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Science Policy in Poland. Influence of Human Resource Policy on the Presence of Polish Science in the World

Abstract

The aim of the article is to indicate the influence of human resource policy on the presence of Polish science in global science. Research findings include an analysis of changes over time in the number of research personnel and papers indexed in the Web of Science database. The research method used in the study is statistical analysis with the use of correlation analysis and regression analysis. Application of these tools allowed for establishing basic relationships between the analysed variables. Obtained results point to the fact that the human resource policy in Polish science, aimed at increasing the number of papers published at international level or in international circulation, turns out to be effective. This growth was especially visible in the years 1999–2011.

Keywords: science policy, human resource policy, publishing, parameterization, evaluation of research, Web of Science, Polish science

Introduction

The first and fundamental duty of a scientist should be conducting research, its subsequent publication and subjecting obtained results to discussion. At the same time, however, the role of didactics and the idea of sharing the acquired knowledge are equally important. The debate concerning the role of a scientist in the system of higher education takes place between those who support transfer-

ring the main focus of job appraisal to the effects of scientific work and those who put didactics first (Thieme). In a wider context, it is possible to notice the ongoing debate on the role of universities and science in the contemporary world (Kwiek 2012: 641–654; Szadkowski). This discussion is based mainly on two points: the first regards the model of the financing of research and higher education, whereas the second concerns the establishment and functioning of the principles of human resource policy. Seemingly, these are two completely different issues; in reality, however, human resource policy, including, e.g., rules for promotion or continuing employment, is strictly dependent on the model of financing (Newman, Couturier & Scurry; Antonowicz: 158–172).

The problem discussed in the article concerns the influence of human resource policy on the presence of Polish science in international academic research. Human resource policy directly translates into the number of the employed research workers and the manner of evaluation of their work (mainly cyclical evaluation). However, the presence of Polish science in the international discourse can be analysed through the number of papers in the most important wide-reaching journals and the number of citations in these periodicals (Eyre-Walker & Stoletzki; Uzzi, Mukherjee, Stringer & Jones: 468–472). In the analysed period (the years 1999–2011) there was a considerable change caused by a shift from a totalitarian model of human resource policy, through a bureaucratic model, to the formation of an evaluative model of the principles of human resources policy. The changes in the system of higher education were caused by political, demographic, and also economic transformations (Dobbins; Kościelniak: 114–119; Kwiek 2013: 553–576; Froumin & Smolentseva). At present, the evaluation of a researcher is based on the model of research unit parameterization, created for the purposes of diversification of funding levels for particular units and not for the evaluation of individual scientists. Thus, what are researchers to do? They are facing the need to publish in the most important periodicals in their disciplines, usually in English, usually abroad. Paraphrasing Descartes – you publish, therefore you are. However, it often translates into something much more threatening – publish or die.

Research Methodology

The research findings include an analysis of changes over time in the number of research personnel and papers indexed in the Web of Science database. It allows for determining to what degree the change in human resource policy in the Polish system of higher education in the years 1999–2011 is reflected in the number of

articles published in periodicals indexed in the database of the Thomson Reuters Corporation. The Web of Science is a database of periodicals that the Ministry of Science and Higher Education in Poland ranks the highest (for papers in periodicals indexed there it is possible to receive from 15 to 50 points, while for publications in other periodicals, including the ones indexed in The European Reference Index for the Humanities, it is possible to receive a maximum of 10 points). The Ministry's decisions regarding the method of science parameterization has given rise to many controversies, particularly among the representatives of humanities, social sciences and arts (Szkudlarek & Stankiewicz: 37–49; Wilkin: 51–70). However, showing the above-mentioned relation between the number of researchers and the number of highly-scored publications will allow for determining the level of the presence of Polish science in global science.

