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Professional paper

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FACTORS INFLUENCING SCIENTIFIC MIGRATION-CASE OF THE REPUBLIC OF MACEDONIA

Abstract

Republic of Macedonia as developing country, in order to provide sustainable economic development, naturally needs to straighten its human resources. In these sense, it is of immanent importance to ensure adequate use of all created knowledge in the country.

Contrary to this, latest data show that Republic of Macedonia is faced with highly intensive scientific emigration. In this context, this paper is observing the main factors influencing the scientific migration, in general and with special emphasis to the Republic of Macedonia. Main objective of this paper is to present and analyses current situation regarding tertiary education and research and development sector in Republic of Macedonia. Namely, in the focus of this paper are high production of graduates and postgraduates, unfavorable sources and structure of founding and employment, as well as low expenditures for development of the research and development sector in the Republic of Macedonia. One of the intentions is to make an attempt to answer the question if Macedonia is using efficiently the produced knowledge. Based on the analysis and examination of the crucial determinants, expected outcome is to identify causes of the remarkable trend of scientific migration and to give appropriate recommendations for overcoming this situation.

Key words: knowledge, sustainable economic development, scientific migration, research and development

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Introduction

Knowledge is essential for individual progress and development of the national economy as well as its integration into global trends and is a key factor for achieving sustainable economic development in the long term. The effective use of knowledge depends on the extent to which a national economy can reach previously specified order, which emphasizes the inseparable link between the economic and the educational system.

Countries that have achieved outflow of human capital, suffered multiple significant adverse effects (slowing of economic development and the development of science, reduced productivity and competitiveness of the country and so on.). "Brain Drain" not only adversely affects the available stock of human capital in a given country, but creates other unfavorable effects on the broader socio-economic system.

When it comes to Macedonia in mind that we are still in the phase of "brain drain" from the country, the effects generated by this process is negative, leading to reduced production base of the country, slowing the development of science and research, slowing the technological development of the country, based on the reduction of the available human capital from one side, and less application of transfer of technology and knowledge from abroad from other side.

Macedonia is faced with the need to produce a quality of highly educated, or science- research staff, but as creators and disseminators of knowledge. This means that it is not enough only its production but it's effectively using in the function of sustainable economic development. Unlike developed countries where knowledge applied in the business sector, in the Republic of Macedonia it is usually associated with universities (academia) and public administration.

In science are analyzed a number of theoretical and empirical aspects of scientific migration, whereas particularly interesting ones of the periods before and after the fall of the Iron Curtain. Most theoretical approaches for analyzing scientific diaspora mainly based on general theories of migration, the prevailing view that is not entirely appropriate because failed to fully explain the phenomenon. In many of them

exaggerated the economic aspect, and less attention is paid to the analysis of other factors that cause mobility. Other theoretical concepts the mobility of highly educated and scientific research personnel explain in the context of globalization, the emergence of multinational companies and intermediary agencies that facilitate the movement of human capital. In such concepts the globalization clue as mutual interconnection of the world, and the migration is interpreted as a form of creating networks. Here the driving force is economic and educational compatibility, which explains the Americanization of education systems in Europe, particularly in post-socialist countries of Central and Southeast Europe.

1. Types of mobility of the highly educated and scientific research staff

Observed historical mobility of the highly educated and scientific research personnel, passes through several stages. Despite the general migration, the occurrence and trends are continuously monitored; interest in the scientific community for research mobility highly educated staff is relatively recent. The first findings of monitoring the occurrence of the general public and are presented in 1963, when he introduced the term "brain drain". Scientific debates in that period have been caused by the alarming outflow of British highly educated and research staff in the U.S. Then commenced intensive debate continues to this day, resulting in the expansion and differentiation of the terminology used to explain the mobility of scientists. Thus, the "brain drain" is considered permanent migration of scientists from poorer to richer countries, whereas positive effects a country that takes such personnel, while the country that broadcast has negative effects.

