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BULGARIA AND THE EUROINTEGRATION IN THE SCIENTIFIC RESEARCH SECTOR

This article addresses problems in the field of scientific research, faced by Bulgaria in its process of accession to the European Union. On a comparative analysis basis, it evaluates the state of existing financial and human resources support to science in the country. It points out a series of weaknesses in the research process, incurred in the past decade. It also suggests ways of overcoming them, focusing the attention on achieving standards that would provide science in Bulgaria with adequate means of development and integration in the European research area.

JEL: H5; 032

The European Research Area and the National Strategy and Policy for Science

The accession process of Bulgaria to the European Union (EU) encompasses all spheres of socio-economic activities in the country. An integral part of this process is harmonizing legislation and achieving certain criteria and benchmarks in the field of research. In accordance with recommendations made in the pre-accession documentation in the field of research, achieving certain standards is necessary so as to provide science and scientific research in Bulgaria with means of development, similar to those in EU countries.

In the negotiating process with the EU and especially after closing the Chapter on science in the pre-accession documentation, the public was left with the false and the governing bodies with the comforting feeling that in the research area the country had achieved considerable progress. The speed with which the negotiations were held led some to think that if not all, at least the major part of the assumed obligations had been fulfilled. Hence came the illusion that science in Bulgaria was developing in a normal way, without considerable difficulties or cataclysms. This led to the belief that even if certain problems existed, they could be easily solved and were not of such nature that could irrevocably hinder the inclusion of science in the European Research Area (ERA).[1]

In accordance with the implementation of assumed accession obligations in the field of science, one of the requirements is to formulate a respective *national strategy and policy in this sphere.* This also represents one of the crucial and primary steps towards achieving set criteria and benchmarks. A well-formulated strategy and efficiently carried out policy both require implementing tools that ensure protective mechanisms

[1] Towards a European Research Area. European Commission, 2000.

for science in case of unfavorable circumstances in the environment of deep economic crisis. At the same time, there is the need to create such prerequisites that would enable science and scientific research to develop unhindered and become easily integrated in the European Research Area (ERA).

Formulating adequate and effective in the environment of economic crisis strategy and policy for science is one of the leading requirements of the EU towards pre-accession countries.[2] They should be consistent with the concrete economic situation both in the respective country and abroad. It is necessary that the well-balanced strategy and policy provide maximum opportunities for the development of science in the light of its integration in the European Research Area. This implies the adoption of a systematic approach towards the formulation and implementation of strategies and policies, as well as *evaluating science in an objective and respectful way, accounting for its importance for each country's economy.* Any subjective approach towards science shall only have negative results.

In Bulgaria, due to the lack of a national strategy and policy, as well as a national program in the field of science, governing bodies still hold on to the conception that in periods of economic crisis and transition from one type of economy to another, it is natural that certain spheres of economy, primarily the budgetary one, should be "temporary" disregarded since they only consume financial resources. Thus, it is believed that sectors and activities on budgetary support should bear the huge financial costs of transition. Such concepts were particularly convenient and were automatically accepted by all Bulgarian governments after 1990. They enforced a restrictive financial policy towards fields in the budgetary sector, and especially towards those with intellectual and spiritual orientation such as education, science and culture. Today, these spheres are still perceived as mere consumers and a 'budgetary restrictions' policy is applied to them in the belief that all cut-downs of their subsidies would have a relieving effect on the state budget.

This is perhaps one of the reasons why for the past 10-12 years science in Bulgaria has had little attraction for governing bodies. Focused on solving other "key" problems of the day, they have easily neglected opportunities and solutions that science could have offered for overcoming the economic crisis. Instead, science was perceived as an unnecessary and needless extra burden on the state budget; hence it was believed that all cut-downs of its subsidies would be only beneficial. Science was left on the periphery and was turned into *the most heavily neglected sector in the Bulgarian economy.* The *most rigid and restrictive measures* were applied

[2] Bulgaria, Estonia, Cyprus, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Slovenia, Turkey, Hungary, the Czech Republic.

when financing science. Moreover, this process ran in contradiction with world tendencies that had gained ground in the past few years for increasing the interest precisely towards research.

World theory and practice are full of examples of focusing exclusive attention on research and directing considerable financial resources towards this field precisely in periods when a given country has to overcome difficulties in its development, most of all in times of economic crisis. It is the increased financing for science in such periods that is the mechanism whose effective implementation can eliminate some of the reasons for economic crises, tone down their acuteness, as well as overcome their consequences.

