

RESEARCHERS AT THE INSTITUTE OF MATHEMATICS AND INFORMATICS, BULGARIAN ACADEMY OF SCIENCES (IMI-BAS) – ATTESTATION ANALYSIS – RESULTS AND RECOMMENDATIONS

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Abstract. In 2010 attestation of the academic staff of the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences, was carried out. The attestation procedures and the results of their applying in practice are both described in the present paper. The level-drop in IMI-BAS is alarming. The main reason for it is the brain-drain, we suppose.

Keywords: research policy, researchers, attestation

Introduction

In September 2010, in the Institute of Mathematics and Informatics, Bulgarian Academy of Sciences (IMI-BAS), there was an attestation for the research personnel. The data collected from the attestation gives base for analysis of important aspects of scientific activities. Attestation in IMI was part of a procedure for all structures in BAS. Indicators for assessment in attestation forms and the points were and still are subject to discussion and criticism, often justified.

This paper makes analysis of attestation and shows results and recommendations. We think that if such attestations are held regularly, they could track important changes in type of activities of scientists in Bulgaria over time. For instance they could check whether average expert activity increases altogether with experience over the years; or they could check commitment of the researchers to scientific, organizational and educational activities. The conclusions should be considered when making management decisions in educational institutions.

Assessment and attestation are indispensable element of the life of research units and institutions because they are crucial for both - management decisions and personal self-control. On the other hand development of appropriate criteria and rating scales is not trivial and must be based on experience. In this respect the attestation in IMI in 2010 is the first step in the right direction.

Many scientists and university specialists in Bulgaria state that Bulgarian science must be subject to serious reform. Nevertheless how such a reform will be made, it should be preceded by a careful assessment of the scientific expression of the scientists and units. Moreover, attestation procedures should be conducted periodically.

Neglecting and gradual degradation of the evaluation is one of the sad failures of the Bulgarian society in recent decades. The recent recovery of the exams, although in considerably truncated form, is an important step in the right direction. This helps monitoring the quality of education and gives teachers important feedback. Assessment is an obstacle for mediocre people before their career development. Wide groups among researchers avoid it intuitively and seek various pretexts such assessment not to be done. In such a context, the very conduct of large-scale attestation of researchers in BAS in 2008 – 2010 is a positive mark. Unfortunately, the example of BAS was not

followed by higher education institutions which remained in the mainstream of "denial of quality control" in Education and Science.

All described above pictures difficult future-path of scientific community till adequate assessments of professional performance of researchers are established. We think that contemporary and adequate assessment will stimulate creativity and help the correct management policy to be followed by governing body in BAS. Another positive result in long-term perspective would be decrease of the frightening brain-speed in Bulgaria in recent decades.¹⁾

The analysis of attestation results in IMI shows an extremely important issue for BAS system – "aging" of the researchers. The average age of research staff is constantly growing, while incoming young scientists are rare.

Attestation forms and results

Attestation forms were filled by all the staff with scientific functions in IMI-BAS, including researchers. 133 people filled the form. The forms are systematizing personal results between 2005 and 2010 г.¹⁾ in five types of activities: (i) research activity; (ii) applied research activity; (iii) learning and educational activity; (iv) scientific and organizational activity; (v) expertise.

Fig. 1 shows dissemination by age of the researchers. Fig. 2 shows dissemination of attestation points by age - the sum of points of all researchers born in a year. It is important to note, that the number of researchers born in any given "unit" interval of years differs. Therefore in Fig. 3 we give the average sum of points got by one researcher born in the respective year. Of special interest to us are assessments of the activities of the first section of the questionnaire (*I. Research*). The next two figures (Figs. 4 and 5) are analogous respectively to the Fig. 2 and Fig. 3, but based on points of for the first section only.

