

TENDENCIES OF INTERNATIONAL CAREER OF ROMANIAN RESEARCHERS: BRAIN DRAIN?

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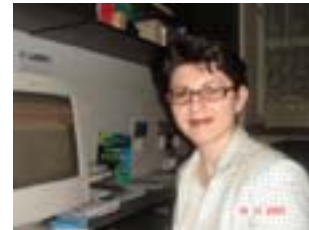
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Abstract: Recent economic and technological developments have led to a growing international demand for highly skilled human resources. The increased competition for human capital has determined numerous OECD countries to take special measures for attracting and retaining human capital in such fields as: information technology, biotechnology, nanotechnology, health care, etc. These measures have stimulated the emigration of highly skilled professionals, especially from less developed to more developed economies. In this international context, in the last decade, Romanian and other Eastern European people with an academic background have had a significant propensity towards emigration. This phenomenon is not surprising if one considers the limited (although increasing) number of attractive career opportunities in this region. Consequently, numerous scientists and other highly skilled individuals from Eastern Europe have been attracted by the United States, Canada and other Western countries, which have facilitated the access of certain categories of qualified foreigners.

Key words: researcher, brain drain, Romania, career

Motto: "Forget terrorism and weapons of mass destruction.
The next global war will be fought over human capital."
David Heenan, **Flight Capital**

1. Introduction: Study Background and Motivation

After the accession to the European Union in 2007, the number of Romanian and other Eastern European workers abroad is likely to increase (Constantin & al., 2004, p. 78+). This can have negative consequences on the quantity, quality and structure of the workforce available in their home country. For instance, Romania's internal production could diminish by more than 3%, due to emigration (Van der Putten, 2002). In addition, since most people who choose to live and work abroad are young, this phenomenon may also enhance the social problems associated with the demographic ageing in the country of origin. This threat is particularly serious for Eastern Europe, which is experiencing low fertility and high emigration rates.

Without underestimating the importance of international migration management for other occupational categories, in our opinion, a special attention should be paid to the highly skilled people, who have numerous career opportunities abroad (researchers, doctors, professors and so on). Their international experience could be a major resource for socio-economic development in their home country, to the extent their productive and creative potential is retained. Otherwise, the country of origin loses the investment made in the scientists who emigrate, while the destination countries benefit from their expertise.

In today's globalizing economy, the international migration management is a common concern worldwide. Therefore, Romania (as well as other states facing similar challenges) can learn from the experience of those countries, which have already conceived and implemented measures to attract and retain human capital, in general, and scientific talent, in particular. According to the OECD experts, these measures can be classified in several categories such as:

- *developing the infrastructure for innovation and high-tech entrepreneurship, by setting-up (or stimulating the entrepreneurs to set up) companies in high-tech industries;*
- *improving the attractiveness of public research sector, by increasing scientists' compensation and offering more and better career opportunities in public universities and research institute;*
- *repatriation schemes for post-docs and scientists, including adequate financial incentives;*
- *leveraging immigrant and Diaspora networks, that is ensuring collaboration between the highly skilled migrants and their peers in the country of origin etc. (Auriol & al., 2002; Cervantes & Guellec, 2002).*

However, the application of certain methods, which have proven to be appropriate in a specific context or country, does not guarantee similar outcomes in another context or country. Therefore, in order to design and implement efficient policies, projects and programs for a specific country, (at least) the following questions should be asked regarding the international career of scientists (and other highly skilled migrants):

- *To what extent the action plans adopted by other countries are also indicated for "country X" (in this case, Romania), in order to attract and retain scientists? Which*

are the priorities, according to the people concerned, i.e. the national scientists residing abroad (including PhD students, post-docs, professors, etc.)?

- To what extent do scientists residing abroad collaborate with their peers in the country of origin? To what extent do they intend to return to the country of origin, on a permanent or on a temporary basis, to work there?

However, to date, the literature on this topic consists of several articles, which reflect the personal opinions and experiences of one (the author) or a small number of Romanian researchers. For these reasons, we have launched a quantitative-qualitative study regarding the international career of Romanian researchers.