Scientific Research in the EU

Countries investing in science are current examples of economic and social prosperity. European countries serve as good examples in this respect - Sweden has the highest relative share of GDP dedicated to science - 3.8% (2000); Finland has for the past 10 years increased this share from 1.9% in 1990 to 3.3% in 2000; Iceland has increased its spending on scientific research from 1.5 to 2.32% in only three years (1996-1999); Germany has a 2.45% of GDP (2000) for science, etc.[3]

However, certain major differences do exist between EU countries in the relative share of GDP they dedicate to science. On the one end are Greece with 0.7%, Portugal - 0.8% and Spain - 0.9%, all with less than 1% GDP share, and at the other - Sweden, Finland and Germany with indicators of Over 2.5% GDP share. Such disproportions show that *in the EU there is still a lack of coherent financial policy* in the sphere of science and scientific research. The differences in relative GDP shares, reaching up to 3.1%, are too big and hence we can hardly speak of implementing a common EU policy and strategy on problems of existing financial support for scientific research. Disparities grow even wider when we analyze the absolute values behind these relative shares. If we take that expenditure for scientific research per capita in the EU in 2000 equals 100 units, then in Greece it amounts to a mere 25, while in Sweden it reaches 209. Although in the past 5 years this gap has decreased from 11 to 8 times, it still remains considerable and is one of the primary setbacks for ensuring favorable circumstances for the harmonious development of scientific research in Europe.

There are major differences between EU countries concerning their human resources in this field (Fig. 1).

[3] Sources of information: Main Science and Technology indicators. OECD, 2/2000; Science and Technology in Europe 1990-2000. Eurostat; Science, Technology and Innovation. Key Figures 2002; Basic Macroeconomic Indicators 2000-2001, NSI.

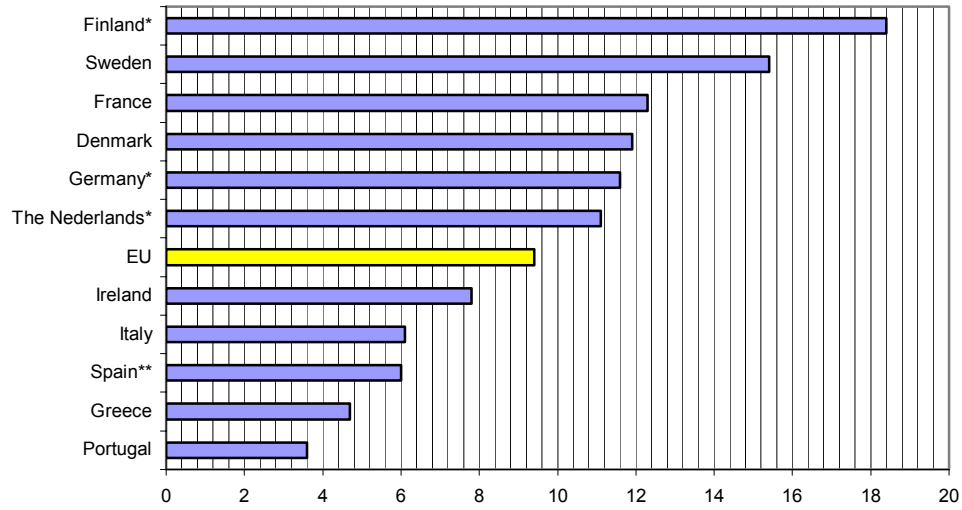

Figure 1. Human resources engaged in scientific research per 1000 people workforce (1997)

* -1998; ** -1999.

The average values for the EU for the past decade show approximately 9 people engaged in scientific work per 1000 people workforce (9.4 - 1997), but the gap between the two poles - Finland (18.4) and Portugal (3.6) still remains considerable.

We get a similar picture with researchers. The majority of EU countries have indicators between 4.6 and 7 researchers per 1000 people workforce. Finland has the highest indicators -in 2000 it is already a world leader with 13 researchers per 1000 people workforce, followed by Sweden with 9, Belgium with 7, and Italy (2.8) and Greece (3.3) at the other end.

The average annual increase rate of this indicator for the EU after 1995 is 3%, while for the US it is 6.2% and for Japan -2.7%. Among the EU countries with the highest average annual increase rate are Greece, Finland, Spain and Ireland (above 10%), and with the lowest - Italy, France and Germany (respectively 1.5, 2.5 and 2.6%).

Scientific Research in Pre-accession Countries

Existing problems and contradictions in the field of research in the EU would be further deepened after the accession of candidate countries since the majority of them face serious difficulties in carrying out research. The levels of resource provision, both human and financial, for research in these countries are extremely low. Although the leading problem for science in this case is its financing, there are also other setbacks that in one way or another are related to it or result from it.