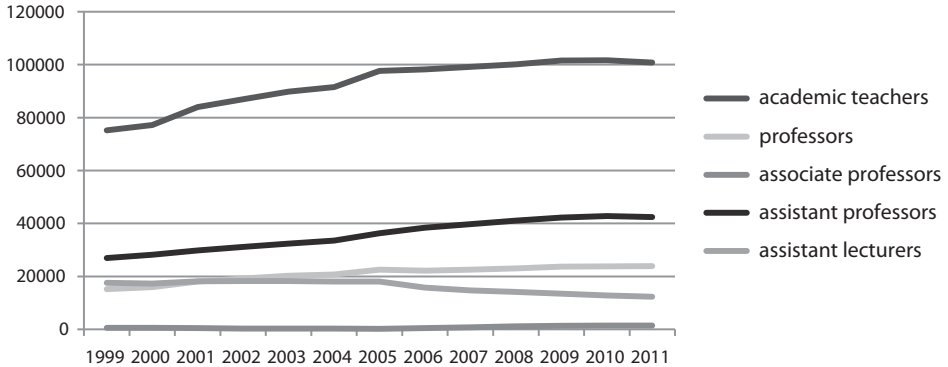
The analysis used data gathered in data search of the Web of Science database (consisting in searching for all papers in the Web of Science database in which at least one of the authors was affiliated with a Polish university or research unit) and data on research workers in Poland made available by the Central Statistical Office of Poland and the publication "Higher Education Institutions and their Finances in 2012". The gathered data was subjected to statistical analysis with correlation and regression analyses, which allowed for establishing basic relationships between the analysed variables, i.e., the number of papers of Polish authors published in the periodicals indexed in the Web of Science and the number of research workers and academic promotions. The analysed data and their relationships covered the period of 1999–2011. Also, an analysis of change dynamics was performed.

Research Results

According to the data of the Central Statistical Office of Poland (GUS), the number of university teachers in Poland rose from 75,000 to 100,000 in the period from 1999 to 2011. Considering this data, one should take into account that this number is not tantamount to the number of "scholars", since people employed in more than one unit are shown as more than one employee/university teacher. The highest increase concerned the position of *docent* (associate professor). (This position, frequent in the period of the Polish People's Republic, returned in 2005 regulated in the act "Law on Higher Education"). The number of associate professors in 2011 constituted 242% of their number in 1999, and in the case of the position of *adiunkt* (assistant professor) and professor – it was 157.5% (however, in absolute numbers the number of employees in the position of assistant profes-

sors was almost double the number of professors – to be more precise, in 2011 their number constituted 177% of the number of the employees in the position of professors).

Figure 1. Change in the number of academic teachers in the years 1999–2011 in Poland in total and according to positions

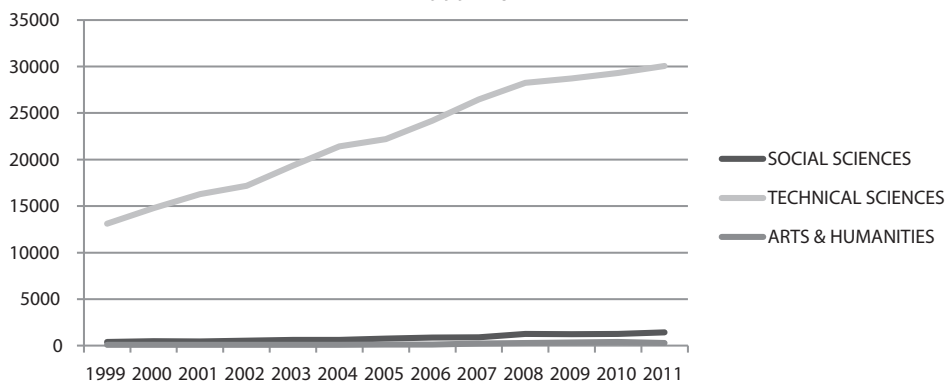


Summing up the above data, one should notice that based on the information provided by the Central Statistical Office of Poland (2012: 162) it is possible to find the following number of employees in the Polish higher education institutions according to academic titles and degrees – 11,500 professors with an academic title, 16,500 habilitated doctors, and 40,000 doctors. It is possible to state with all certainty that these numbers add up to 100,000 employed, which results from holding multiple positions and the fact that GUS did not take into account employees with a doctor’s degree in the positions of assistant lecturers, lecturers and senior lecturers.

The analysis of the number of papers of the Polish scientists in periodicals indexed in the Web of Science allows for indicating a considerable increase in the number of papers of the authors affiliated with Polish universities – while in 1999 it was 13,500, in 2011 it was almost 2.5 times more – almost 32,000. However, even though a rise in the number of papers took place in every field over the years, the share of technical sciences remained very high – in 1999 it was 96.4%, whereas in 2011 – 94.5%, which means that the reduction was slight.