2. Research Hypotheses and the Relative Importance of Various Factors Influencing Romanian Researchers' Professional Emigration

Several Romanian researchers have pointed out various challenges faced by the research activity in their country. According to them, Romania's attractiveness for scientists depends on finding suitable solutions to the identified problems. A central concern refers to the insufficiency (doubled by the inadequate allocation) of financial resources for research. In certain specializations, such as genetics or chemistry, the equipment, as well as other technical and material resources are particularly important for successful research. These remarks form the basis of our first hypothesis, that is:

Hypothesis 1: *A major determinant of Romanian researchers' emigration, especially in certain domains of activity, is represented by the insufficient funding, technical and material resources allocated to research in their home country.*

Nevertheless, the lack of adequate resources is not the only problem faced by the research sector in Romania. Therefore, other factors may have a considerable impact on Romanian researchers' decision to pursue career opportunities abroad. Indeed, an international career involves certain risks and sacrifices, which are usually accepted by ambitious individuals, highly motivated to further their development, to get an intercultural experience and/or a better salary and benefits. Hence, our second hypothesis is the following:

Hypothesis 2: *The type of work, getting better opportunities for professional development and advancement, a better compensation package and/ or gaining international experience represent, for the majority of the researchers, factors with a considerable impact ("high", "very high" or "crucial" importance) in their decision to work abroad.*

Prior to this research, we have conducted several exploratory interviews, involving Romanian PhD students and post-docs at Leiden University and Technical University Delft (The Netherlands). These interviews revealed that, after leaving their country, Romanian PhD students and post-docs in The Netherlands had a limited relation or no relation with their former university and colleagues in Romania. On the other hand, the experts in expatriate management recommend keeping in touch with the migrant workers, in order to stimulate their return in the home country / organization. Hence, the third hypothesis states:

Hypothesis 3: *The relations between the Romanian researches working abroad, on the one hand, and universities, research institutes and scientific community in Romania, on the other hand, are, in general, limited. This is correlated with a low interest of Romanian researchers residing abroad to return and work in their home country.*

Remark: Since most people invited to answer our questionnaire are members or collaborators of "Ad Astra Association", we have also expected our study to reveal that "Ad Astra" is an important way to keep in touch with the Romanian scientific environment, while residing abroad.

Based on the international studies in this field, the "migrant workers" integrate gradually in the host country's socio-professional environment; at the same time, their "links" to the country of origin diminish. This process is accompanied by increased legal rights in the host country (usually, after 5 or more years of continuous residence). Consequently, we assume the following:

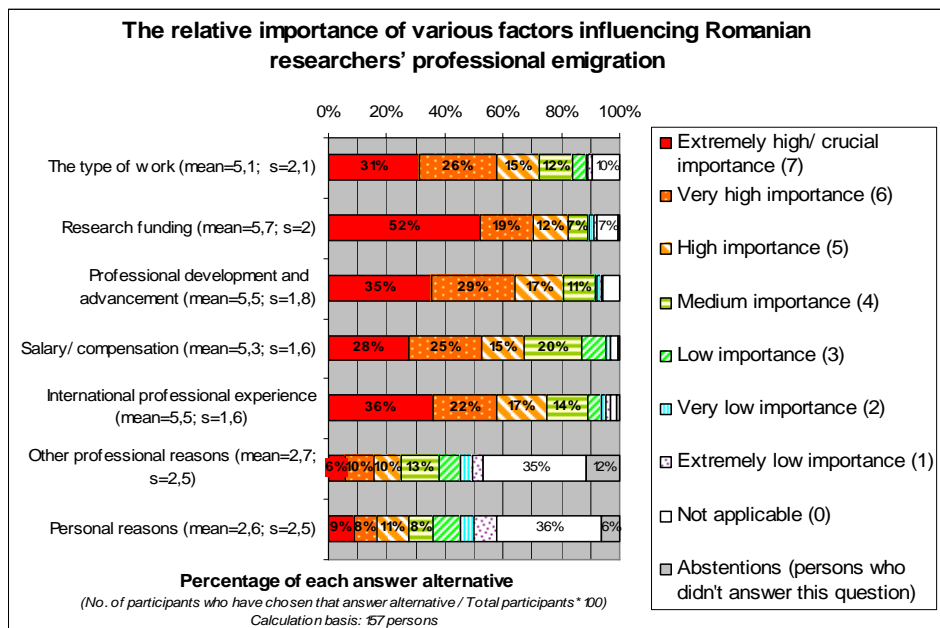
Hypothesis 4: *The majority of Romanian researchers, particularly after a few years of work outside their home country, prefer to extend their stay abroad, usually in the same host country.*

Nevertheless, the scientists' emigration is not necessarily a (total) loss for the home country. The international experience proves that highly skilled migrants could contribute, in a way or another, to the socio-economic development of their country of origin. Usually this involves their return in the home country, for professional reasons, either on a permanent or a temporary basis.

Figure 1 below summarizes the respondents' reasons for working abroad.

As anticipated (see Hypothesis 1), the insufficient resources allocated to research in Romania ("research funding") represents the most important reason for researchers' emigration (71% stating it was "crucial" or "very important" in their decision to work abroad).