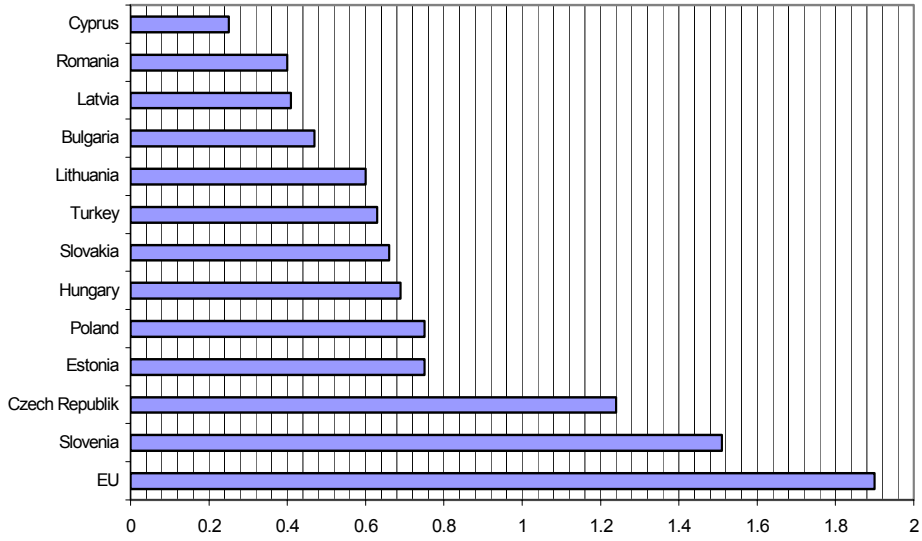

Figure 2. Gross Domestic Expenditure on R&D*

* % of GDP - 1999; Bulgaria - 2001; EU – 2000.

From the pre-accession countries only Slovenia (1.51%) and the Czech Republic (1.25%) spend on science more than 1% of their GDP. The rest like Poland (0.75%), Estonia (0.75%), Slovakia (0.66%), Hungary (0.69%), Bulgaria (0.57%), Latvia (0.41%), Romania (0.4%) and Cyprus (0.25%) have indicators similar to those of EU member states with the lowest relative GDP shares, spent on science (Portugal - 0.76% and Greece - 0.68%). Without major progress, driven towards increasing the resources for research in candidate countries, their accession to the EU would cause unfavorable changes in the European research area due to the inclusion of sectors with low resource back up. This would naturally fail to support raising the average level of financial subsidies for research in Europe, and would be a drawback in terms of shaping a common research area (see Fig. 2).

Employment in the research sector in pre-accession countries is also below the EU average. In the past decade the scientific research workforce in former socialist countries was considerably cut down. In the Czech Republic, in 1991 there were 81 895 people employed (FTE)[4] in this field, while in 1995 their number is already cut down to 22 678; in Hungary the cut down is from 36 384 to 19 585

[4] Full-time Equivalent (FTE) — this is the workforce, calculated on the basis of working hours, spent in doing scientific research.

people. Irrespective of the certain increase in these numbers in the two countries in the past 5 years, for the whole past decade the workforce in this field has been reduced 3.5 times in the Czech Republic and 1.7 times in Hungary. Similar processes run in the rest of the former socialist countries as well. However, while in the past 5 years in the Czech Republic and Hungary there has been a certain increase in the number of people employed in the research sector and this has not only helped in a way overcome the negative tendency toward workforce cut-downs, but also signaled their strive towards meeting EU average levels, in countries like Bulgaria the above mentioned tendency continues to be descending. From 25 055 people workforce (FTE) in 1995, in 2001 it is already down to 14 949 i.e. for the past 6 years it has decreased 1.7 times.

In 11 of the pre-accession countries, excluding Malta and Turkey and irrespective of certain differences, the tendency towards cut-downs in the research workforce has not changed. In 1999 the total number of workforce engaged in the sector amounts to 233 646 (FTE) people, which is around 15% of their total number in the EU 15. This is with 12 688 people less compared to 1998, which represents a cut down of 5% of their total number.

Implementing the objectives concerning science and research, set down during the 2000 EU summit in Lisbon for a *more competitive, dynamic and knowledge-based economy,* and those from Barcelona in 2002 for *increasing the expenditure/or scientific research in the EU till 2010 to 3% of GDP,* would only be possible if respective steps are made towards implementing the idea for a common scientific research area. This exacts pooling together the efforts not only of EU member states, but also those of candidate countries. The common scientific research area cannot be set up and made work on the basis of current widely diverging national research areas. Achieving a high level of cohesion in the European research area calls for the implementation of certain standards, obligatory for both EU member states and candidate countries. Reaching these standards should lead to improved conditions for scientific development and doing relevant research, *with the final aim of overcoming the lagging behind the US and Japan and making the scientific sector in Europe a world leader.*

Which are the Parameters for Lagging behind?

In comparative terms, the relative share of expenditure for science in EU GDP (1.9% in 2000) is still considerably lower than that of the US (2.76% in 2000) and Japan (2.93% in 1999) (See Fig. 3). In absolute values, US expenditure for scientific research in 2000 was 288 billion Euro, and that of the EU and Japan for 1999 - 161 and 124 billion Euro respectively. EU countries with their 427 Euro per capita lag seriously behind the US and Japan, with their 1040 and 979 Euro per capita respectively. These figures clearly point to the need for a new policy, related to the future of science and research in the EU. Establishing the European research area requires the urgent implementation of a new fiscal policy, which should by all means find its *normative application* in every EU member state and candidate country.

