

THE EFFECTS OF BRAIN DRAIN ON MOLDOVAN INNOVATIONAL POTENTIAL

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Republica Moldova se confruntă cu problema migrației în ultimele decenii, iar în prezent tot mai actuală este migrația forței de muncă cu un nivel înalt de studii. Acest fenomen duce la reducerea potențialului intelectual și inovațional al țării. Scopul acestei cercetări este de a identifica modul în care exodul potențialului intelectual influențează dezvoltarea economică și inovațională, de a stabili un șir de recomandări și măsuri necesare pentru o economie sustenabilă bazată pe cunoaștere și valorificare la maxim a potențialului uman. Pentru a identifica efectele exodului potențialului intelectual se vor folosi metode economice, statistice de analiză în scopul de a stabili relațiile cauză-efect. Datele folosite sunt oficiale, oferite de statistica națională și internațională și vor fi extrapolate, comparate, corelate pentru formularea concluziilor necesare. Cercetarea oferă un set de calcule și concluzii care facilitează aprecierea obiectivă a fenomenului exodului de intelect și a efectelor sale asupra economiei și proceselor inovaționale din Republica Moldova.

Cuvinte-cheie: potențial inovațional, exodul potențialului intelectual, dezvoltare sustenabilă, migrație, emigrant, personal calificat

Republic of Moldova has major migration problems in the last decades and currently a stronger migration among skilled labor. This phenomenon reduces the country's intellectual and innovational potential. The purpose of this research is to identify the effects of brain drain on economic and innovational development, to set recommendations and measures that are much needed in a sustainable economy based on knowledge and maximum capitalization of human potential. In order to identify the effects of brain drain on we will use economic, statistical methods of analysis in order to set the potential cause-effect relationships. The data used in this research are provided by official national and international sources and will be extrapolated, compared, correlated in order to formulate conclusions. The research provides a set of valuable conclusions and calculations that will help to better appreciate the brain drain phenomenon in Republic of Moldova and its effects on economy and innovation.

Key words: innovational potential, intellectual potential exodus/brain drain, sustainable development, migration, emigrant, qualified personnel

Intellectual potential exodus is a major problem for developing countries, especially for Republic of Moldova. Unfavorable economic conditions, the existence of better opportunities abroad are creating those push-factors that day by day worsen the situation. The amplitude of this phenomenon accentuates the importance of efficient intellectual potential exodus management.

Even though, Republic of Moldova is a classic example of massive brain drain which increases year after year, this migration problem is common also for many other countries. In 2000 year, almost 175 million people, or 2.9% of the world's population, were living outside their country of birth for more than a year. Of these, about 65 million were economically active. [1] This shows us how much the world economics has changed and how globalization has become something natural but with so many consequences.

In order to develop a sustainable economy, each country needs to have a rich intellectual potential that will be able to apply knowledge and know-how in innovation. It means that the population with higher education play a crucial role in economics. Talking about intellectual potential from an economic point of view, we do not mean only the country's population overall but also the companies' skilled personnel that adds real monetary value to the company.

Given the fact that it is quiet complicated to analyze how brain drain influences intellectual potential, then innovational potential at company level, using official statistical data we will analyze it at a country level.

Year by year, the number of Moldovan emigrants with higher education is increasing rapidly, which leads to a decrease of the local intellectual potential.

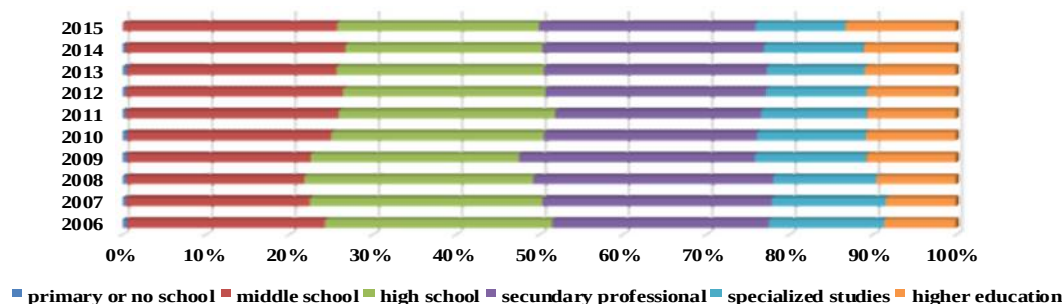


**Fig. 1. Analysis of the emigrants from RM aged over 15 years,
abroad for a job purpose or looking for a job, by educational level**

Source: realized by the author [2]

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From 2006 till 2015 the share of Moldovan emigrants with higher education increased by 5.24 points, from 8.56% (in 2006) till 13.8% (in 2015).