Figure 1.



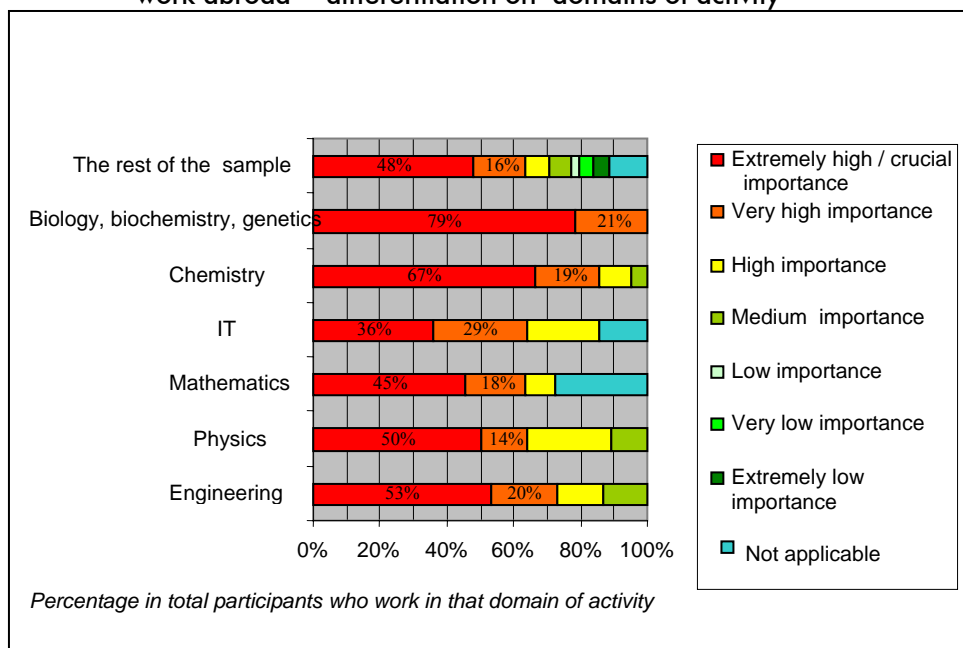
Remark: "s" represents "the standard deviation"

The relevance of "research funding" differs from one scientific domain to another. Thus, all respondents specialized in biology, bio-chemistry or genetics appreciated this factor as having an "extremely" or a "very" important role in their decision. This factor had a similar role for 86% of chemists (see Figure 2). Furthermore, the overwhelming majority of participants working in chemistry or biology (including bio-chemistry and genetics)

considered “extremely” or “very” important to enhance “technical and material resources for research” and to increase “research project funding”, in order to motivate scientists from abroad to return to Romania.

On the other hand, a considerable percentage of mathematicians (27%) and IT specialists (15%) were **not** influenced in their decision to emigrate by the limited research funds in Romania (see Figure 2). Since excellence in mathematics and IT does **not** require as many resources as research in chemistry, bio-chemistry, genetics and biology, in general, this finding is not surprising. Nevertheless, almost two thirds of the IT and mathematics specialists considered the “insufficient research funding” in Romania as playing a “very high” or even a “critical” role in their decision to work abroad. Moreover, virtually all of them think this factor needs to be ameliorated in order to stimulate Romanian scientists’ repatriation.

Figure 2. The importance of “research funding” in the participants’ decision to work abroad - differentiation on domains of activity



According to our expectations (see Hypothesis 2), besides the insufficient funding of researches in Romania, there are other reasons why Romanian researchers choose an international career, instead of working in their home country. For instance, getting “an international professional experience” seem to be “very” or “extremely” important for a considerable number of Romanian highly skilled migrants (58% of our sample).

Sixty four percent declared that getting better “opportunities for professional development and advancement” had a “crucial” or a “very important” role in their decision to emigrate. Interestingly, our study reveals a statistically significant correlation between this factor and “promoting clear and objective assessment criteria in the Romanian research system”, as a way to attract Romanian scientists towards their home country ($\chi^2 = 111,9574$; $p = 0$; 42 degrees of freedom; critical value for $p=.01$ (1%): 0.0) – see Table 1. Hence, the following conclusion: the ambitious researchers, which are keen to learn and grow professionally, are highly interested in the objectivity and transparency of the research evaluation. Therefore, improving this dimension of the Romanian research system (i.e. the

quality of assessments) is an essential prerequisite for stimulating the repatriation of talented scientists from Diaspora.

Table 1.