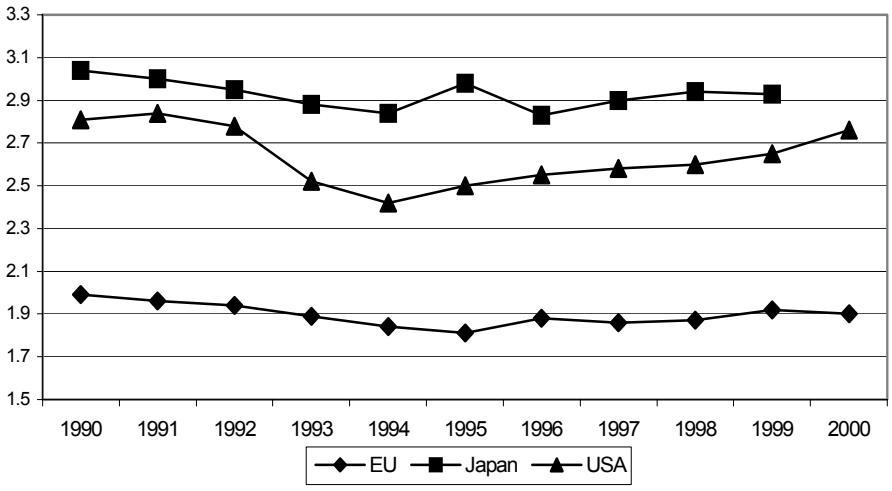

Figure 3. Dynamics of the relative shares of GDP for science expenditure (in %)

According to the indicator 'number of researchers per 1000 people workforce', Europe ranks far behind Japan and the US. In 1999, the total number of researchers in the EU was 920 000. This is almost 300 000 people less than those in the US and above 260 000 people more than in Japan. Still, there are 5.4 researchers per 1000 people workforce in the EU, while in the US and Japan they are respectively 8.1 and 9.6. After 1995, the EU has increased the average annual number of its researchers by 3%, the US by 6.2% and Japan by 2.6%. Leading EU countries in this respect are Greece (11%), Finland (10.8%) and Ireland (10.2%). France (1.5%) and Germany (2.5%) are with the lowest levels of average annual increase, and Italy even has negative levels (0.6 %).

Taking into account these figures and the overall condition of research in Europe, the new 17.5 billion Euro budget of the EU *Sixth Framework Program* for research aims to overcome the Above mentioned lagging behind through setting up networks of research teams and institutes in member states and candidate countries, so as to establish an internal European market for knowledge and science. Thus Europe could become a world leader in a market economy based on knowledge and science. This would be one of the fundamental pillars of the common European research area where science shall play an important role for the EU's economic prosperity.

Research in Bulgaria

Against the background of the new EU policy on science and research, in Bulgaria, although on different occasions those in power proclaim their positive

approach towards science and scholars, facts speak the opposite - their role and importance in the modem world are bluntly underestimated. Compared to the rest of the candidate countries, the majority of which mark a clear tendency towards increasing funds for science, Bulgaria unfortunately ranks among those that for the past 10 years have registered the biggest cut-downs in expenditure in this area. Understandably, this is quite a disturbing fact due to the huge scope of the collapse in financing science. If in 1989 2.4% of GDP were spent on science, in 1996 this percent was no more than 0.6. 2001 marked the lowest level of financing available for science - 0.47% of GDP, which again confirms the attitude of the state towards science and research.

The analysis of the absolute values shows an even graver picture. Throughout the past decade financing for science has reached alarmingly low levels. In comparison to 1987 when funds for science in Bulgaria reached their highest level - 654 million USD, only ten years later in 1997 this level has dropped 12 times to 53 million USD (see Fig. 4).

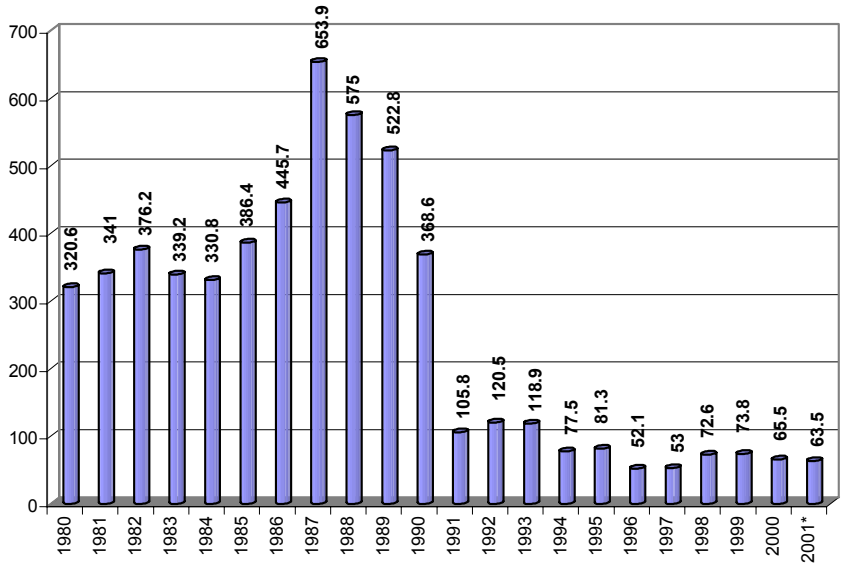

Figure 4. Scientific research expenditure (in million USD)

* Preliminary data.