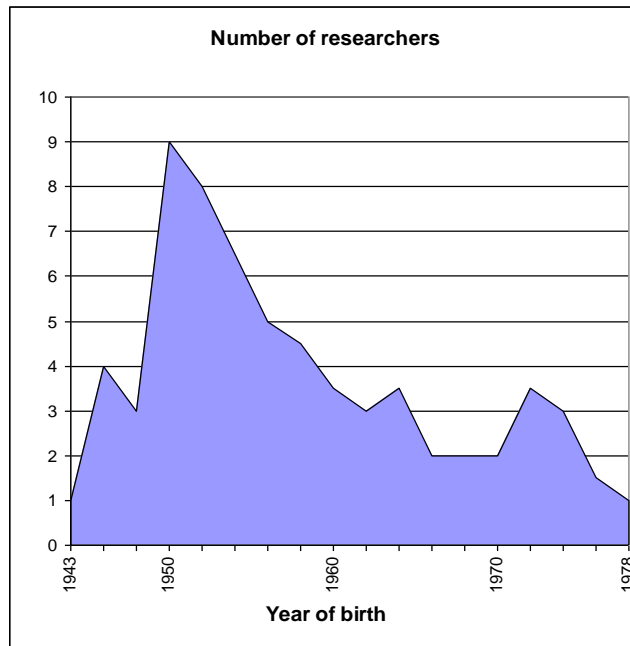


Fig. 1. Approximate age distribution (only for IMI researchers, who filled out the attestation form). Abscissa axis (X-axis) lists year of births, starting from 1943. Ordinate axis (Y-axis) shows number of researchers