Number participants who indicated the corresponding answer alternatives		The importance of "promoting clear and objective assessment criteria in Romania's research system" for stimulating scientists' repatriation						
		Extremely low/ Not significant	Very low	Low	Medium	High	Very high	Extremely high/ crucial
The importance of "opportunities for professional development and advancement" in respondent decision to work abroad	Not applicable	1	0	0	0	2	1	4
	Extremely low	0	0	0	0	0	1	0
	Very low	0	0	0	0	1	1	0
	Low	0	0	1	0	0	0	0
	Medium	1	1	0	3	3	4	5
	High	0	1	0	1	1	8	15
	Very high	1	0	0	1	4	9	29
	Extremely high/ crucial	2	0	1	2	4	9	36

As indicated in *Figure 1*, almost three quarters of participants gave a considerable importance ("high", "very high" or "extremely high") to "the type of work". In other words, not having the opportunity to perform "a similar or an equally interesting work" in their home country, has substantially influenced many scientists' decision to emigrate. Finally, getting a better salary/ "compensation package" is another important motivator for Romanian researchers' professional emigration. 68% of our sample indicated this factor had a "high", a "very high" or an "extremely high" importance in their personal decision to work abroad. In conclusions, the survey outcomes confirm the first two research hypotheses.

3. The Relations with the University/ Research Institute, Former Colleagues and the Scientific Environment in Romania, while Pursuing a Career Opportunity Abroad

After leaving Romania, two-thirds of participants kept in touch with their former university or research institute **and** (some of) their former colleagues. However, less than a quarter (23%) considered that relation "substantial and quite frequent". As expected (see *Hypothesis 3*), most participants had "limited relations" with their former university/ research institute (44%), or kept in touch only with some of their former colleagues (25%). Other 8% did not maintained contact with their former university/ institute or colleagues in Romania.

While abroad, the relation with the former university/ research institute and/ or colleagues in Romania, consisted of: discussions regarding new developments in one's domain of activity (40% of respondents); discussions about socio-economical, political, and/or cultural developments in Romania (37%); consultation-collaboration on professional topics (35%); discussions/ information about career opportunities in Romania (27%); none of

the issues mentioned above: it was simply a friendship or a "courtesy" relationship (20%). Three quarters of the respondents⁴ indicated only one or two of the answer alternatives mentioned above. However, 14% of the respondents mentioned also "other professional aspects". Most of these people declared they maintained a substantial relation with their former university/ research institute in Romania.

The category "other professional aspects" include a variety of elements such as⁵: making donations of scientific articles and books to former colleagues, to the university or to a library in Romania; publishing scientific articles and/ or books, in collaboration with colleagues from Romania; intermediating professional visits for former colleagues/ professors to their host university abroad, thus facilitating the exchange of experience and future collaborations; helping colleagues from Romania to find career opportunities abroad etc.

While pursuing a career opportunity abroad, 25% of participants did not keep an active interest in the scientific developments in Romania. Other 60% indicated one or two of the following answer alternatives: "I have kept in touch with Romania's scientific community through Ad-Astra" (32%)⁶; "I have participated in workshops, conferences and other scientific events in Romania" (30%), "I have not kept in touch with the Romanian scientific community, but I read about scientific developments in Romania" (28%), "I have collaborated in research projects in Romania" (16%). About one fifth of the respondents declared they kept in touch in "other ways", such as⁷: personal relations with members of the scientific community in Romania (including, in some cases, former professors or colleagues); communication through e-mail; mutual visits, common workshops and conferences; direct contact at international congresses; publications in Romanian magazines (either scientific or general interest magazines) etc.

An analysis of the data indicates a significant correlation between:

- a. (the intensity of) the relation with one's former university/ research institute and colleagues, while pursuing a career opportunity abroad, and
- b. one's preference to work in Romania, upon completing his/her current projects in other countries (see Table 2).

Considering the entire sample (the respondents who answered both questions, irrespective of their country of residence – see the numbers in **bold**), the correlation between the two variables presented in Table 1 is statistically significant (Total $\chi^2 = 17.32$; $p=0.044$; 9 degrees of freedom; critical value for $p=0.05$ [5%]: 16.919). Consequently, the scientists who intend to return to Romania have maintained stronger relationships with colleagues in Romania than those who do not intend to return. Indirectly, this finding leads us to the following conclusion: *the percentage of people who prefer (and tend to) remain abroad is likely to diminish, to the extent a relation is maintained between them and their former university/ research institute and colleagues in the home country.*

Table 2.