In 2001 the relative share of GDP for science in Bulgaria is 5 times less than in 1990. Taking as well into consideration the decreased GDP of the country for the past decade, the financial state of science becomes even more disturbing and its departure from European standards - more than

obvious. If in 1989 when 2.4% of GDP was dedicated to science each percent of it equaled 217.8 million USD, in 2000 a 0.52% of GDP for science meant that one percent equaled only 126 million USD. Despite various conditional data in such analysis, one could say that in 2000 research expenditure in Bulgaria was 8 times less compared to 1989. According to preliminary data, in 2001 levels of expenditure on science continue their downward trend, reaching 63.7 million USD.

If we compare Bulgaria to Hungary and the Czech Republic as candidate countries for EU membership, we see that Bulgaria seriously lags behind in those parameters that characterize existing financial support for scientific research. While in the past few years'in these two countries there is the tendency towards increasing the relative share of GDP spent on science, in Bulgaria this tendency is just the opposite (see Fig.5).

Whether science could be a factor for a given country's development and play the role of both a stimulator and corrective for overcoming different obstacles depends primarily on science's potential and current state, which on its side depends largely upon the level of financial support it receives.

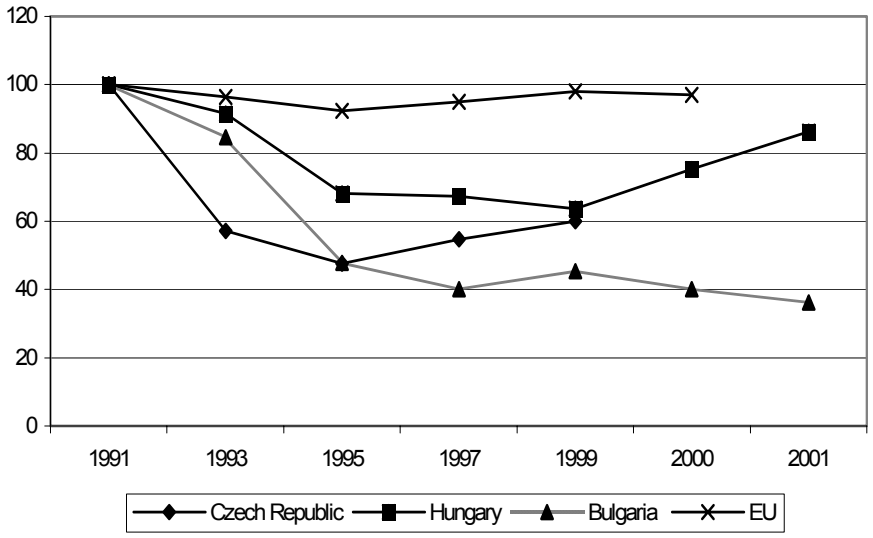

Figure 5. Tendencies in the changes of expenditure for science in % of GDP (year 1990 = 100)

Due to differences in the methodologies of evaluating and analyzing the state of science, used in former socialist and other European countries, it is impossible to make a precise comparative analysis and give a realistic assessment of the state and tendencies in developing scientific research in

individual countries and regions. In Bulgaria, making an objective assessment of the level of scientific research and the state of science in general was made possible only after the National Statistics Institute introduced the system of criteria and indicators, presented in the so-called Frascati manual.[5] The manual contains definitions, criteria and indicators that are the foundations of international comparative analysis in this area. By using the Frascati manual we can give a clear answer to the following questions: what is the level of research in Bulgaria; what is the general state of science and are there any grounds for concern about its current and future development, especially in the context of the country's accession to the EU; which are the major obstacles for turning science into a factor for dynamic economic development that could be used successfully in the years of transition?

Financial Problems Facing Science in Bulgaria

The analysis of different aspects of scientific development in Bulgaria throughout the past decade clearly shows that one of the leading and perhaps most important problems facing science is an economic one and is related to the levels of financial support science receives, which have undergone grave changes. The critical level, representing the risk threshold beyond which one can no longer speak of financing that allows the normal run of the research process, has already been passed. Under this threshold financial resources are absolutely insufficient and this can cause irreversible degenerative processes in the scientific system. The low level of financing is a huge impediment to scientists. It also represents the barrier that stands before science in Bulgaria and threatens the existence of its very system as a whole.

Due to the chronic lack of funds in the past decade, the necessary equipment for scientific activities was not timely updated according to world standards, and hence Bulgarian scholars had to carry out their research in extremely difficult working conditions. Existing for a long time under the financial threshold that could provide for the normal reproduction of the scientific system had irrevocable negative consequences for the future development of research in the country. The insufficient level of modernization in the necessary technical equipment base for science in the past decade will be among the main obstacles to the country's inclusion in the European Research Area.

[5] Proposed Standard Practice for surveys of research and experimental development "FRASCATI MANUAL". OECD, Paris, 1993. The National Statistics Institute began practising the recommendations and requirements contained in the Manual in 1993. Many obstacles were overcome and now there are dynamic series on the separate indicators that allow an objective comparative analysis in the field of science.

