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Anthi Charalampous, Alexis Chatzimpiros, Panos Coroyannakis, Zefi Dimadama, Bratislav Đorđević, Ilias Eftymiopoulos, Liana Gouta, Bengt Olof Grahn, Vitalii Gryga, Lise Guennal, Terry Hegarty, Søren Hermansen, T. Ionescu, Bertil Klintbom, Kostas Komninos, Vasileios Kyriazis, Ioanna Lagoumidou, Elvira Laneborg, Michael Larsen, Mirjana Lenhardt, Jimmy Margo, Najiba Mustafayeva, Kai Niklasson, Kaidi Nõmmerga, Filipe Oliveira, Anatoli Pataridou, Agne Petersoo, Christian Pleijel, Penélope Ramírez, C. Sandu, R. Suciu, K. Tošić, Lili Vasileva, Savvas Vlachos, Alkisti Florou

"Science, Technology & Innovation in the Black Sea: Moving Forward"

ICBSS
INTERNATIONAL CENTRE FOR BLACK SEA STUDIES
BSEC
ΔΙΕΘΝΕΣ ΚΕΝΤΡΟ ΜΕΛΕΤΩΝ ΕΥΞΕΙΝΟΥ ΠΟΝΤΟΥ
ΔΙΚΕΜΕΠ

April 2016

The **International Centre for Black Sea Studies (ICBSS)** was founded in 1998 as a not-for-profit organisation under Greek law. It has since fulfilled a dual function: on the one hand, it is an independent research and training institution focusing on the Black Sea region. On the other hand, it is a related body of the Organisation of the Black Sea Economic Cooperation (BSEC) and in this capacity serves as its acknowledged think-tank. Thus the ICBSS is a uniquely positioned independent expert on the Black Sea area and its regional cooperation dynamics. **Moving towards a "Green Black Sea" is our new perspective,** one characterised by a focus on development, culture, as well as economic and social prosperity, one that goes beyond the traditional approach and makes the **concept of Sustainable Economic Development, Energy, Regional Governance and Stability our driving force**. Thus, the environmental dimension runs through all of our actions and aims.

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The present publication is the scientific outcome of the 8th International Black Sea Symposium on "Science, Technology & Innovation in the Black Sea: Moving Forward", that was organised on 19-20 November 2015, in Athens, in the framework of the Black Sea Horizon Project.

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Preface

The International Centre for Black Sea Studies (ICBSS) was founded in 1998 as a related body of the Organization of the Black Sea Economic Cooperation (BSEC), with the obligation to serve as its acknowledged think-tank, which will provide the organization with the appropriate data and policy recommendation for decision and implementation.

Each year, the ICBSS organizes the International Black Sea Symposium (IBSS), the annual ICBSS event, with the participation of prominent personalities, such as professors, researchers, students, as well as representatives from the civil society, entrepreneurs and policy makers, interested in the Black Sea region.

The ICBSS launched the International Black Sea Symposium project in the context of a need for transnational cooperation in the wider Black Sea region. In its eighth year, the International Black Sea Symposium builds on the success and positive impact of its previous seven editions to bring together the next generation of stakeholders with an interest in the Black Sea area, focusing on STI Cooperation, a key parameter for sustainable development.

The 8th International Black Sea Symposium on "Science, Technology & Innovation in the Black Sea: Moving Forward" was held in Athens, Greece, from 19 to 20 November 2015, under the framework of the Black Sea Horizon Project. The said Project, with the participation of 19 partners from EU and BS Countries, is a good example of productive STI Cooperation between the two regions.

Besides, the Black Sea countries, based on their rich and long-lasting traditions in S&T, foster dialogue and productive synergies as means to strengthen their research and innovation capacity with the aim to enhance their excellence and competitiveness so as to create more sustainable and more inclusive societies.

Moreover, the 8th IBSS dedicated a special session to women and their contribution to sciences and innovation. We were pleased to welcome the participation of inspiring women scientists from variable sectors.

Within this framework, through the 8th IBSS, the ICBSS aimed to offer a platform for dialogue among stakeholders in order to stimulate enhanced regional STI cooperation for mutually beneficial joint actions.

Through interactive sessions, speakers and participants with acute interest in or involved with STI we had the opportunity to explore and discuss the perspectives of R&D cooperation in relation to its academic and economic impact on the Black Sea countries. The present publication is the outcome of the said successful Symposium.

In my capacity as Director General of the ICBSS, I would like to express my sincere thanks to all speakers and participants, who trusted the ICBSS and without their invaluable help the said publication could not come true.

I hope you enjoy it!

