (6.1% of articles), technical universities (4.3% of articles) and pedagogical universities (3.5% of the articles) in journals devoted to the aforementioned subjects should be explained by interesting field of research, not only for APEs' employees. This interest demonstrated by authors is the proof that the subject of articles published in sports science and sports medicine journals is being taken at many Polish APEs. However, there are no empirical arguments which would allow for a clear conclusion that – irrespective of the affiliated school of higher education – the articles are the product of specialists in sports science and sports medicine.

A very useful solution in this kind of analyses is the scientists' evaluation system **Index Copernicus** (apart from the other capabilities of this system), as it is based on multiparametric criteria and allows for an unequivocal confirmation of competence. Due to the fact that it is completely voluntary and that there are not many authors evaluated by Index Copernicus, this tool could not be effectively applied in this analysis.

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