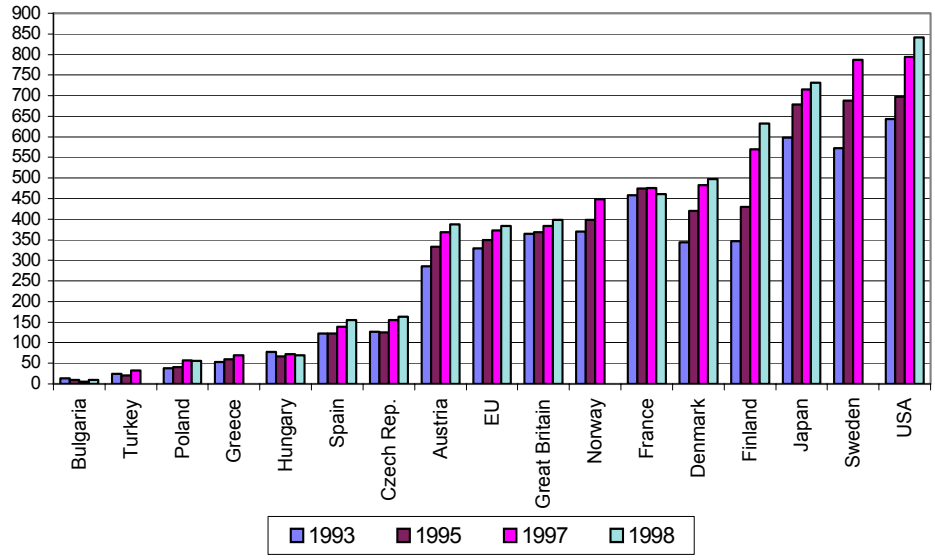

Figure 6. Expenditure for science per capita (USD, PPP)

Adopting the wrong policy of cutting down funds in some sectors of economy so as to "discharge" the budgetary burden, governing bodies took the only "logical" decision to bluntly cut down subsidies for scientific research. Already back in 1991, only in two years, the gross expenditure on science (GERD), measured against GDP, had shrunk from 2.4 (in 1989) to 1.3%, and budgetary expenditure - from 1% (in 1989) to 0.46%. Such a drastic cut down in funds in a delicate field such as science is intolerable and unequivocally confirms the lack of a relevant national strategy and policy. In the period 1990 — 2000, Bulgaria saw an extreme and shocking cut down in funds for science that found no parallel in any other sector or economic activity in the country. Reduced financial resources in fact serve primarily for covering the monthly salary costs for those employed in the field of science, and their relative share often exceeds 50% of the budgetary subsidy. [6] Together with other operating costs in the past 5 years, they represent around 94% of the subsidy, with only 6% remaining for capital stock fund. Such expenditure structure is not feasible — it does not allow for the normal carrying out of the scientific research process since it fails to provide the necessary funds for equipment and materials, needed both for doing research and acquiring long term assets. The

[6] In the past few years, in the Bulgarian Academy of Science the relative share of monthly salaries and social security instalments is over 80% of the total amount of the Academy's financial resources. In 2001 this share is 82% (see The Report on the Academy's activities in 2001).

1996 - 2001 period marks the lowest levels of funding for science. This is also the borderline beyond which the system begins to disintegrate since the existing funds are insufficient not only for developing science, but also for its survival. Hence increasing the expenditure for research needs to be complemented by changes in the structure of expenditure itself in the direction of increasing the share of funds for research and capital costs.

Statistic data clearly shows that our country is among the few that experience such a drastic cut down of financial resources allocated to science. Comparison with other candidate countries for EU membership reveals that in 1989 Bulgaria had one of the highest percentages of GDP allocated to science, and in 1996 that percentage is already among the lowest and continues to fall. In this respect we are far below the average European level, even below the level of EU countries with lowest indicators (Greece and Portugal), and this ranks Bulgaria at the end of the row of candidate countries. At the same time in the last couple of years countries like Slovenia, the Czech republic, Estonia and Latvia managed to raise their percentages of GDP for science, and make serious efforts to catch up with European standards. Bulgaria together with Romania and Slovakia, on the other hand, continue their departure from average European standards in funding science.

The Road to the European Research Area

Harmonizing of legislation

The drawbacks in the functioning of science are a direct result of the lack of a national strategy and policy in this field. Comparisons show that in many ways tendencies in the development of science run counter to those in EU countries. This refers not only to funding science, but also to solving a series of other issues of economic and institutional nature. Issues connected to harmonizing Bulgarian legislation with that of the EU have not yet fully found their solution, too. The national strategy and policy in the field of science should evolve from those implemented by the EU. At the same time they should be in accordance with the most progressive world tendencies in science development, as well as with the traditions and specific features of science research in Bulgaria. The national strategy and policy for science should also find their concrete expression in the respective normative order that should reflect both the general and the specific in the development of research.