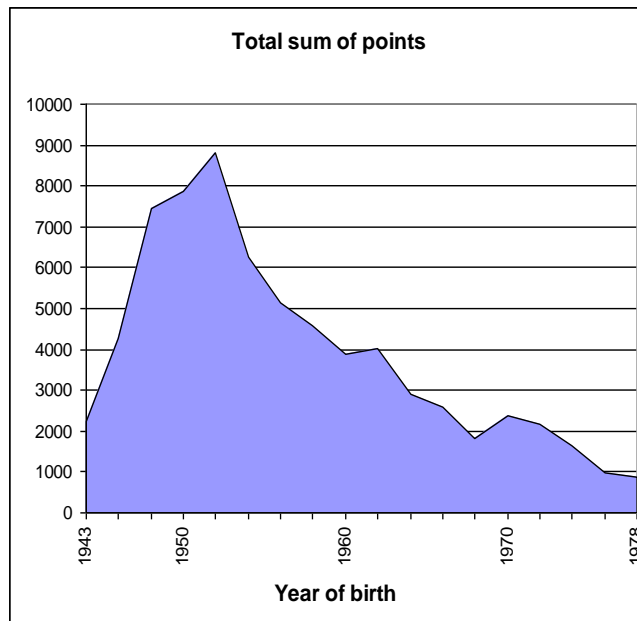


Fig. 2. Dissemination of points according to the age of the researchers

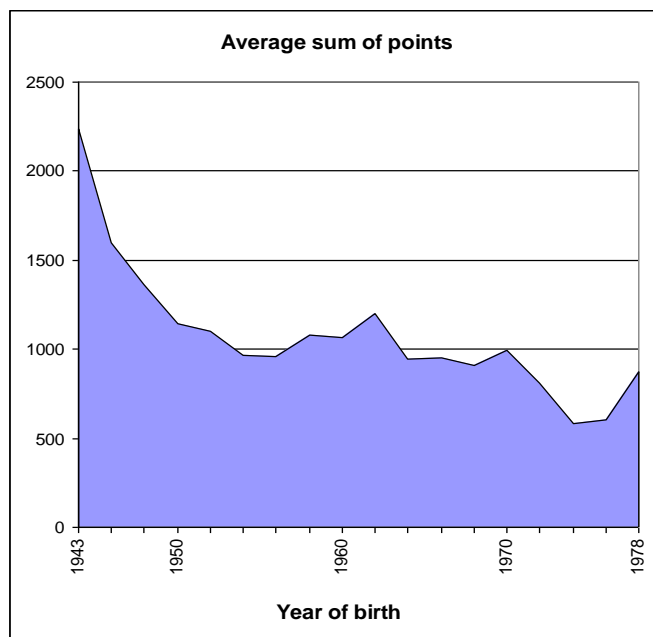


Fig. 1. Average sum of points got by one researcher born in the respective year

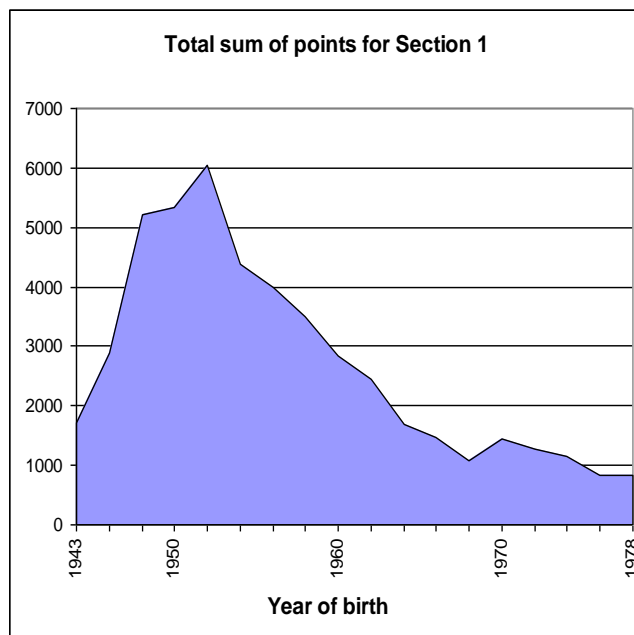


Fig. 2. Dissemination of points for *Section 1* "Research Activity" according to the age of the researchers

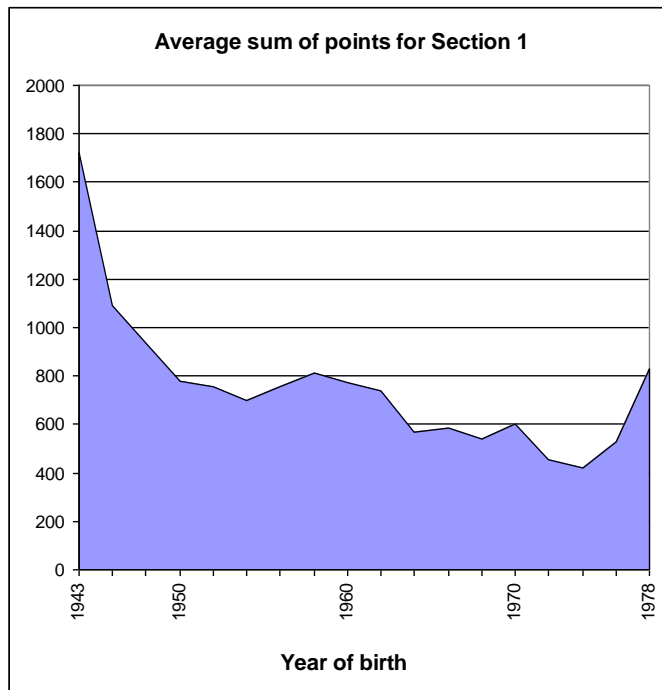


Fig. 3. Average sum of points for *Section 1* "Research Activity" got by one researcher born in the respective year

Analysis of attestation results

In order to analyze results presented above we should clarify the purpose and details of the attestation. In fact, the attestation gives a numerical evaluation of the activities of scientists, scientific bodies and organizations during a specific period of time. Analysis in this paper is centered at particular aspects of research.