As a clarification of the term "brain drain" in the early 90s of last century, the scientific debates introduces the term "brain exchange", which explains the spatial exchange (spatial displacement) knowledge that primarily occurs between developed countries. This term denotes balanced exchange highly educated and research staff. If the ultimate effect of such exchange is unidirectional negative for the country that broadcast staff, then it is a "brain drain", but if the effect is unidirectional

positive for the country that receives them, then more precise definition of emergence uses the term "brain gain." ¹

Another mechanical term which is used to explain the scientific mobility is the term "overflow the brain." It occurs when a given country is excessively produced highly educated and research staff, the domestic labor market has the capacity to absorb. Consequently, highly educated and scientific research personnel are forced to leave the country. The late 70s and early 80s of last century, "overflow the brain" was a term that has been interpreted mass emergence of scientific diaspora of POS-socialist countries in Central and Southeast Europe. In fact, the former level of competitiveness of their economies, most former socialist countries had oversized research sectors. By changing the economic system and the liberalization of the higher education and science sector in these countries occurred simultaneously transfer the staff to the private higher education and science institutions or business sector, or so-called "internal brain drain" and migration in developed countries, or "brain drain". ²

In the late 80s of last century, introduced the term "brain circulation" which is used to explain the trend of returning emigrated highly educated and academia staff, which appeared in North Korea and India³. Also, the "brain circulation" became the preferred form of scientific mobility because the probability of dispersal and circulation of knowledge is greatest. Another term that clarifies the emergence of mobility of highly educated and research personnel, especially in post-socialist countries, is the so-called "horizontal outflow of brains." This form of mobility occurs when individuals occupied with scientific research, mostly due to low salaries and poor working conditions, they leaving scientific activity and moving into the business sector. Result of "horizontal drain brain" is the emergence of "brain waste", and accepts the jobs and tasks that do not require knowledge, skills and experience acquired in the process of education or previous employment. Depending on whether people leave the research activity will remain in the country or emigrate, "waste of brains" will be internally or externally. As a lighter form of "brain waste" is considered the emergence of "brain

¹ Devesh Kapur and John McHale, *The Global Migration of Talent: What Does it Mean for Developing Countries?*, Centar for Global Development, October, 2005, p.17.

² Andreas Breinbauer: *Brain Drain-Brain Circulation or...What Else Happens or Should Happen to the Brains Some Aspects of Qualified Person Mobility/Migration*, FIW Working Paper N°4 June, 2007, p. 2.

³ Danny M. Leipziger: "Brain Drain" and the Global Mobility of High-Skilled Talent, World bank, Prim Notes, No. 124, September, 2008.

freeze" in which regardless of whether you leave scientific research or not, highly educated and scientific researchers do not use the maximum of their capabilities and qualifications or at least not to the extent to which they would like.⁴

The previous terms confirm complexity and uniqueness of physical displacement of scientific research personnel and the need of clarification. Namely, within the global scientific community, physical displacement and interaction between scientific researches is basic purpose of the production and transfer of knowledge, and in this respect, migration is only one kind of scientific mobility. Additionally, in the 21st century, study visits to foreign institutions have become an essential prerequisite for advancement in scientific research career.

2. Factors affecting the mobility of scientific research staff

The mobility of highly educated personnel affects factors such as:⁵

1. Differences in the amount of wages or earnings of Individuals between different national economies. This factor is closely correlated with the level of development of a given country, so that the difference between the levels of economic development of individual countries requires the size and mobility of highly educated staff. Differences in economic development between the countries primarily relates to differences in rates of economic growth, which in turn leads to the existence of differences in 'income per capita and living standards. In this context, from the international point of view, the mobility of individuals takes place from poorer, less developed countries in richer, more developed economies.

2. Factors immaterial. In addition to salary or earnings, a very important factor especially for scientific profile of staff present intangible factors that influence the decision to leave own countries and resettlement in other countries. These intangible factors primarily related to the opportunity to work in prestigious universities, research centers, and developed research infrastructure in countries that allocate large amounts of funding for science and research and so on.

⁴ Andreas Breinbauer: Brain Drain-Brain Circulation or...What Else Happens or Should Happen to the Brains Some Aspects of Qualified Person Mobility/Migration, FIW Working Paper N°4 June, 2007, p. 8.

⁵ Solimano A.: Cause and Consequences of the talent mobility, Oxford University Press, 2008, str.5.

3. Demand for factors of production. This factor is closely associated with the development of economic opportunities and living conditions in a given country. Because mutual correlation of factors of production, economic development opportunities are bigger (have higher growth rate) and at the same time becoming more attractive for foreign capital, influx of foreign labor and human capital. Moreover, these countries the human capital need can provide a number of ways:

- The human capital to provide through permanent employment of highly educated staff available on the domestic labor market;
- Outsourcing contracting, whereby it possible to use domestic and / or foreign human resources;
- Re-allocation of capacities in countries where you can use human capital or knowledge at a lower price.