By analyzing the following economic aspects in comparison with intellectual potential, we can certainly see that there is a direct connection between brain drain, GDP growth, high technology export and the country's expenditures for R&D.

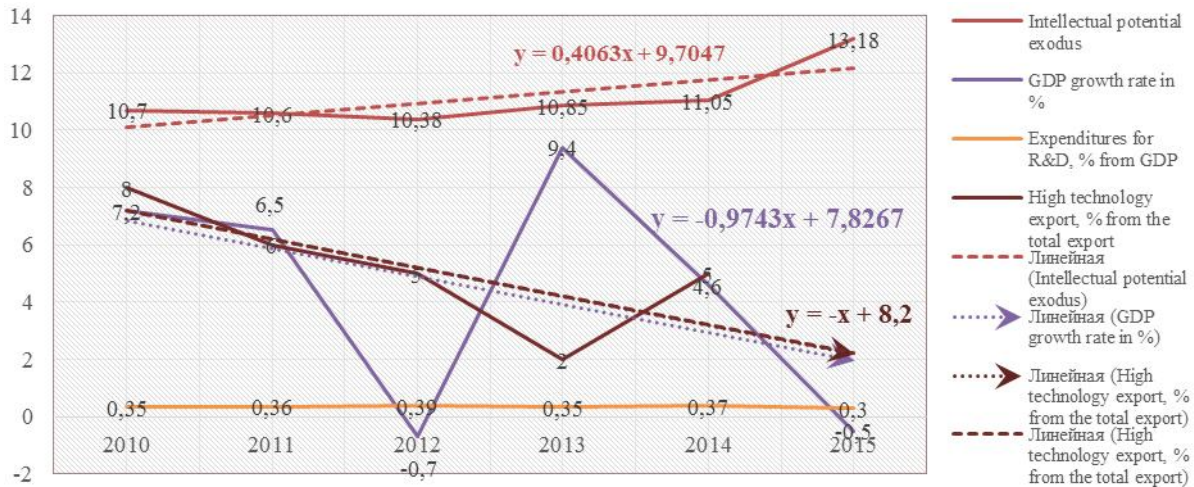


Fig. 2. Comparative analysis of intellectual potential exodus, expenditures for R&D (% from GDP) and export of high technology (% from total exports), 2010 – 2015 in RM [3]

From 2013 to 2015 we observe that the intellectual potential exodus is increasing year by year while the GDP growth rate is decreasing (trend equation $y = -0.9743x + 7.8267$). In addition, the export of high technology is getting lower year by year (trend equation $y = -x + 8.2$).

All this is happening while the number of emigrants with higher education is increasing with 0.4 points annually but the expenditures for R&D are remaining the same, thus no action is taken to improve the existent situation.

Both the expenditures for R&D activity and the export of high technology are indicators of a country's innovational potential. The increase of intellectual potential exodus with a decrease in the exports of high technology are major attention signs on the fact that there is poor innovation in Republic of Moldova.