Throughout the past decade, the state's withdrawal from providing financial support to science, together with its failure to draft an adequate normative base for the functioning of science under the new conditions, was a grave mistake. The requirement for harmonizing legislation (acquis communautaire) in the filed of science was not fulfilled in accordance with the recommendations, set down in the pre-accession documentation. This refers most of all to the necessity of establishing the normative order that regulates all questions of providing financial

support to the sector. This necessity should have found its practical fulfillment in passing the *Law of stimulating scientific research* as one of the first steps/towards establishing the normative base for funding science under the conditions of a developed market economy. In EU countries the question of funding science has found its normative solution in way that reflects its specificities, adequate for each country.

An important aspect of harmonizing the normative order addressing science in Bulgaria is also the update of the *Law of academic degrees and ranks,* since currently it fails to match the common norms ofEU legislation. These two laws, together with the laws of public education, higher education, the Bulgarian Academy of Science and some other education and science related normative acts should form a so-called *Code of knowledge.* The Code should also contain a normative solution to questions concerning its setting up and dissemination.

Improving funding

The problems facing science in Bulgaria can be solved if the existing economic milieu undergoes radical changes. The first and most important factor is changing the tendency in its financing i.e. throughout the coming years it is imperative that a *sustainable annual increase of the relative share of funds from the GDP, allocated to science.,* is achieved. This process should run parallel to adopting the normative order that would guarantee the annual increase of financial resources until they reach and surpass the average EU indicators - 2-2.5% of GDP. Or, if we take a 5-6 year period, *the increase should not be less than an annual 0.2% of GDP.* For this purpose the funds allocated to science should have around *19-20% average annual* increase. Relevant examples in this case are countries like Finland and Ireland that in the post-1995 period have achieved a 10-18% average annual increase of funds for science.

A specific feature of financing science in Bulgaria is the relatively *high percentage of state share in the general resources for science* - 66.2% of the total costs for 2001. This specific feature will remain dominating for the coming years due to the impossibility of Bulgarian industry to take up the larger part of the financial burden, related to science. In the years before the transition to market economy, industry covered between 65-70% of the total expenditure for research. The strategy and policy in the field of financing science should be directed towards changing this correlation in favour of industry, which would guarantee the sustainable increase of funds necessary for scientific development.

Such high relative shares of industrial participation in the general financing for science are characteristic only of most economically well-developed countries, including those from the EU. In 1999 56% of the total expenditure for scientific research in the EU were covered by the industry, 34.5% - from the budget, 7.4% - from abroad and 2.1% - from other sources. It should be underlined that the range of relative shares of industry is quite broad - from 21.3% in Portugal to 67.8% in Sweden, while the costs incurred by states themselves vary from 24.5% in Sweden

to 69.7% in Portugal.

Slovenia is from the pre-accession countries closest to the average EU level, with a relative share of industry as a financial source for scientific research 56.9% (1999). In the Czech republic, Slovakia and Romania industry covers around 50% of the total expenditure on science, while in Hungary and Poland - around 38%. Against this background, with its 27.1% (2001) share of industry as a financial source for science, *Bulgaria seriously differs from the average indicators in the EU.* It is alarming that for the last 3-4 years this share remains under 30%.

In the last few years one can witness a process of approximation in the relative shares of the budgetary resources (GBAORD) [7] of the US and Japan with those of EU countries, measured in terms of GDP. If in 1990 the budgets of the US and Japan allocated respectively around 1.1 and 0.9% of GDP for science, in 2000 the allocation is in the range of 0.7-0.8%. For the same period EU countries increased their budget share for science, measured in terms of GDP, from 0.4% to almost 0.65%. Hence in 2000 the governments of the three major world centers for scientific allocate through their budgets between 0.6 and 0.8% of GDP for scientific development, which is between 20% (for Japan) and around 40% (for the EU) from their total GERD expenditure.

Foreign funds gradually turn into a serious source of financing scientific development in Bulgaria. International scientific programs in which Bulgaria participates are the natural sources of these funds. From 0.25% of the total resources for science in 1996, they mark an increase to 5.3% in 2000, which is still under the average EU indicator - 7.4% in 1999. In connection with Bulgaria's accession to the EU, this source of financing should play a relevant role. Greece, for example, covered 24.8% of its total cots for science in 1999 through foreign funds. A similar high percent for 1999 was also valid for countries like Austria (19.9%), Great Britain (17.6%) and the Netherlands (11.2%).

Over the last few years, Bulgarian scholars have successfully participated in a number of international programs - the Fifth Framework Program of the EU, the NATO scientific programs, etc. In 2001 only the Fifth Framework Program supported the implementation of over 180 projects. According to the capacities of the scientific potential in the country, foreign funds could provide for *no less than 10-15%* of the total financing for science. In order to maintain the positive tendency towards increasing the funds absorbed along the line of different international scientific programs, a more active participation in them is of vital importance.

The launch of the EU Sixth Framework Program on research in November 2002 presented European scholars with new objectives. The main aim is to set up, parallel to increasing the funds for research in the EU, a true internal scientific market, characterized by a high level of mobility and competitiveness. Science and research are expected to provide the solid basis of future Europe.[8]

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[7] GBAORD — Government Budget Appropriation or Outlays for R&D

[8] *Busquin, Ph.* Science, Technology and Innovation. Key Figures 2002, Preface.