No. participants who answered both questions (out of which ... persons in Romania)		Upon completing my current professional projects, I prefer to work in Romania				Total
		Fully agree: My 1 st choice	Partially agree: My 2 nd choice	I do not agree	I don't know yet	
While abroad, have you kept in touch with your former university/ research institute and/ or with your former colleagues in Romania?	a) Yes , I have had substantial and quite frequent relations with my former university/ institute <u>and</u> colleagues	4 (1)	17 (4)	2	6 (2)	29 (7)
	b) Yes , I have kept in touch with my former university/ institute and colleagues, but to a limited extent	10 (5)	21 (2)	18	16	65 (7)
	c) I have NOT maintained a relation with my former university/ institute, <u>but</u> I kept in touch with my colleagues	2	9 (1)	6	16 (2)	33 (3)
	d) No , I have NOT kept in touch either with my colleagues or my former university/ institute	0	4	2	3 (1)	9 (1)
TOTAL		16 (6)	51 (7)	28	41 (5)	136 ⁸ (18)

As anticipated in *Hypothesis 3*, the participant preference for a career in Romania is weak. Only one tenth indicated working in Romania as a first choice. The preference towards working in Romania is lower amongst the respondents who reside abroad. 24% of them declared they "did not agree" to return and work in Romania, upon completing their current projects. Most respondents residing abroad (two thirds) "partially agree" with the idea of working in Romania or "did not make their minds up".

Amongst the respondents residing in Romania (see the numbers written in parentheses in Table 2), one third would prefer a career abroad, as a first choice, but none of them excludes the option of remaining and working in their home country. While pursuing a career opportunity abroad, *more than three quarters of this group* kept in touch, to a more or less extent, with both their university/ research institute and colleagues in Romania.

A complementary analysis can be made based on the data presented in Table 3. This reflects the answers given by the researches who didn't keep in touch with the scientific developments in Romania, on the other hand, and the rest of the sample, on the other hand. The numbers in parentheses represent the respondents residing in Romania. The numbers in bold represent total participants (irrespective of their country of residence).

The information in Table 3 confirms the previous conclusions, respectively: the preference for working in Romania is weak, especially amongst those researchers who did not keep in touch with Romania's scientific environment, while pursuing a career opportunity abroad. Thus, only 36% of this group (4+9 respondents) declared Romania was an option for their professional future. An almost equal number of people in the same group (12 out of

36 respondents, that is 33%) did “not agree” to return and work in Romania, after completing their current projects abroad.

Table 3.

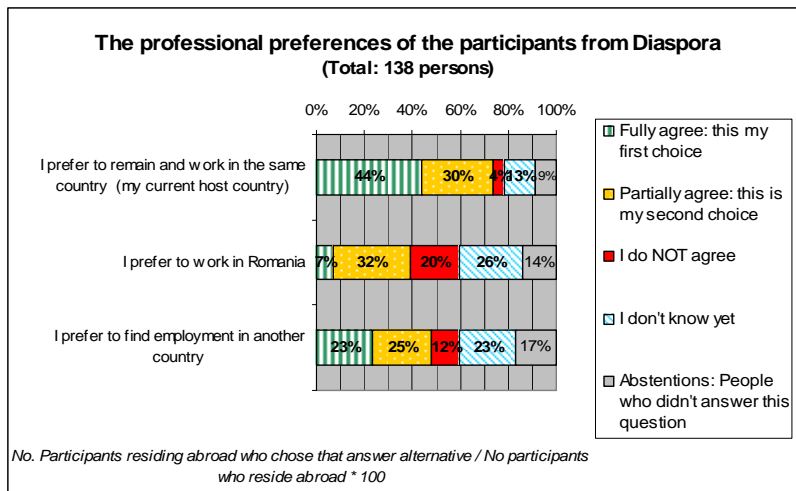
	Total No. participants who answered both questions (out of which ... persons in Romania)	Upon completing my current professional projects, I prefer to work in Romania				TOTAL
		Fully agree (My 1 st choice)	Partially agree (My 2 nd choice)	I do NOT agree	I do NOT know yet	
After leaving the country, how have you kept in touch with the scientific developments in Romania?	a) I have NOT kept in touch with the scientific developments in Romania	4 (1)	9 (1)	12	11 (1)	36 (3)
	The rest of the sample (people who kept in touch with the scientific community in Romania, or got informed, in a way or another, on Romania’s scientific developments)	12 (5)	43 (7)	16	30 (4)	101 (16)
	TOTAL	16 (6)	52 (8)	28	41 (5)	137 (19)

On the other hand, more than 50% of those participants, which kept in touch with Romania’s scientific environment, showed interest in working in Romania. Not surprisingly, in most cases, this option was a “second choice” for the people concerned. On the positive side, only 16% of this group (16 out of 101 respondents) disagreed with the idea of working in their country of origin, after completing their on-going projects. Also, the majority of the participants who returned to Romania (16 out of 19 individuals) kept in touch with the scientific developments in their home country, while working or studying abroad.