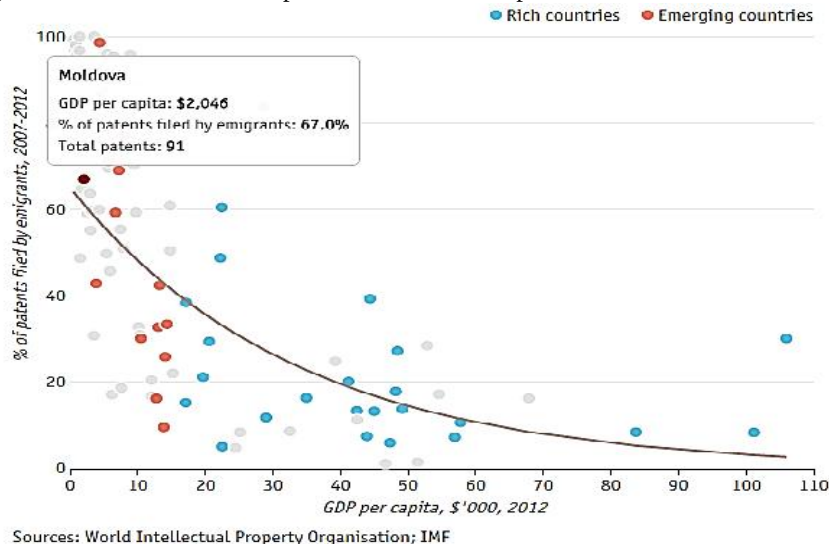


Fig. 3. Analysis of interdependence between percentage share of patents filled by emigrants from 2007 to 2012 and GDP (thousands USD) in 2012
 Source: official The Economist blog.

The study published in The Economist [4] in July 2015 using data from the World Intellectual Property, has analyzed the growth rate of GDP per capita relative to the number of patents filed by emigrants by country. IT has elucidated the following conclusion: the poorer the country is (the GDP per capita is lower), the more it's researchers and scientists are motivated to so researchers, scholars of this state are more motivated to work outside their native country.

Following the idea, we see that Republic of Moldova, with a 2046 USD GDP per capita in 2012, holds 91 patents of which 67% filed by emigrants. At the other extreme, there is another country with a high innovational potential, Japan, with a GDP of 46661 USD per capita (2012) and 362 321 filed patents of which only 1.2% have been

filed by Japanese residents of another country. This shows towards what we should strive: a developed country that will offer equal and fair opportunities for the bright minds to evolve their innovational ideas.

According to the latest World Economic Forum, in 2016, Republic of Moldova takes the 84th rank in the Global Competitiveness Index, with a score of 4.0 points out of 7. The Global Competitiveness Index is calculated including the rankings of many aspects of the country's development, such as institutions, macroeconomic environment, health and primary education etc. The lowest score that we took for is the index of innovation. RM scored only 2.6 points out of 7. The highest 10 ranks for this category were obtained by such countries as Switzerland, Finland, Israel, United States, Japan, Germany, Sweden, Netherlands, Singapore and Denmark. Republic of Moldova with its 130 rank (out of 140), is among such countries as Zimbabwe (128), Gabon (129), Sierra Leone (131), Myanmar (132), Burundi (133) etc. [5]

A low index of innovation is a serious push factor for intellectual potential exodus.

In order to understand better what are the issues that caused such a low innovation index it is important to take a closer look at the components that make up this index.

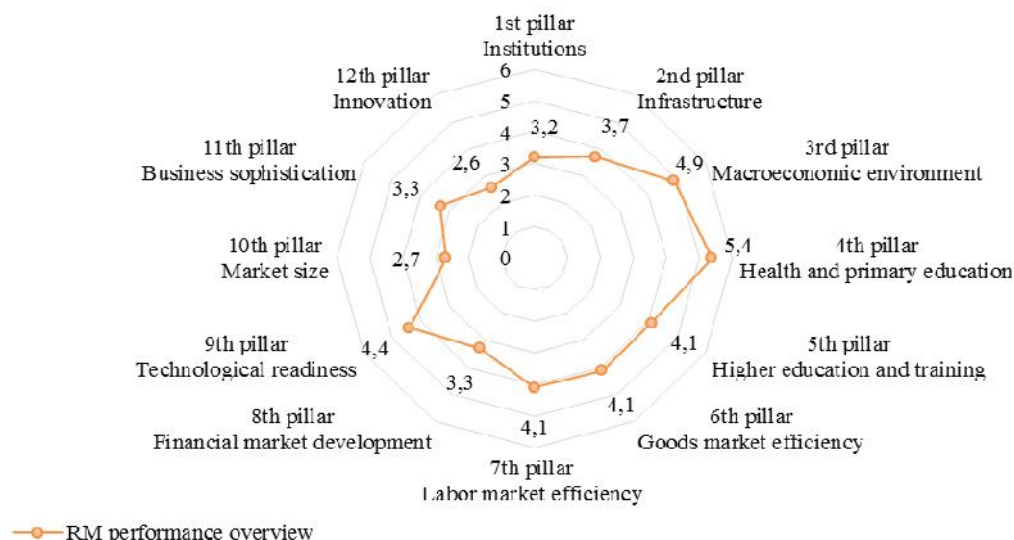


Fig. 4. Global Competitiveness Index, performance overview of Republic of Moldova in 2015 – 2016 years.