4. Level of technological development of countries. This mainly refers to ICT, which in the modern economy clearly facilitate the mobility of factors of production, including knowledge. The attraction of highly educated and scientific staff is causally related to the high level of technological development. Indeed, ICT has enabled the development of outsourcing, i.e. satisfying the needs of human capital and knowledge, without their physical migration.

5. Effect of agglomeration and concentration. The emergence of modern and developed centers-agglomerates, in which a concentration of renowned intellectuals from various fields, creating interest and motivation to be in the middle of the action. This is particularly evident in the migration of scientists and researchers because it allows them to cooperate, and it is important for them to share knowledge and experiences with reputable and quality personnel.

6. Socio-cultural and linguistic affinities. In the modern era language and socio-cultural differences between different countries are less constraining factors for mobility of individuals, particularly for highly educated staff. Long positive trend of foreign languages, coupled with the impact of pervasive globalization has led to a reduction of language barriers and raising the overall socio-cultural awareness. In terms of scientific migration, this has led to the emergence of so-called international elite that has gained education on the prestigious education faculties in the world and is part of the alumni networks of other prestigious research, highly educated and professional institutions. This in turn allows greater mobility of knowledge.

7. Political regime and migration policies of countries. Macroeconomic stability, political environment, administrative efficiency and the level of investment in science, are important factors in migration flows. Understandably, there also should be especially emphasized the role of migration policies of the states as they have a direct impact on mobility, inflow and / or outflow of human capital. In modern times, the need for knowledge in all countries, increasingly intensifying their mutual competition and struggle in attracting highly educated staff. Thanks to the application of various concepts, developed countries increase their own attractiveness in the function of continuous knowledge transfer. On the other hand, the developing and poor economies introduced policies that endeavor to reduce the outflow of highly educated staff or possibly attract staff from other countries, in order to compensate the internal lack of highly educated staff or research staff.

3. Main determinants of scientific migration in Southeast Europe and the Republic of Macedonia

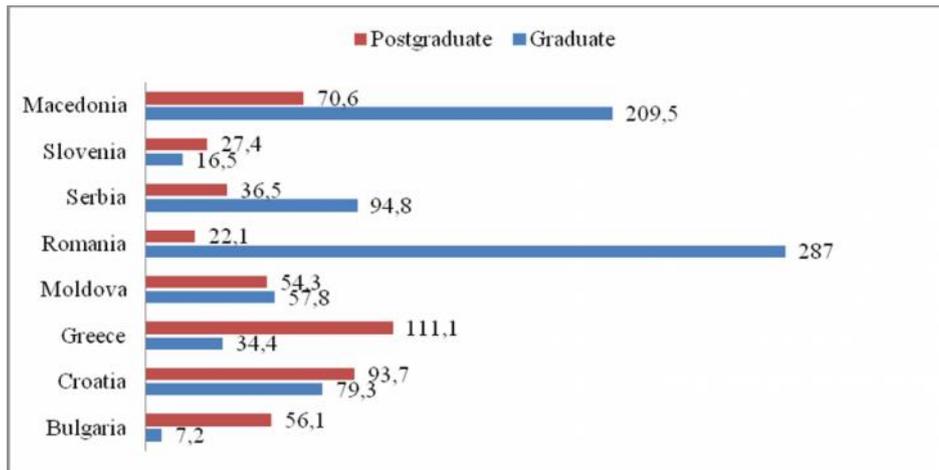
Taking into consideration World's Bank latest data for the period 1997-2005, the emigration rate of Macedonian highly educated persons was more than 29%,⁶ that is highest emigration rate in the group of candidate countries for full-flagged membership into EU. This data impose immanent importance to analyze main determinants of scientific migration in Southeast Europe and the Republic of Macedonia.

This section presents analysis in terms of the several of determinants contributing to this alarming emigration and comparisons are made regarding the trend of creating a high-educated staff, the structure of funding sources and sectors employing scientific and research staff. Namely, as in all countries in the region, the reform process in higher education Macedonia started immediately after independence and in early 2000 resulted in the establishment of private higher education institutions. The emergence of private higher education institutions increased the possibility of studying for a large number of citizens, and thus from year to year there is permanent increasing in the

⁶ Trading Economics.com:<http://www.tradingeconomics.com/macedonia/emigration-rate-of-tertiary-educated-percent-of-total-tertiary-educated-population-wb-data.html>

number of graduates and master's degree students, as can be observed from Chart 1.