4. The Participant Career Plans: Preferences upon Completing the Current Projects

Most researchers residing abroad prefer to remain and work outside Romania, in the same host country (the country in which they currently reside) or in a third country (neither Romania, nor their current host country). Only 7% of respondents “fully agreed” to return and get employed in Romania, after completing their current projects abroad (see Figure 3 below).

Figure 3.



As expected (see Hypothesis 4), the propensity towards remaining and working in the same host country increases with the period of time spent abroad. Thus, when dividing the participants residing abroad in three groups, based on the time spent outside Romania, one gets the following results regarding the statement “I prefer to remain and work in the same country”) – option “Fully agree: this is my first choice” (see Table 4).

Table 4.

Period of activity abroad (No. years)	Total respondents in each time interval ⁹	No. respondents who chose the option “Fully agree”	Average time spent abroad: no. years (X) ¹⁰	Respondents who chose “Fully agree” / Total group (Y)
Under 5 years	44	15	3.386	0.34
5 - 10 years	56	28	7.071	0.5
10-15 years	21	14	12.5	0.66

The correlation coefficient between the variables “X” and “Y” in Table 2 is not only positive, but also very high ($r = 0.995$), allowing us to draw the following conclusion: *the more time spent abroad, the higher the percentage of people who prefer to remain in the host country in which they reside.*

On the other hand, the percentage of participants, whose first preference is to work in a “third country” (neither Romania, nor their current host country), tends to decrease in time, reaching the lowest value in the “7-10 years” interval. Consequently, the percentage of survey participants, which prefer to continue working abroad, either in the same country or in a third country, does not differ substantially, based on the period of time spent abroad. *Irrespective of how long their international experience has been so far, more than half of the Romanian researchers from Diaspora prefer to remain and work abroad (the average percentage for the entire sample is about 60%).*

As expected, the tendency to extend one’s activity outside Romania is higher (71%) amongst the researchers with an extensive international experience (more than 10 years). However, one fact we did not anticipate (see Hypothesis 4) is the high percentage (73%) of people with little international experience (less than 3 years), which prefer to remain and work abroad, after completing their current professional projects.

Besides the action measure specified in the questionnaire, attracting and (re)integrating scientists in the Romanian research system involves, according to our participants, efforts towards¹¹:

- *Improving the academic and research system*, by: involving in Romania's education and research reform a number of personalities who have clearly demonstrated professional success, according to internationally accepted criteria; changing the attitudes and mentalities in the academic and research system; creating a scientific and moral meritocracy in the Romanian universities; making job promotions based on the individual's international scientific merit; improving the research funding system, with an accent on flexibility, transparency and objectivity; correctly defining the research activity: where, how and by whom it should be done; automatically recognizing the university degrees earned in USA and Western Europe etc.
- *Creating "de novo" a "system of excellence"*, including: elite research institute, having world-class human, technical and financial resources; a National Institute for Multidisciplinary Research; a national agency for leveraging the research results; incubators of start-ups etc.
- *Stimulating the entrepreneurial activity and "private research" sector* by: a) facilitating the access to financial resources for entrepreneurs and b) improving the legal framework.
- *Other action directions*: about 20 suggestions have been made. They refer to a large variety of issues. Some recommendations are quite specific, while others are more general, such as: "accepting and supporting the principle of intellectual freedom".

Remark: The most frequent comments were geared towards the amelioration of the existing research and academic system in Romania. Several participants recommended setting up "de novo" a "system of excellence" in research. We think these two approaches are not mutually exclusive. Actually, they can be used as complementary action strategies.

5. Final Remarks and Recommendations: A Brief Discussion from the International Career Management Perspective

The international work experience provides the scientists with the opportunity of expanding their know-how and know-who, which in turn could bring important benefits for their organization and country of origin. Such benefits may consist in enhancing research productivity and quality, better connecting the internal research activity to the international scientific circuit and, ultimately, stimulating the national economic development, in general.

However, such outcomes occur to the extent the scientists' international professional mobility is managed according to the interests of their organization and country of origin. In the case of many states, including Romania, this involves simultaneous efforts in two directions, that is: a) limiting the permanent emigration amongst the most talented individuals and b) stimulating the transfer of capital and expertise from highly skilled migrants towards their country of origin.