Source: World Economic Forum Report on Global Competitiveness Index, 2016

The innovation index contains many components, at which Republic of Moldova scored in the following way (global rank):

- capacity for innovation – 3.4 (115);
- quality of scientific research institutions – 2.7 (124);
- company spending on R&D – 2.3 (135);
- university-industry collaboration in R&D – 2.7 (123);
- government procurement of advanced technology products – 2.5 (134);
- availability of scientists and engineers – 2.9 (132);
- PCT patent applications (applications/million pop.) – 1.2 (67). [6]

Analyzing these scores, we see that the lowest results include companies spending on R&D, availability of scientists and engineers, university-industry collaboration in R&D and quality of scientific research institutions. The fact that companies and government spend so little on R&D and procurement of innovational products shows that Republic of Moldova is far away of an innovational, sustainable economy. It seems incredible, but the research is showing also that RM lacks the availability of scientist and engineers. This is when we realize that the intellectual potential exodus phenomenon has reached the point when it affects directly innovation and the whole economic development of the country. Investors pointed out that Republic of Moldova doesn't have proper skilled personnel in strategic and innovative economic areas such as IT, engineering, telecommunication etc. So where are these skilled people? Does it mean that they have emigrated or does it mean that the educational system in Republic of Moldova is not able to create this kind of personnel? It is a good question that can be answered with 'yes' twice. The same study has analyzed, as 5th pillar, the higher education and training. We scored 3.4 points, being on the 120th position regarding on-the-job training. The reason why on-the-job trainings are so poor quality in Republic of Moldova is because there is no constructive dialogue between universities and industries, and the lack of collaboration in R&D between them is key to why we scored again on the 123th position together with the quality of research institutions being ranked with the 124th position from 140.

In order to have a high innovational potential it is important to engage future skilled personnel in the innovation process, since studenthood.

Analyzing the following figure, we can realize that year after year, the number of younger researchers (aged under 25 y.o.) is decreasing while the number of older ones are increasing seriously. This is happening due to two major reasons: the overall Moldovan population ageing and the constant migration problems reflected in a strong intellectual potential exodus.

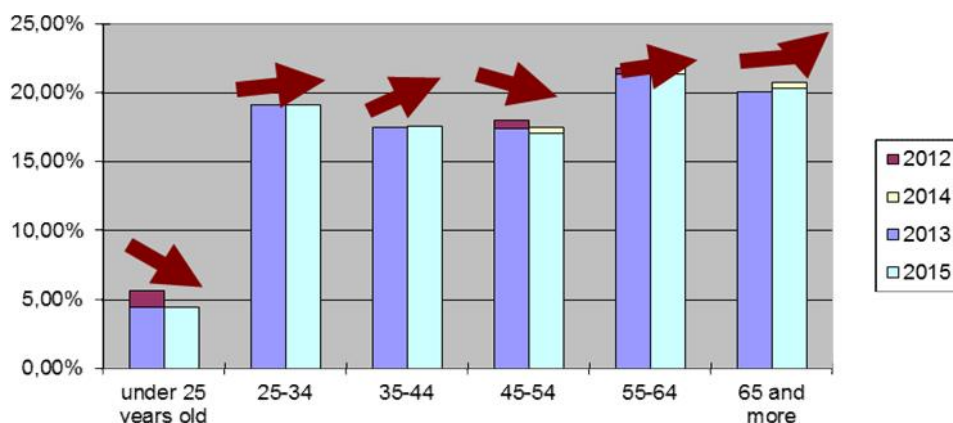


Fig. 5. Dynamics of Moldovan researchers, analysis by age, during 2012 – 2015 [7]

Anyways, the interest of youth in science and R&D activity is extremely important for a country's innovational potential, so let us have a look at the situation in Republic of Moldova. Next figure represents the number of doctoral students per total and the number of ones under 25 years old. The trends say that every year the number of doctoral students is decreasing by 2 persons, while the number of young people who choose to follow the paths of science is decreasing by 48 persons annually.