Dr. Zefi Dimadama, ICBSS Director General

Athens, April 2016

Section 1:

"Science, Technology & Innovation in the Black Sea"

Chapter 1

Cooperation among Member States of the Organization of the Black Sea Economic Cooperation (BSEC) in the field of Science and Technology

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The Organization of the Black Sea Economic Cooperation (BSEC) was established in 1992 as a regional initiative, and with the entry into force of its Charter in 1999, it was transformed into a full-fledged regional economic organization. In addition to 12 member States from the wider Black Sea area (Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russian Federation, Serbia, Turkey, Ukraine) and four Related Bodies (Parliamentary Assembly of BSEC, BSEC Business Council, Black Sea Trade and Development Bank and International Centre for Black Sea Studies), BSEC has 17 Observers and 15 Sectoral Dialogue Partners (States and International Organizations) from the region and beyond. During twenty three years, BSEC has become the most inclusive and comprehensive organization in the wider Black Sea area, and a forum for discussion and cooperation in a wide range of areas. We have also developed the cooperation with other regional organizations, among others: the Central European Initiative, the Regional Cooperation Council, the Adriatic-Ionian Initiative, the Danube Commission, the Council of the Baltic Sea States and others.

Science and Technology was included among the priority areas of cooperation since the very establishment of the BSEC. A Working Group on Cooperation in Science and Technology was established already in 1994, with a mission to promote cooperative activities in the field of S&T in the BSEC region. Up to now, 27 meetings of the Working Group and four Meetings of Ministers in charge of S&T were held.

Of particular importance are the three consecutive BSEC Action Plans on Cooperation in Science and Technology (2005-2009; 2010-2014 and 2014-2018) adopted by the Ministers in charge of S&T that created the framework for further cooperation in this field. The last Meeting of Ministers in charge of S&T, held in Baku in December 2014, adopted the Third BSEC Action Plan on Cooperation in S&T for the period 2014-2018 that represents the major milestone not only for cooperation among the BSEC Member States but also with other States and international organizations.

Another important development was the adoption, in June 2012, of the “BSEC Economic Agenda: Towards an Enhanced BSEC Partnership”, as a strategic document for guiding the cooperation in the BSEC framework in order to meet the goals set by the BSEC Charter and the new challenges and opportunities that the Member States will be facing in the years to come. The BSEC Economic Agenda aims, inter alia, at supporting a closer, balanced and

mutually beneficial cooperation between BSEC and the European Union, inter alia, by advocating for increased commitment of financial and technical resources to be devoted to the BSEC Region, via such means as closer trade ties and increased inflows of foreign investment; and, achieving higher efficiency of the BSEC-EU cooperation within the framework of the BSEC-EU regional short-, medium- and long-term projects and initiatives through flexible and pragmatic dialogue within identified priority areas.

The activities of the BSEC on S&T have been guided by the consecutive BSEC Action Plans, the adoption of which was preceded by the establishment of the BSEC Ad Hoc Group of Experts on BSEC – EU Interaction and the communication by the European Union of two key policy documents that defined the EU's strategy towards the wider Black Sea area: the 'Black Sea Synergy – A new regional cooperation initiative' and the 'Eastern Partnership', identifying S&T as a priority field for the development of mutually beneficial BSEC-EU cooperation.

At operational/project level significant initiatives were under implementation aimed at an enhanced cooperation among the countries of the wider Black Sea region with EU Member States in the field of S&T: 'S&T International Cooperation Network for Eastern European and Central Asian Countries' (IncoNet EECA), 'Networking on Science and Technology in the Black Sea region' (BS-ERA.NET), the SEE ERANET+, "Linking Russia to ERA" (ERA.NET-RUS). The BSEC was connected with some of those projects also through its Related Body - the International Centre for Black Sea Studies (ICBSS). The common effort undertaken by the BSEC WG and BS-ERA.NET's Task Force for the preparation of the Black Sea Research Programme (BSRP) was a major step for the benefit of the whole region.

BSEC has fully taken into account the broader landscape and focused its activities on human resources, capacity building, research infrastructure and innovation.

In respect of human resources, the following policy orientations were addressed in priority: recognition and consolidation of the role of researchers in addressing Societal Challenges and in a knowledge-based sustainable development of each country and the region as a whole; stimulation and enhancement of the performance of the local research personnel through intensive activities such as mobility schemes, participation in scientific events, promotion of international networking and participation in international projects; provision of a stable working environment for the researchers; increasing the recruitment of researchers and introduction of incentives for pursuing careers in RTD locally in order to avoid further brain-drain.