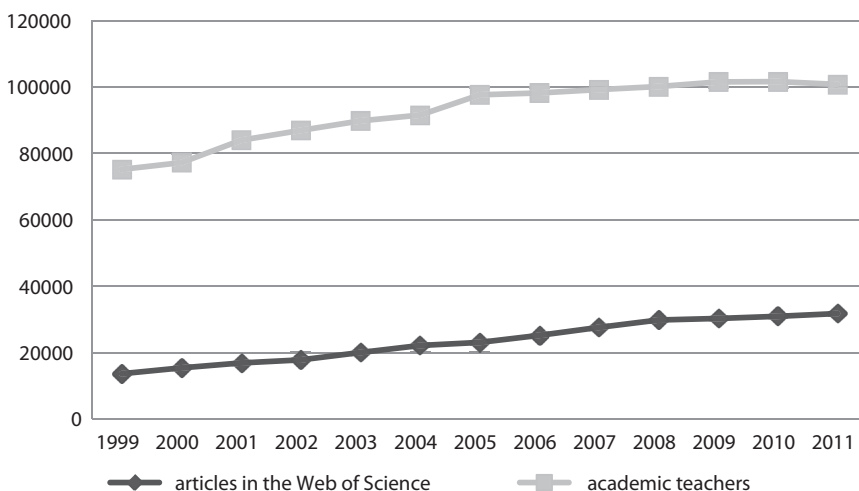
Data shows that the number of articles in 2011 in the case of social sciences constituted 360% of their number in 1999, in the case of technical sciences – 229%, and in the case of arts and humanities – 326%.

Figure 2. Change in the number of papers according to main fields in the years 1999–2011



Juxtaposing both analysed values, i.e., the number of academic teachers (employees of higher education institutions) and the number of papers with Polish affiliation indexed in the Web of Science database, shows convergent dynamics. It means a significant increase over time, which is possible to see as a positive direction, the more so since the number of papers rose more than the number of employees of higher education institutions – increase of 57% in the number of papers compared to an increase of 25% in the number of academic teachers.

Figure 3. Change in the number of academic teachers and papers indexed in the Web of Science in the years 1999–2011



It is possible to notice a positive change also in the statistics comparing the relationships of both variables in consecutive years. In 1999 there was one article from Poland indexed in the database to 5.5 employees – in 2011 this indicator lowered to 3.2. Thus, the statistical publishing efficiency increased – even though it still constituted one-third of an article annually or, to put it differently, one paper for three years. However, one should emphasise that the positive trend of improvement in that synthetic measure of efficiency continued in the entire analysed period.

Table 1. Rates of publishing efficiency in the years 1999-2011

Publishing efficiency	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Number of teachers per one article	5.53	5.03	4.99	4.89	4.48	4.13	4.24	3.90	3.59	3.36	3.35	3.28	3.17
Number of articles per one teacher	0.18	0.20	0.20	0.20	0.22	0.24	0.24	0.26	0.28	0.30	0.30	0.30	0.32

The relationships between both values were analysed also with the use of regression analysis. The relationship between both variables turned out to be strong ($R^2=0.9047$), and the regression line has a positive direction ($a=0.6497$). On the basis of the above, it is possible to show that on average every new university teacher produces fewer than one (0.65) paper in the database, i.e., it is necessary to increase employment by 3 persons to increase the number of articles by 2. One should also emphasize that this data is better suited to be presented as an exponential function ($R^2=0.9507$) than a linear one – confirming the earlier indicated growing publishing efficiency – resulting either from the growing pressure of indicators and requirements of parameterization of research units and evaluation of individual achievements or from higher compatibility of the submitted papers to the requirements of periodicals indexed in the database.

However, the most striking result in the analysis is obtained through disaggregation of the summary number of academic teachers to subgroups according to positions. It turns out that efficiency – measured with the rate of regression – is much higher in the subgroup of professors ($a=2.0435$), than in the subgroup of assistant professors ($a=1.1016$).

Juxtaposing the number of papers with academic promotions in a given year, i.e. the number of professorial appointments and granted post-doctoral degrees, makes it possible to reach an important conclusion for the conducted research. It reveals that in this relationship there is no recognizable trend; the distribution of both variables is random and does not allow for making an analysis of correlation or regression ($R^2=0.0472$ for awarded professorial titles and $R^2=0.1718$ for post-doctoral degrees). Relationships between promotions and world-class papers were not discernible in this period. This could be caused by different and internally heterogeneous length of both processes.