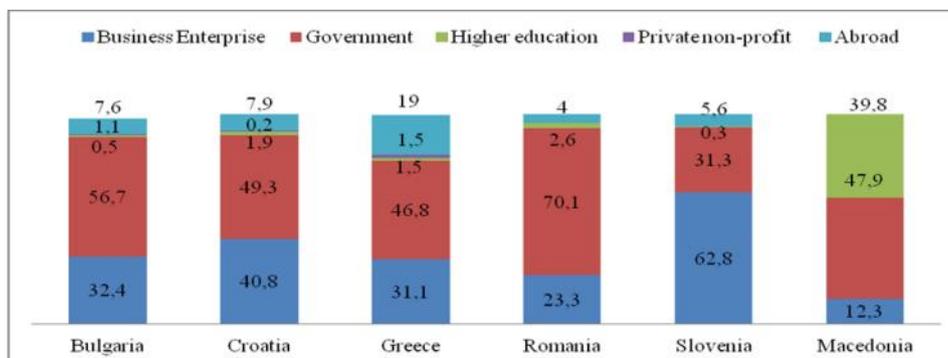
Chart 1. Growth in graduate and master's degree students in Southeast Europe, in the period 2002-2008, in %.



Source: UNESCO Science Report 2010, p. 188

From the data presented in the Chart 1., it can be clearly seen that this trend is typical for other transitional economies. Regarding the sources of the funds spent on research and development, it should be said that in the case of Republic of Macedonia there is a deviation both in the number, and the structure of the sources (Chart 2.). Namely, in Macedonia, compared with other countries from the region, private nonprofit institutions and foreign resources, do not appear as a founding source. Regarding the structure, it can be said that there is no significant concessions in terms of expenditure made for research and development from the national budget, as opposed to expenditures made in this respect by the entities in higher education (39.8%) and business sector (12.3%).

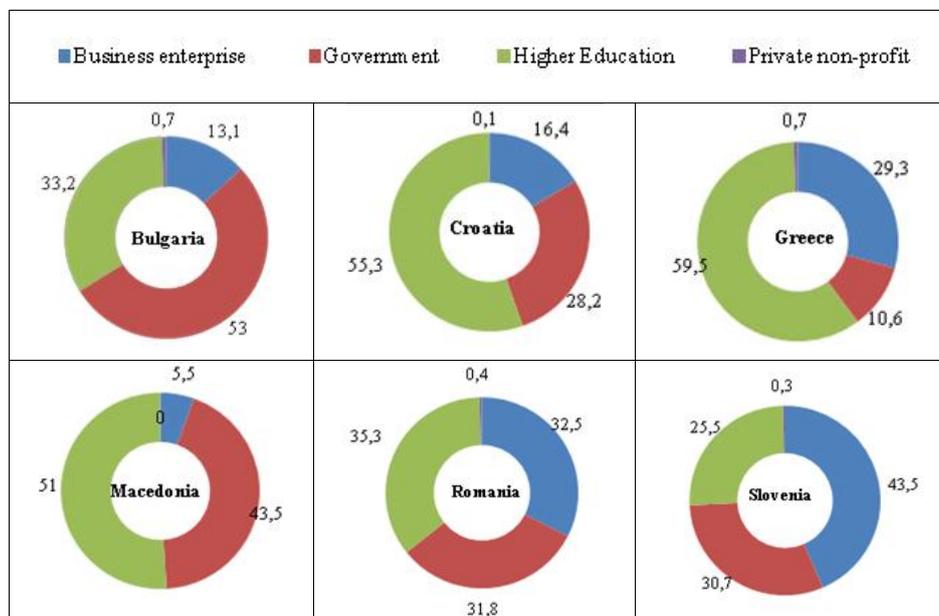
Chart 2. Structure of sources of Funds to fund research and development in Southeast Europe, in 2008, in %.



Source: UNESCO Science Report 2010, p. 187

From Chart 3., it is clear that the Macedonian scientific researchers are mostly engaged in higher education (51%) and public institutions (43.5%), and much less in the business sector (5.5%). A similar structure of employment is present in other countries in the region. Only exception is Slovenia, where the business sector is in the same time biggest funder of research and development (62.8%), and the sector in which most scientific research staff is engaged (43.5%).