In the context of capacity building, there was a need to assess the progress, to consolidate the achievements and to address weaknesses. The cooperation within the BSEC was instrumental in this process through benchmarking activities, exchange of good practices, sharing experiences, etc. that enriched the development and implementation of national future-oriented S&T policies. A special focus was placed on highly skilled researchers mobility issues, encouraging, on the one hand, international mobility of talents and, on the other, mitigating the negative effects of 'brain drain'. Cooperation and coordination at regional and international level was essential and to this end, synergies were explored, particularly with the EU.

The renewal or upgrading of the research infrastructures remained an essential need in most of the BSEC Member States. The development of a registry of research infrastructures in the BSEC region has been long discussed. Working Group has chosen to develop a registry of national innovation related structures in the BSEC Member States. A survey has been

prepared by Turkey (TUBITAK) for this purpose and communicated to the Member States. This database will make the policy makers more informed about the infrastructures related with innovation in the region and enable researchers to further interact with their colleagues in the region. This survey should be conceived as a first step in a larger plan of S&T cooperation. Once the data is collected and processed, the WG may think about how to facilitate cooperation among these centres.

The optimum exploitation of the research results and in particular their transformation into innovative products and processes remains a key priority in all the BSEC Member States due to its direct positive impact on employment, economic growth and prosperity. In addressing this priority, all the BSEC Member States already devoted particular efforts to the development of innovation-related structures such as science and technology parks and incubators. In addition to that the international experience shows that several other factors are decisively influencing the innovation capacity. These factors ('Innovation framework conditions') include legal barriers, such as IPR and industry – academia relations, innovation financing. In this context, sharing experiences and good practices within the BSEC and close cooperation with innovation forerunners in the EU and beyond, is essential.

As the BSEC was aiming to be project oriented organization, the Project Development Fund was established in 2002, based on voluntary contributions of the Member States, to assist the project pre-feasibility studies proposed by the institutions of the Member States. With the modest financial resources (up to 30.000 EUR per project), 8 projects in the field of S&T were accomplished so far with the assistance of that Fund. However, as the economic crisis affected the ability of the Member States to contribute, the Fund is depleted and unable to further continue to support new projects. Discussions are under way on how to resolve the problem, but it became obvious that one would need to seek the funding for BSEC projects in the future from outside sources.

In order to assist the Member States, the Project Management Unit (PMU) within the Secretariat was established in 2014. The creation of the Project Management Unit is considered to be an important step to support BSEC's endeavour to improve its project output and to promote good practices in project management. It was a necessary step to close the gap between the organization's focus on projects and the limited internal project management capacities. The PMU is also an important tool to improve the organization's position in the competition for funding and to attract donor and partner organizations for joint project activities.

BSEC has a network of Observers and Sectoral Dialogue Partners that, among others, include the most highly technologically developed countries, and we believe that through such partnerships and synergies, a solution for funding the projects could be found. BSEC concluded the Memorandum of Intent on the cooperation in S&T with the US Government, the European Commission is Observer, and Japan and the Republic of Korea are SDPs of our Organization.

If we are looking ahead, there is a clear orientation of the BSEC to focus on the following priorities in the field of S&T:

• Human resources, capacity building, research infrastructure and innovation as areas of action;

• Developing a registry of national innovation related structures of the BSEC Member States and creating the conditions for their effective interaction;

• Encouraging joint research and training programmes among the Scientific Institutions and Universities in the Member States in line with their priorities;

• Identifying innovative ways for combining allocat
through public-private partnerships, and facilitating the access to other available financial resources;

• Strengthening the network among research institutions and universities for sharing know-how and experiences on innovative projects;

• Facilitating closer cooperation in the fields of S&T among the BSEC Member States, the BSEC Related Bodies and with other partners and international organizations in order to encourage co-funding schemes for formulating and implementing regional research projects.

We are confident that, based on the above mentioned priorities, further steps towards consolidating the project-oriented dimension of the regional cooperation in the fields of S&T will be undertaken by implementing the already existing and identifying new projects of common interest for the Member States. A dynamic dialogue among stakeholders in the S&T community – research organizations, industry, user groups – in order to ensure their cost-effective and result-oriented interaction for the purpose of converting scientific discoveries into innovative, commercially viable products and processes, will be promoted. The particular importance will be attached to further developing collaboration between the BSEC and the EU with a view to implementing the previous commitments, and to this end, to make use of potential that the interaction between them can bring also in the field of S&T. In this regard, BSEC Member States are encouraged to identify strategic partnerships in selected fields of S&T with a view to engaging their best scientists in view of the Horizon 2020.

To this end, two meetings were held within the framework of the “Horizon 2020” project titled “Black Sea Horizon”, aimed at solidifying the foundation of a future multilateral joint funding scheme with respect to management of the call for proposals and the peer review system, respectively.