Discussion

The conducted analysis reveals certain unusually interesting regularities. One should emphasize that over the period 1999–2011 there was an increase in the presence of Polish scientists in international academic research, at least in the number of published papers. This growth turns out to be stronger than the increase in the number of researchers, which attests to increasing publishing efficiency. Analysis conducted on chosen subgroups of researchers (assistant professors and professors) shows that a higher rate of regression is achieved by the relationship of the number of papers with the number of professors. On the one hand, based on the normative standards this result should not be surprising – promotions in science are, on principle, related to scientific achievements. On the other hand, however, universal and colloquial evaluations show that young employees show more initiative and more effectiveness in seeking to publish – assistant professors are the most determined in the scored scientific activity, aspiring to academic promotion. The increase in the number of papers of Polish scientists, but most of all the growing publishing efficiency, constitute the premise for a positive assessment of the human resource policy in the Polish system of higher education.

However, it is also important that this data reveals no recognizable connection between the number of papers indexed in the Web of Science and the number of academic promotions in a given year. It is possible to think that the recalled lack of statistically important relationships will probably change into a measurable relationship with the popularization of the modified postdoctoral procedures; however, it will become visible in the statistics only after a considerable period of time, since this data is unavoidably historical. Taking into account the shift associated with different lengths of publishing and promotional cycles allows for the interpretation that this relationship does not concern the number of

professors, but the number of promotions and requirements of human resource policy, i.e., more papers are produced in reaction to expectations of the university, which coincides with the career path (i.e., it is not the professors who write more effectively, but assistant professors aspiring to professorship, under the pressure of the requirements of university, while the length of a publishing cycle makes us notice this relationship with a delay – when a given author – assistant professor already moved to the subgroup of employees in the professorial position). It would mean that the implemented human resource policy is producing the desired result. However, confirmation of this fact based on statistical data requires time.

Also the significance of papers from technical and natural sciences is indisputable, as it is the activity of their representatives that is decisive in regards to the number of papers of Polish scientists in the Web of Science. However, the meaning of remaining disciplines increases. Nevertheless, there is one scientific post in Poland to 1/3 of a scientific paper recorded annually in databases of the Web of Science.

Some open questions remain, such as whether the identified trend will continue, and at the methodological level, whether the presence in periodicals indexed in the Web of Science is indeed the best measure. Not only is the question of publication worth considering, but also citations (which would determine the level of reception of these papers) and other databases, e.g., Google Scholar (Śleszczyński: 599–627), as alternative sources of information.

Conclusions

Human resource policy in Polish science, or more generally a certain philosophy leading to increasing incentives (or the need) for publishing at the international level, or in international circulation, turns out to be effective. Above all, in the period 1999–2011 there was an increase in the presence of Polish scientists in international academic research, at least if it is to be measured with the number of papers. In addition, it is important to indicate that the increase in the number of papers was greater than the increase in the number of researchers, thus attesting to the increasing publishing efficiency (from 5.53 researchers per one article in the Web of Science in 1999 to 3.17 in 2011). However, the analysis conducted on only chosen subgroups of researchers (assistant professors and professors) shows that a higher rate of regression is found in the relationship of the number of papers with the number of professors. The increase in the number of papers of Polish scientists, but most of all the growing publishing efficiency, alone constitute

the premise for a positive assessment of the human resource policy in the Polish system of higher education. However, it is also significant that simultaneously data reveals no recognizable relationship between the number of papers indexed in the Web of Science and the number of academic promotions in a given year (Wang: 329–339). The current requirements for promotion, constituting an important part of the human resource policy in Polish science are strongly connected with papers with international reach; thus, it is possible to assume that after presenting data from the period after 2011, and particularly after 2013, that relationship will become apparent. It will be possible to recognize a statistically relevant relationship between the number of papers indexed in the Web of Science and the number of academic promotions in Poland as quantitative confirmation of the implemented human resource policy.

However, only their reception, based on analysis of citations, will allow for assessing whether they are indeed papers of a world-class quality. The question whether the Web of Science should remain the basic database for gathering such data remains open. Perhaps the use of other databases, better suited to the Polish conditions, is worth considering, especially with reference to social sciences and humanities.

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