A key prerequisite for attracting researchers towards Romania (and/or other developing country) consists in ameliorating their work conditions and career opportunities

in that country. As this study has confirmed, reaching this goal involves more (and better) investments in the research sector. However, certain improvements can be made from the point of view of the international career management. In this sense, the universities, research institutes, the Ministry of Education and Research, other governmental and nongovernmental organizations should consistently and systematically apply (some of) the "retention measures" recommended by the experts in expatriation management¹².

First of all, it is necessary to *keep in touch with the (national) scientists residing abroad*. As suggested by one of our survey participants, this requires to set up – and regularly up-date – a special database, including the highly skilled migrants' contact information and specialization. While abroad, these individuals should be informed about scientific and cultural events in their country of origin, projects they could cooperate in, and so on.

Maintaining a relation with the scientific environment in the country of origin (through collaborations in national and international projects, professional visits, common conferences, symposia and workshops etc.) is positively correlated with the likelihood of coming back, upon completing one's on-going projects abroad. Furthermore, these relations facilitate the exchange of experience between the scientists from Diaspora and their peers in the home country. Since most researchers work in developed countries, such exchange could bring major advantages to their country of origin. Regarding this issue, our study reveals the following:

- Although only 30% of respondents participated in workshops, conferences and other scientific events in Romania, 77% considered this was a way to capitalize on Romanian scientists' international experience, to the benefit of their country of origin.
- Only 16% of participants collaborated in projects in Romania, while 71% declared such collaborations would be beneficial to Romania.
- 81% thought the scientists from Diaspora should be invited to give presentations (in workshops, laboratory classes etc.) at universities; however, only a couple of respondents declared they made presentations in a Romanian university, while abroad.

This comparative analysis underlines the need for organized and systematic efforts, at university and institute level, for stimulating (temporary, short-term) collaborations with the Romanian scientists residing abroad. This is particularly important because many talented Romanian nationals might not return for a full-time job in Romania (see *Table 2*).

Nevertheless, two thirds of survey respondents "did not make their minds up" or declared their return to Romania would be "a second choice". In our opinion, the repatriation of (some of) these individuals can be stimulated by providing them with correct and prompt information regarding various career opportunities in Romania (e.g. vacant positions in their field of expertise). Unfortunately, only 27% of participants in this study declared they had discussions with their former colleagues about possible career opportunities in Romania.

Apparently, after 3-4 years of activity abroad (towards the end of a PhD programme, for instance), a slightly higher percentage (15.4%) of Romanian researchers prefer to return to their country of origin, as a *first choice*. Although most of the respondents in this group (38.5%) didn't make their minds up, *relatively few* of them (less than 20%) "did not agree" to work in Romania, upon completing their current projects (see *Table 5*).

Table 5.

Period of time spent abroad	Upon completing my current professional projects, I prefer to work in Romania				Total
	Fully agree: this is my 1 st choice	Partially agree: this is my 2 nd choice	I do NOT agree	I do NOT know yet	
Under 3 years	6.7%	33.3%	40%	20%	100%
3-5 years	15.4%	26.9%	19.2%	38.5%	100%
5-7 years	9.1%	33.3%	24.3%	33.3%	100%
7-10 years	4.5%	45.5%	27.3%	22.7%	100%
More than 10 years	4.3%	56.6%	8.7%	30.4%	100%

Consequently, the repatriation efforts have the highest chance to succeed when directed towards those researchers, which have been abroad for 3-5 years. After spending more years in a foreign country, the highly skilled migrants become gradually integrated in their new professional and socio-cultural environment. Not surprisingly, the perspective of returning to their home country becomes, for many of them, "a second choice".

Numerous suggestions and comments made in this survey belong to researchers whose coming back to Romania is only "a second choice". To the extent their recommendations are applied, it is likely that Romania becomes "a more attractive option" for scientists, either for temporary collaborations, or for regular, full-time jobs.

Some ideas can be implemented as such, while others may be modified, to a more or less extent, according to the national strategy and priorities in the research and development sector. For instance, the suggestion regarding the automatic recognition of university degrees obtained in Western Europe and USA could be amended as follow: "the automatic recognition of graduate degrees obtained at top 100 universities abroad (including, among others, A-universities) in USA as well as well-known universities in Europe). The list of eligible universities will be periodically up-dated and communicated to the Romanian nationals, which are studying or are planning to study in universities abroad."

Considering the current problems in Romania's (and other developing countries') research system, any action plan directed towards scientists' repatriation may have limited impact. Therefore, *in the short term*, we recommend to stimulate and facilitate temporary, short-term collaborations between researchers and academic personnel in the country and their peers abroad. This can be done by: creating part-time jobs in universities/ research laboratories for scientists residing abroad; organizing international conferences, symposia and workshops in the country concerned; inviting highly skilled migrants (and their foreign colleagues) to collaborate in projects in that country and so on.