Chapter 2

STI Performance in the Black Sea region

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Abstract

The paper devoted to the analysis of STI development in the Black Sea region countries during the last decade. The analysis is based on traditional indicators: R&D investment, R&D personal, tertiary enrolment, scientific publications and patent dynamic. Despite of relatively low values of the most S&T indicators, Black Sea region is quite heterogeneous. It is true both for innovation and R&D input indicators, which reflect potential to generate new knowledge, and for indicators, which reflect the quality of enabling and transmission mechanisms to transform new knowledge to innovation, and innovation outputs as well. Also policy gaps in STI policy reforms were calculated for all countries using distance to frontier technique. It allows identifying the urgent reforms in each Black Sea region country as well as structural reforms to upgrade itself to advanced economies "league". As a lack of innovation linkages (academia-industry collaboration, cluster development etc) is one of the main problem for Black Sea countries, some recent measures supported by EU were presented in the paper, in particularly EU Horizon 2020 project "Enhanced bi-regional STI cooperation between the EU and the Black Sea Region", aimed at increasing innovation cooperation through cluster development and support of joint research activity etc.

Keywords

STI indicators, STI performance, Black sea countries, STI cooperation, Horizon 2020.

Introduction

The paper deals with the issues of STI development in the Black Sea region, which covers all 12 members of the Black Sea Economic Cooperation organization (BSEC): Albania, Armenia, Azerbaijan, Bulgaria, Georgia, Greece, Moldova, Romania, Russia, Serbia, Turkey, and Ukraine. The BSEC members contribute almost 6% to world GDP, of which around 3% comes from Russia, only resource rich country in the region. The market size of the region is about 335 mln persons (of which 40% is Russia). BSEC consists mainly of upper-middle and lower-middle income economies, only Russia and Greece belongs to high-income cohort according to the World Bank classification. The most important for STI development is that almost all countries were in so-called soviet block (except Turkey and Greece) that predefined their STI governance system and still negatively affect STI performance.

Methodology

The methodology relies on the comparative analysis of STI indicators available for the BSEC. The sources of relevant data are UNESCO database, World Bank Indicators, Scimago, WEF Global Competitiveness report (GCR). Unlike traditional approach, used in many research policy studies, including UNESCO science reports, more advances statistical techniques were used in this paper in addition to descriptive analysis of S&T trends in human resources, R&D financing and scientific output:

- stationarity test was used to evaluate quality of changes in STI performance. It was applied to long term data of expert assessments, which came from survey conducted in the framework of GCR (pillar 5 "education and training, pillar 9 "technological readiness" and pillar 12 "innovation and R&D");
- distance to frontier technique was applied to determine differences in STI system of the BSEC members. All of them were compared to BSEC average on GCR pillars related to STI;
- income and size adjusted policy gaps were calculated for each BSEC member to identify priorities for STI policy reform. Gaps were measured as standardized differences between actual values of STI indicator and projected values adjusted to GDP per capita and population as regional dummies. The latest data available for GCR 2015-2016 was used, apart from GDP and population data, which refers to 2013.

Main results

Current trends and state of STI development in the Black Sea region

The most important for STI development is human capital, thus it is the first indicator we paid attention in the study. The total number of R&D personnel is about 1,1 mln persons, of which 0,7 mln is from Russia. But the overall trend is not positive. Among Black Sea countries there is no awareness of importance of the issue as each country's dynamic differs a lot. So, the number of R&D staff decreased in four countries, especially in Georgia, where the fall down was 60% during 2001-2013. In the same time the largest increase in R&D staff during 2001-2013 was in Turkey (>2.5 times), Bulgaria and Azerbaijan (1.3-1.4), Greece (1.3), which obviously put more attention on STI development.

It could be noted that the share of researchers in total R&D staff highly depends on the soviet heritage. So, the lowest values were in Ukraine, Russia and Romania (approx. 50-55%), while in Turkey it was about 78%, even more than UK, one of world leader in STI. The low share of researchers could be treated as a negative sign due to inefficient use of research budget. Probably it was good in the past when research activity was manually driven and researcher needed more technical assistance, but now there are advanced machines and scientific tools which simplify research process, thus the necessity in army of non-research staff has gone away.

To conduct high quality research and to get good results researchers should be provided with all necessary equipment, materials and remuneration as well. Thus next point of our interest was R&D expenditures per FTE researcher. It is calculated in constant 2005 USD in PPP by UNESCO Institute of Statistics. In all BS countries the level of R&D financial support is much below world leaders. E.g. USA spends about 300 thus. USD and UK spends about 150. But in

most BS countries such amount doesn't exceed 50 thus. USD, and only Turkey spends more than 100 thus. Notably, during 2009-2013 the R&D expenditures per researcher decreased in majority of the BSEC countries due to the global economic crisis and fiscal austerity measures as well.