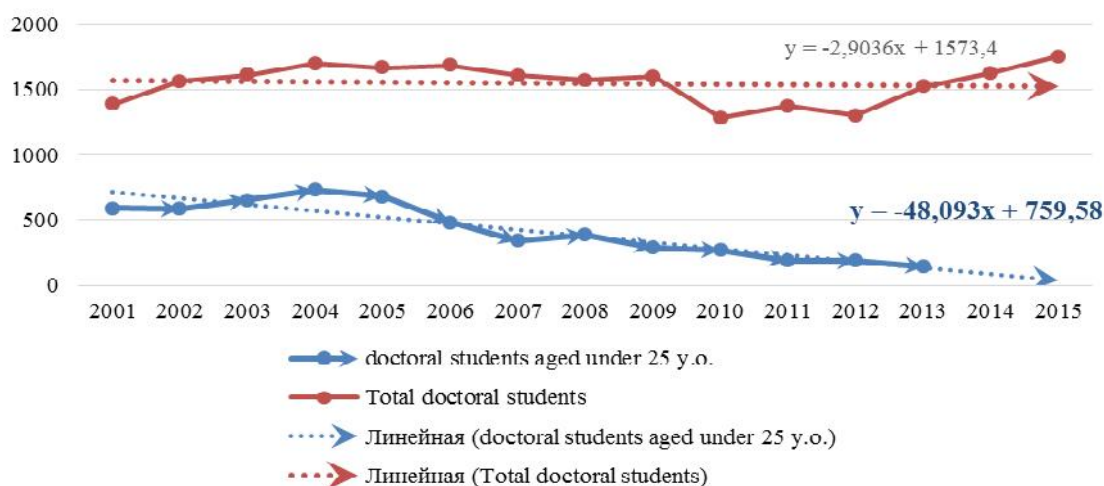


Fig. 6. Comparative analysis between the total number of doctoral students and students aged under 25 years old, 2001-2015

Source: National Bureau of Statistics

On the other side, the official statistics report that there is Moldovan scientific staff that studies abroad. Their number increase annually with a concentration rather on probationers than on doctoral students. This is a beneficial activity as it contributes to scientific cooperation and improvement of Moldovan staff.

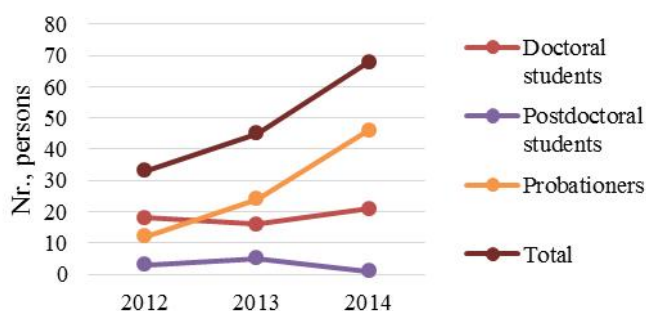


Fig. 7. Scientific staff training abroad, 2012-2014

Source: National Bureau of Statistics

The fact is that brain drain should be managed effectively to ensure a sustainable development of the national economy and a high innovational potential.

In a knowledge society where progress is what mobilizes all economic activities, labor is the link without which this progress would not be possible. The rapid development of tertiary sector underlines the importance of qualified personnel growth. Governments should cherish its qualified staff leading successfully different strategies in order to convert brain drain into brain gain. It is also important to pay more attention to the R&D activity, encouraging it by a serious increase of its budget. This way we can to reduce the number of patents filed by Moldovan emigrants and diminish the excessive intellectual potential exodus. In Republic of Moldova, the economic side plays a huge role when it comes to establish new effective policies with a qualitative implementation. It all comes to numbers of a relatively small GDP, reduced governmental investments in science, innovation and human capital. It is a vicious circle because only by investing in these key developmental elements we can have a response effect of GDP increase and even augmentation of living standards.

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