Human resources and employment in science

The shortcomings in financing research also had their negative impact on scholars themselves. As a result of a series of decisions, aimed at cutting down the number of employees in the field of science, the final number of those employed was brought to a minimum beyond which the continuity in science was made, if not impossible, at least extremely difficult (see Fig. 7). The bond between the generations was broken, and only in 10 years the average age of scholars jumped with more than 5 years. The reasons for this "operation" were not determined by an objective need for cutting down the number of scholars in accordance with some vague "European" criteria. They were not financial either, although that was the official stance, but rather resulted from the lack of knowledge or at least the will to evaluate accordingly the scholar's role in society. Not less destructive was the role of subjective opinions, bred by ill-masked party partialities. The official justification, however, was the false concept that the number of scholars in Bulgaria was needlessly big. It was this concept that was launched at the beginning of the transition period and successfully upheld almost throughout the whole 1990ies that finally brought about the above-mentioned situation. *This was how Bulgaria took one of the last places in number of people employed in science in Europe.*

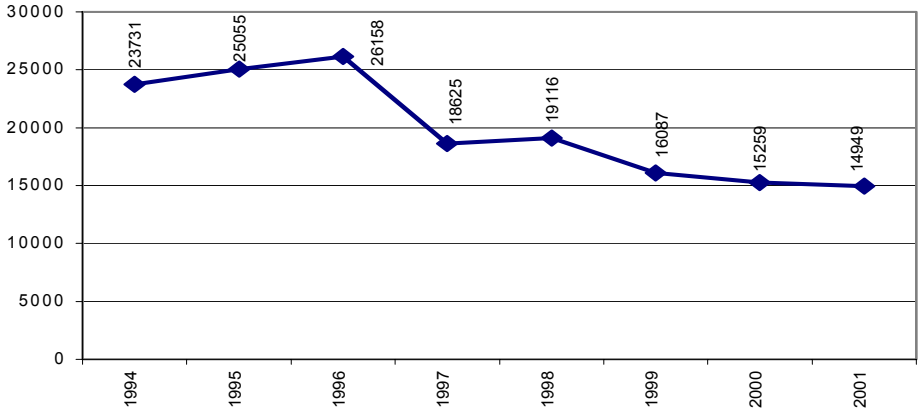

Figure 7. Number of people employed in scientific research activities in Bulgaria

In recent years the number of people employed in the science field, including researchers, dropped sharply. From 5.2 researchers per 1000 people active work force in 1996, this number shrank to 3.1 in 2001. This is far below the average EU level.

From the perspective of the global development of science, it is necessary that the EU implements a more focused and active strategy and policy in this field, so that it could eventually outstrip scientific developments in other leading countries in the world. This necessity should also include the very future of the Union itself since the implementation of a common EU strategy and policy on research directly results from the principle of developing a *knowledge-based economy.* This principle is beginning to shape itself as the

major concept for the future development of the world, and any country or community that neglect science as the primary source of knowledge are doomed to failure. Therefore, any form of discrimination or outspoken egoism will have fatal consequences for the community in the future. It is science that is the field of human activity with an international character, and all attempts to put it in a single frame are doomed to failure.

Taking into account the crucial role of science for the future of the EU, its governing bodies underline their will and ambition *to put it at the heart of the community.*[9] In the light of the future development of the European research area and according to the priorities of the Sixth Framework Program for research and technological development, it is necessary that science should offer a better answer to the needs of society. What Robert Shuman said many years ago still sounds up-to-date:

'The achievements of literature, culture and science, all of which have too high a price sometimes, should become more easily accessible... When state resources are lacking or are squandered, certain scientific researches should be jointly organized and funded. [10] Bulgarian's accession to the EU undoubtedly requires the meeting of certain standards and criteria. In the field of science they are focused on harmonizing legislation and creating an economic environment that offers adequate conditions for developing scientific research. This is why the current state of the normative base and especially the unresolved problems of financing science in Bulgaria are inexplicable and unacceptable for a country that had a serious for its small size scientific potential and a science sector that once attracted deserved attention. If the EU is going to shape its future on the basis of high technologies and knowledge, its new member states should naturally have similar standards in developing research. If not, the idea for a common European research area would only be wishful thinking or at least such an area would not be a coherent one, offering the same opportunities to all of its members. *A coherent research area means, above all, the free movement of ideas, scholars and resources with the aim of making a competitive scientific product.* This logically requires the harmonization of criteria, indicators and conditions for developing research in each country. The lack of an adequate milieu would hence be the major stop to the timely and successful implementation of high technologies in the EU.

In order to shape a modem knowledge-based society in which science is perceived not merely as a consumer, Europe has to solve the key question of the links between science and governance. Science is beginning to be seen as the factor that can solve problems and pave the way towards a society based on scientific knowledge. Thus future priorities should include integrating science and governance, exploring the impact of science on politics and implementing initiatives, aimed at signing a new pact between science and society - the so-called *new alliance between science, citizens and society.*

19.XII.2002

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[9] CORDIS focus, 6.10.2000.

[10] *Шуман, Р.* За Европа. Sofia, 2001, p. 44.