Despite low financial support and decrease in R&D staff an output is growing in the most of BS countries (Table 1). Notably, publication activity of Greek researchers during last 6 years slowed down jointly with R&D financing, while researchers from Romania, Moldova and Ukraine intensified their publication activity. On average the growth rate of publications in the BS countries was higher in comparison with Western Europe, where annual growth rate was 1.1% during 2009-2013. One could argue that it is due to high dominance in total number of publications. But it is not fully true, as countries in Asiatic region produce even more scientific documents; the growth rate was about 9%.

Another interesting point is international cooperation between researchers, which is measured by Scimago as document ratio whose affiliation includes more than one country address. Obviously, there are two groups of countries in the BS region, which differs in international cooperation intensity. First group is represented by Moldova, Georgia, Azerbaijan, Armenia, Bulgaria and Greece (to some extent) and it is characterized by quite high international scientific cooperation. And rest of countries belongs to low cooperation group, except of Serbia, which is somewhere on the middle. Unexpectedly, Turkey has the lowest value (about 20%) only, that means S&T development of Turkey is driven mainly by domestic needs and own resources. The data also shows that the level of R&D financing and size of country have negative correlation with international cooperation. More money and bigger size of country lead to lower international cooperation.

Table 1. Publication activity in the Black Sea region

	Annual growth, 2009-2014 , %	**Documents*, average per year 2009-2014**	**International cooperation,** +/- 5%
Russia**	5,7	43404	-30
*Turkey****	4,2	35040	20
Greece*	**-0,8**	**17721**	**45-50**
Romania**	2,6	13093	30-35
Ukraine	5,5	8703	=37
Serbia	7,1	6354	35-40
Bulgaria	**-1,4**	**3736**	**45-50**
Armenia	7,7	1000	55-60
Georgia	4,7	869	55-65
Azerbaijan	**-5,2**	**793**	**50-55**
Moldova	2,5	389	65
Albania	29,1	309	=37

** Number of documents published during the selected year in journals indexed in Scopus.*

Source: author's calculations based on Scimago data (scimagojr.com).

To complete brief analysis of input factors for STI development one should look at gross expenditures on R&D (Fig.1), which was and still is the most cherished indicator in this field[1]. As we can see R&D intensity trends are not in line with a need of sustainable STI development and target settled by the EU. All countries perform far below the EU average, even those who are the EU members. Russia. Moldova and Ukraine are going in opposite direction reducing R&D expenditures year by year, while Turkey, Greece and Bulgaria are likely to fill the gap in R&D financing. But the pace of such catching up is not sufficient to become even regional leaders, especially given the sources of expenditures.

Figure 1. GERD dynamic in BS countries during 2009-2013

Low level	**Moderate (from 0,6% to 1%)**	**High (>1%)**	**EU average in 2013** **2.01% (target 3%)**
Romania ?	Bulgaria ↑	**Russia** ↓	
Moldova ↓	Greece ↑		
Armenia =	Serbia ?		
Azerbaijan=	Turkey ↑		
Albania ?	**Ukraine** ↓		

Source: UNESCO Institute of Statistics

The common problem for all BS countries is low involvement of business sector in S&T activity. The share of business sector is usually low and in some cases is EXTREMELY low (Serbia, Albania <10%). Only in Turkey it was about 50% GERD that is on the same level as in the UK, but still less then USA by 12 p.p. At the same time trends are not clear for all countries as the share of business R&D expenditures is quite vulnerable. However, it is quite obvious that there are negative trends in Bulgaria and Romania and Ukraine.

As for foreign financing, which is an indicator of an international cooperation, usually in all BS countries it is on the low level. However, during last years the high growth of foreign financing was experienced in Romania and Moldova (up to 15 and 12% of GERD), while Ukraine keeps quite high share on more or less stable level around 20%. The most internationalized in terms of financing is Bulgaria getting around 50% of R&D expenditure from abroad and this was achieved starting from 8% in 2009. This case shows that Bulgaria has found a good way to attract EU funds and foreign investors, which are interesting in medical research. The share of medical science drastically increased since 2008 from 4 to 44% in 2012 in Bulgaria. And it is the highest level among all BS countries.

[1] Benoît Godin "The most cherished indicator: GERD". Project on History and Sociology of S&T Statistic. Working Paper №22 (2003). Retrieved from http://www.csiic.ca/pdf/godin_22.pdf

Looking at others, it is quite surprising that Ukraine famous for its agriculture with one of the best soil in the world doesn't support agricultural science (its share in R&D financing is around 6%), preserving engineering and technology as a de-facto priority (55-60%). But the most specialized country is Russia spending more than 70% of R&D expenditures on engineering and technology.