We should add here an important note. The evaluation of performance of a researcher could not be thought of as an assessment of scientific contribution in the strict sense of the word, because the impact and influence of publications and other activities of the scientists on the development of science can be adequately assessed only after a long time - sometimes decades, and more. The evaluation should not be an assessment of the qualifications of the scientist *in general* (i.e., as a whole), it should not be influenced directly by his

talent, nor by his professional authority won in the past. The whole meaning of attestation is estimation of concrete results over evaluation period.

For convenience we will use the term "*scientific manifestations*": those activities on which the evaluation is calculated according to the attestation rules. Let us mention some of those rules under *Section I: Research*. Here "*Scientific manifestations*" and their result, which provide parameters for estimating, are: 1.1. Publications; 1.2. Citations without auto-citations; 1.3. Scientific forums (conferences/congresses); 1.4. Research projects; 1.5. Borrowed funds; 1.6. PhD and DSc theses.

Publications in *Section 1.1* are divided into 11 types (monographs at home and abroad, papers, etc.); for each paper of particular type the researchers get certain number of points, starting from 100 points for a monograph abroad to 4 points for a paper published in proceedings from a national conference. Similar is the assessment of activities in 1.2 - 1.6.

Now let us analyze the results of the figures shown.

Fig. 1 shows that the group of scientists between 56-62 years (born in the interval 1948-1954) is big (51 people); we would reasonably state that this group constitutes the research core of IMI. Altogether with the older colleagues (born before 1948: 17 people), these two groups (aged over 55 in 2010) are 67, i.e. they represent more than half of the human research potential of our institute. In other words, according to the current pace of IMI in 2014 half of its researchers will be over 60 years.

According to our vision for a research institute as IMI the average age of researchers should be around 48-50, from which 25-40 aged researchers should be not less than the number of researchers over 55. From this perspective, currently the age distribution of researchers in IMI is unfavorable. And which is more important – this fact marks a deteriorate tendency for the future.

The negative predictions for the future are enhanced by Figs. 2 and 3, which show that scientists over 55 years old make the major contribution (82 526 points) of all scientific events in IMI (143 655 points). If we imaginatively move the left end of the curve in Fig. 2 to the right till birth-year “1955” we will see that a large amount of scientific manifestations will be left out of IMI results. Figs. 4 and 5 (age distribution according to *Section “Research Activity”*) show both the creative capacity of scientists (1) and the scientific level of research (2).

We can assume that the accumulated experience of older scientists helps those becoming better experts; as such they should have an advantage over their younger colleagues. At the same time, with such an example in the team they work, younger researchers are expected to show greater scientific activity. The scientific production (publications, reports, participation in projects and conferences) of younger researchers should be bigger.

Unfortunately Fig. 5 shows that contrary to the expectations, the scientific production decreases with age decreasing. This might be due to both, insufficient competition from colleagues about the same age and lack of stimulus - both material and moral. The main reason though is that the average level of their abilities (natural talents) is relatively low. If we imaginatively move the left end of the curve in Fig. 5 to the right we will see decrease of scientific research activities in IMI. Altogether with already mentioned age negatives, a future level-drop in the Institute seems inevitable.

From all considerations above we might assume that till 2019 (i.e., until the retirement of scientists who in 2010 will be were over 55 years) IMI will change significantly its level and quality performance.

Conclusions and recommendations

The expected level-drop in IMI-BAS is alarming. The main reason for it, we believe, is the brain drain. In Bulgaria this process is running two dec-

ades already, but in the last five years the process among high qualified experts and researchers is fasting. Some of the most technologically developed countries (USA, UK, Germany and France) attract talented young people for university education and career afterwards. They have learned and currently apply the wisdom of generations investing in best possible “market” – human brain.