Chart 3. Structure of sectors that employ scientific research staff in Southeast Europe, in 2008, in %.



Source: UNESCO Science Report 2010, p. 189

For the Republic of Macedonia, it should be pointed out that there is low level of investment in this sector, as confirmed by the data presented in Table 1, where it is given a comparison with EU-27, which only supports the previously stated conclusion. An additional concern is the negative trend of the share of expenditure for research and development in GDP of Macedonia, despite the positive trend in the EU27 Member States.

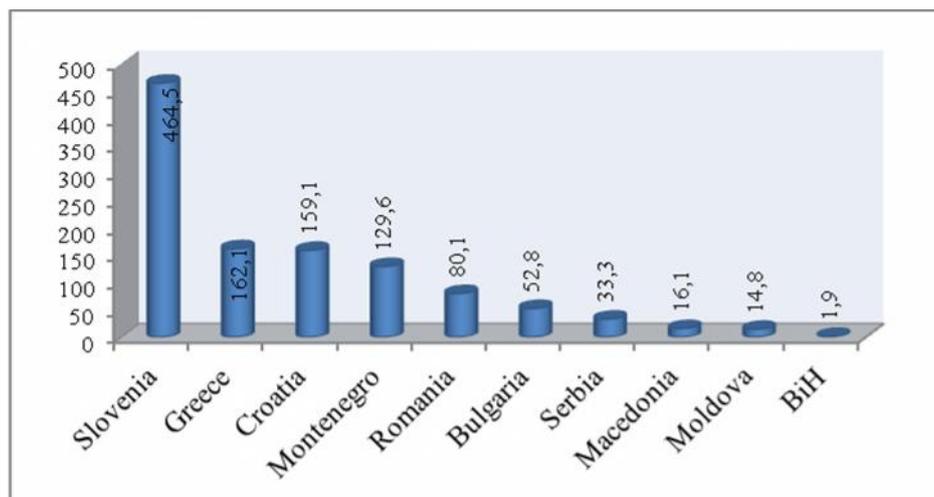
Table 1. Participation expenses for research and development of the total GDP in the Republic of Macedonia for the period 2001-2009, in %.

	2001	2002	2003	2004	2005	2006	2007	2008	2009
Republic of Macedonia	0,20	0,19	0,20	0,17	0,16	0,17	0,16	0,14	0,11
EU 27	1,86	1,87	1,86	1,83	1,82	1,85	1,85	1,92	2,01

Source: State Statistical Office, Eurostat

Regarding the same parameter, the Republic of Macedonia is also lagging in comparison with other countries in Southeast Europe, as can be seen from Chart 4.

Chart 4. Gross expenditure on research and development in South East Euro, in 2007, in U.S. dollars



Source: UNESCO Science Report 2010, p. 186

As shown in Chart 4., in 2007 in Macedonia, in the sector of research and development have been invested 16.1\$ per capita, which is nearly 29 times less than funds that for the same purpose designated in Slovenia.

Conclusion

From the analysis in the paper, it can be concluded that Macedonia is still in the phase of "brain drain" from the country, resulting in numerous adverse effects, leading to:

- Reducing the production base of the country;
- Slowing the development of science and research;
- Slowing the technological development of the country, on the basis of reduction of the available human capital, as well as insufficient application of transfer of technology and knowledge from abroad;

- Reducing the level of productivity of the economy, given that the lost human capital is with high capital productivity, and in the same time is the resource that can increase the productivity of labor and capital;
- Reduction of living standards;
- Reduction or weakening of the international competitiveness of the country;
- Reduction in tax revenues generated from tax revenues that are created on the basis of human capital and other.

Regarding the findings concerning the analysis of the factors for emigration of highly educated staff, and the trend of its production and use, with particular reference to the situation in the research and development activities in the country, situation is unfavorable. Namely, there is permanent positive trend in creation of highly educated staff that simply cannot be absorbed in the economy, including the development and research sector. As a result, much of the staff remains unemployed or gets engaged in activities where the knowledge gained in the educational process is not required, and thereby not used, or as a last resort, left the country.

Specifically for the Republic of Macedonia, it can also be concluded that research and development activities are mostly financed by the state budget, and that public sector is the biggest employer highly educated staff.

Also, mostly as a result of its low profitability and inability to allocate more funds, the role of the Macedonian business sector is supporting the research and development in the country is insignificant.

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