As drawback of statistical indicators is weak relation with quality of S&T and innovation activities, in addition to them survey based assessments are used to assess STI development of a country. Therefore, next part of our study covers analysis of three pillars of Global Competitiveness report of the WEF. First is Education and Training (pillar 5), which reflects the quality of education system, that is an important prerequisite of high quality R&D. Second one is technological readiness (pillar 9), which describes business sector capacity to absorb new technologies. And third one is innovation and R&D (pillar 12), which is one of the most important as it contains expert assessments of R&D quality, science and industry collaboration etc.

The table 2 presents evolution of values during time since 2006 (or earliest available date). But instead of values linear trend coefficient was calculated for the corresponding time series as we wanted to look at the dynamic over time.

Table 2. GCR indices linear trends.

Linear trend, OLS	**Higher education and training**	**Technological readiness**	Technology adoption	**Innovation and R&D**
alpha=5%	Pillar 5	Pillar 9	Subindex 9.A	Pillar 12
Albania	0,19	0,09	**-0,13**	0,09
Armenia	0,12	0,16	0,01 (NS)	0,01 (NS)
Azerbaijan	0,05	0,18	0,01 (NS)	**-0,001 (NS)**
Bulgaria	0,05	0,21	0,07	0,009 (NS)
Georgia	0,04	0,18	**-0,02 (NS)**	0,002 (NS)
Greece	0,05	0,20	**-0,01 (NS)**	**-0,014 (NS)**
Moldova	0,03 (NS)	0,23	0,035 (10%)	0,019 (NS)
Romania	0,05	0,14	0,06 (NS)	0,01 (NS)
Russian	0,08	0,15	0,03 (NS)	**-0,019 (NS)**
Serbia	0,07	0,15	0,009 (NS)	**-0,03**
Turkey	0,07	0,11	**-0,014 (NS)**	0,019 (NS)
Ukraine	0,09	0,08	**-0,06 (NS)**	-0,002 (Highly NS)

Source: author's calculations based on the CGR dataset accessed at http://www3.weforum.org/docs/gcr/2015-2016/GCI_Dataset_2006-2015.xlsx

The leaders in the BS region are Armenia, Bulgaria, Moldova and Turkey as those countries were able to improve substantially performance in most of STI related fields. At the same time Greece was in the top-3 for technological readiness improvement only. By fact the best progress was experienced with regard to pillar 9, but it was mainly due to ICT related

indicators. At the same time only Bulgaria experienced significant progress in technology adoption (subindex of pillar 9). The most problematic for the BS region is pillar 12 (innovation and R&D). Only Albania has significant positive trend and Serbia with significantly negative one. The trends for the pillar 12 are not clear, non-significant for the rest of countries and coefficients are close to zero. It means that almost all BS countries were not able to improve situation with the quality of scientific research (!), lack of university-industry collaboration in R&D etc.

As for education and training it seems that all countries are more or less successful and have a positive dynamic, but such efforts related mainly with extensive measures, that are increase of secondary and tertiary enrollment rate, internet access in schools and so on. Somehow extent of staff training was improved too. But quality of education remains weak issue even for Turkey and Greece, which also represents OECD.

Given the results of OLS estimation of the following cross sectional regression:

$$Log\left(Score_{pillar_i}\right) = const + b_1 * \log(GDP\ per\ cap) + b_2 * + \log(Population) + \cdots b_n * dummy.. + \varepsilon ,$$

income and size adjusted gap was calculated to identify priority areas for STI policy reform for the Black Sea region. The adjusted policy gaps is measured as a standardized difference between actual value of indicator and projected value adjusted to GDP per capita and size of country as well as regional dummies. All BS countries perform worse than they should do with regard of their GDP level (Table 3). It means that STI is underutilized and less effective. To change situation governments should first of all turn attention to the innovation and R&D, e.g. to improve quality of research infrastructure and institutions, to facilitate innovation cooperation and linkages between various actors and stakeholders, to orient public procurement on innovations and high tech solutions etc, and education, which is a base for medium and long term STI performance.