The data of National Statistical Institute¹⁾ from the census in Bulgaria held in 2011²⁾ confirm the brain drain process. It shows that for the period 1980 - 2011 г. 233 463 Bulgarians are back home after being from abroad for couple of years, but only 1.6% of them have PhD degree. 34.4% have university degree. All the rest have finished high school or does not have any school diploma. Most of Bulgarians who came back home were mostly in Russian federation (16.1%), Spain (9.3%), Germany (9.2%) and Greece (9.1%). In the latest news (January 2013) was announced that the population in Bulgaria is already less than 7 million people.

How to decrease brain drain, especially in IMI-BAS? We could give some recommendations in this respect, but they are based on the mass attestation in IMI only. Interesting results could appear if such an analysis will be made for the whole system in BAS.

We believe that important factor that could decrease brain drain in IMI would be creating appropriate conditions and environment for professional development of talented researchers. Such a conclusion have been affirmed by another survey, which has been done in 2009 and according to which guaranteeing professional realisation is the main factor for staying at the national labour market. (4) In the Bulgarian context, characterized by limited potential for funding, this automatically means improving methods of evaluation of scientific manifestations in order to develop a better system for identifying more talented scientists. Otherwise, the efficiency coefficient of efforts and

funding to maintain the level of Bulgarian science will be low and will not result in desired effect.

Noticeable change in "brain drain" process is hardly possible, even if hard work starts immediately (for comparison of the problems related with "brain drain" in Bulgaria and other countries in the world see: Jeff³⁾, Lilova, 2009; Skeldon, 2008; Stark, 2004; Straubhaar, 2008; Toshev, 2006; Vacheva, 2009). Therefore it seems appropriate applying the following effective actions, which could compensate the negative trends: (1) Fostering collaboration among generations in research community (especially between 30s old and 50s old generations); (2) Science communication activities (in the web, in social networks, in PR forums, in "Beautiful Science" activities and "Famelab contest" etc.); (3) Creating attractive conditions for career development of talented researchers (esp. for those below 30 years, but not only); (4) Retention of the most prominent scientists after they complete 65 years.

Here we need to point out three important notes. The first one is that if only one of four points is applied – expected results will not be achieved. The second note concerns the fourth point. It is conditional point and the condition is - *differentiated individual approach* for researchers above 65 years old. This means that in ideal variant senior IMI researchers which will be let working actively will be those, who are able to produce significant results. There should be strictly followed criteria: *not* academic titles and glory from the past, but scientific research and results *today*, doctoral training *today*, collaborative work and publications with young scientists *now*. Part of such differentiated approach could be an individual short-term attestation for a period of a year/year and a half. For example if such an attestation shows that someone aged over 65 works well enough, he could be given one more year to work. The third note is linked with the third point in the list - making possible the future perspective for attracting PhD specialists. What is the context re-attestation for young specialists in IMI? If BAS statute book is followed, once

in three/five years there should be an attestation (for research assistants). In IMI there is a special commission which is doing this and consequently the Scientific Council is voting. As far as we know in some of the institutes in BAS such attestation has not been done quite a lot of time. One thing is true – the first mass attestation was in 2010 and the results vary a lot, even in the frame of one institute. And the institutes in BAS are more than 50. The other thing which appeared clearly after the first mass attestation in IMI is lack of PhD students. And the reasons are two types – first is financial and the second is that even if the PhD thesis is finished successfully there is no any motivation, nor conditions for career development. Let us mention the salary of a PhD professional in IMI – less than 140 Euro monthly.

Afterword

In our opinion, IMI has the environment for implementation of such a differentiated approach. Positive role in this respect could have frequent attestations for all researchers in IMI. They could be held in a period of two years - for example at the end of each even year (2012, 2014, etc.). This could result at more intensive, more efficient research and higher quality research level. As an added value adequate management policy will be made easier.

NOTES

1. <http://www.merriam-webster.com/dictionary/brain%20drain>
2. <http://www.nsi.bg/EPDOCS/Census2011final.pdf>
3. <http://www.time.com/time/magazine/article/0,9171,574849,00.html>

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