In the medium to long term, a more radical approach should be adopted, for a better integration of the national academic and research system in the international scientific circuit. For a maximum efficacy, this approach should have both a financial dimension (adequate investment in research) and a "cultural" dimension (changes in mentalities, attitudes, criteria used for performance assessment, promotions, compensation etc.). Based on the participants' input, this is extremely important for enhancing the research sector and attracting scientists (both national and foreign scientists) towards Romania (and other countries faced with similar challenges).

A complementary requirement refers to the implementation of special action plans for encouraging the repatriation of highly skilled migrants and facilitating their socio-cultural and professional reintegration in the country of origin. In the case of Romania, certain steps

have been already taken into this direction. For instance, in December 1999, the International Research & Exchanges Board (IREX) Bucharest have launched the "Return to Romania" Program, meant to help Romanians returning from studies in the United States to find rewarding careers in their home country¹³. Another notable example refers to the "Online Project for the Romanian Scientific Community", initiated by the "Ad-Astra" Association. However, much remains to be done. The actions taken at organization level (professional associations, institutes etc.) should be stimulated and complemented by government initiatives.

6. Study Limitations & Further Research Directions

This study reveals a significant correlation between the preference to return and work in Romania, on the one hand, and the relations with one's former university/ research institute, colleagues and the scientific developments in the home country, on the other hand. However, further research is necessary to better understand the impact of the relation type and quality (intensity, consistency, frequency, means of communication etc.) on the propensity to return in one's home country.

The period of time spent abroad is strongly correlated with Romanian scientists' career preferences. One could expect their professional preferences to be conditioned by a variety of situational and personal factors. These variables may include certain characteristics of the host country¹⁴, the researcher's specialization (domain of activity), his/ her life stage and family situation, and so on. It was not our objective to identify the independent and/ or moderating variables, which influenced the Romanian scientists' decision to remain abroad, upon completing their on-going projects. Another study should tackle this issue.

Finally, additional research is necessary to better define the ideas presented in this report. This is important because our study reveals substantially different view points on certain issues. For instance, while some respondents consider "an excellent compensation" to be necessary for attracting scientists from Diaspora to work temporarily in Romania, others argue that the title "professor" would be the most important motivator in this respect (the money earned as a part-time professor in Romania being less relevant).

The repatriation measures should be gradual and "selective", encouraging first and foremost the return of the best scientists, in the priority (or "key") fields of interest for the country. Therefore, it is important to better understand their expectations. Thus, a more in-depth, sector-based research, involving (selected) scientists in certain domains of activity could help determine the priorities for Romania, in order to design efficient action plans. Last, but not least important, the (re)integration issue into the Romanian professional and socio-cultural environment needs additional attention/ future investigations.

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⁴ This question did NOT apply to those participants who chose the option "No, I have not kept in touch either with my former university/ institute or colleagues in Romania", when answering the previous question.

⁵ This list includes the most frequent categories of answers. For instance, six participants mentioned they made donations of books and/ or scientific articles; five participants claimed they published in Romania etc.

⁶ Since almost one third of the sample indicated this answer alternative, we can conclude that "Ad-Astra" is an important way to keep in touch with the Romanian scientific environment, while residing abroad.

⁷ These are the most frequent answers given by the participants.

⁸ The rest of the sample did not answer (at least) one of these two questions.

⁹ Only 121 participants, which completed this question, were residing abroad when the study was conducted.

¹⁰ "X" is calculated as an arithmetic mean, considering the middle point of each time interval and the number of participants in that group. For instance, based on the questionnaire, the interval "5-10 years" is made up of two sub-intervals (5-7 years) and (7-10 years), having as middle point 6 and 8.5 years, respectively. There are 32 respondents in the first group and 24 respondents in the second group (sub-interval). Therefore, the average number of years spent abroad by the respondents, which spent abroad 5-10 years, is calculated as follow: $(6*32+8.5*24)/(32+24)=7.071$ years.

¹¹ This is a synthesis of the most frequent comments and suggestions made as "other possible approaches".

¹² See, for instance, "Repatriation Planning Checklist" by Charlene Marmer Solomon (1995) and

"The Art of Coming Home" by Craig Storti (2001).

¹³ See http://www.itcnet.ro/irex/irex_eng.html

¹⁴ For instance: the host country's immigration and naturalization policies and practices, its strategy and policies in the field of research and development, its socio-cultural and economic particularities etc.