Table 3. STI policy gaps for the Black Sea countries

	Higher education and training (Pillar 5)	**Technological readiness** (Pillar 9)	**Innovation** (Pillar 12)
Albania	-0,5	-0,3	-1,3
Armenia	-0,6	-0,2	-1,1
Azerbaijan	**-1,0**	-0,2	-1,1
Bulgaria	**-0,8**	**0,0**	-1,3
Georgia	**-0,8**	-0,2	-1,4
Greece	-0,6	-0,2	**-2,3**
Moldova	-0,6	0,2	-1,4
Romania	**-0,8**	-0,1	-1,2
Russia	**-0,6**	-0,1	-1,1
Serbia	**-0,8**	**0,0**	-1,3
Turkey	**-0,9**	**-0,5**	**-1,9**
Ukraine	-0,5	-0,3	-1,1

Source: own calculations based on the CGR dataset

It should be noted that S&T development and innovation are not key issues for policy making, but rather they are on the shadow of more publically sensitive topics such as pension, taxation, labor policy as well. However, even these policies could and should include measures oriented on STI development. So, STI policy have to be developed in a systemic and complex way, paying more attention to internationalization of science, building linkages between research institution and industry, creating favorable eco-system for innovation etc. This statement is supported by number of studies, including ongoing Black Sea Horizon project in its policy brief on obstacles, drivers and opportunities to enhance EU-Black Sea STI cooperation

STI cooperation in the Black Sea region: further steps to develop

While high level policy makers in the BS countries are taking measures, that by fact are not very effective, to develop R&D and innovation in the countries, there are some efforts made by profile ministries, NGOs and research institutions trying to build new links in STI and expand existing ones. Thus a number of projects within framework programme on research were completed with the support of the EU and what is more important, such projects are still going on. One of them, the Black Sea Horizon project[2] (Grant Agreement №645785), is specially designed to stimulate STI cooperation of the Black Sea countries with the EU and within the region as well.

The project is conducting by a consortium of 19 institutions from 16 countries, of which 10 represents the Black Sea region. The consortium is led by the Centre for Social Innovations (Austria). The project activities covers different issues of STI cooperation, starting from policy oriented measures and finishing with joint call for R&D and innovative projects and facilitation of intercluster cooperation. The BSH project has identified three possible thematic fields for S&T cooperation, based on co-publication analysis. There are sustainable agriculture, advanced and smart materials and resource efficiency & environment. Among core events it should be stressed on **"**Black sea horizon Conference", which will be organized on the beginning of 2017 to reflect, discuss and endorse recommendations to improve the framework conditions and to mitigate obstacles for STI cooperation between researchers from the EU and the non-EU BS countries.

Conclusions

To summarize mentioned above, it should be stated that despite the empirically proved positive impact of STI activity on economic development, there are no consensus among top level policy makers of BS countries on the issue of facilitating and supporting STI development. Human potential in S&T is rather deteriorating or remains the same. The number of R&D personnel has been discernibly increased only in Turkey, Bulgaria, Azerbaijan,

[2] More details and project results are available at https://blacksea-horizon.eu/ and at project's Facebook page https://www.facebook.com/BlackSeaHorizon/

and Greece in 2001-2013, while in the largest BS countries it is still falling down (Russia and Ukraine).

Drop in R&D staff did not relate with increase in financial provision per researcher in most of the BS countries. Only Serbia, Bulgaria and Russia increased it, but the level is still very low. The best performer in the region, that is Turkey, spends three times less than USA and 1.3 less than UK.

As the most important problems for all BS countries lie rather in innovation and R&D domain, particularly quality of scientific institution and education, linkages between various actors and stakeholders. To increase STI performance governments of BS countries should revise STI policy not only towards generation of knowledge, but rather towards its utilization and turning on economic and social benefits. It includes building of university-industry alliances, enhancing innovation cooperation, technology transfer etc. At the same time research system should be reinforced, that needs comprehensive evaluation and assessment, competitive financing and adequate support.

Chapter 3

The Organization of the Black Sea Economic Cooperation (BSEC) and the European Union's Defence Industries: Existing and Potential Synergies

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Abstract

Aerospace and Defence (A&D) industry is one of the most significant and complex industries in terms of the high technological content of its products, the high financial risks related to considerable development costs and the complex structure of the supply chain. A&D industry plays an important role on national economies and on the technological base of any given country, as it provides innovative products and significant socioeconomic benefits (skilled jobs etc.).

International cooperation between A&D companies could help towards the direction of creating interstate strategic synergies aimed at addressing among others technological gaps, developing and/or manufacturing innovative products and/or services, thus providing important gains for the industrial base of the countries involved. Among others, such synergies facilitate the circulation of “tacit knowledge” between entities (companies and/or universities), create new jobs and provide access to resources (knowledge, capital etc.).

The purpose of this paper is to discuss existing and potential synergies between the A&D industries of Black Sea Economic Cooperation (BSEC) and European Union (EU) member states.

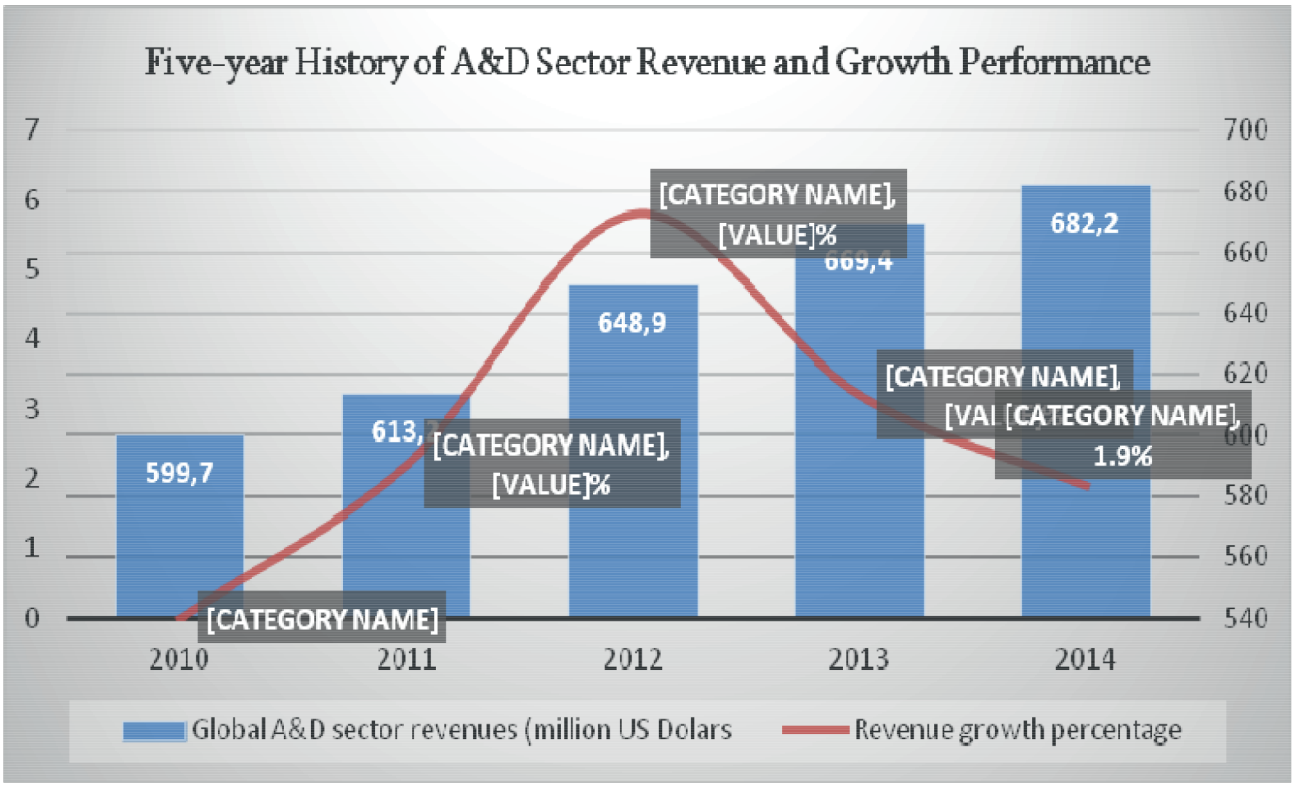
Keywords

Aerospace & Defence industry, BSEC Countries, EU Countries, Cooperation, Defence Imports, Defence Exports

Aerospace and Defence Industry: A complex and interconnected industry

Aerospace and Defence (A&D) industry is one of the most significant and complex industries in terms of the high technological content of its products, the high financial risks related to considerable development costs and the complex structure of the supply chain. A&D industry plays an important role on national economies and on the technological base of any given

country, as it provides innovative products and significant socioeconomic benefits. In order to further understand the scale and size of the industry one can consider the revenue of the sector. According to a report prepared by Deloitte, the revenues of the global A&D sector reached US$682.2 billion in 2014, growing by 1.9% compared to 2013[3].



Source: Five-year history of A&D sector revenue and growth performance, Deloitte, June 2015

As it is commonly acceptable, international collaboration is going to be a vital enabler of growth for the A&D sector in the future. International cooperation helps towards the direction of creating interstate strategic synergies that aim among others at addressing technological gaps and at developing and/or manufacturing innovative products. Such synergies facilitate the circulation of "tacit knowledge" between entities (companies and/or universities), create new jobs and provide access to resources such as knowledge and capital.

Additionally, one must also stress that the latest technological advantages, for example in electronics, computers and composite materials are partially spin-offs of technological developments in the A&D industry. And it is not only the diffusion of technology from A&D activities that it is important, it is the diffusion of all public knowledge that actually matters. These developments should not only perceived as a result of an individual player, but as an interaction between different actors. The more closely companies work together, the better they get to know each other and the easier is to benefit from the knowledge created and then to use this knowledge for the benefit of the society.

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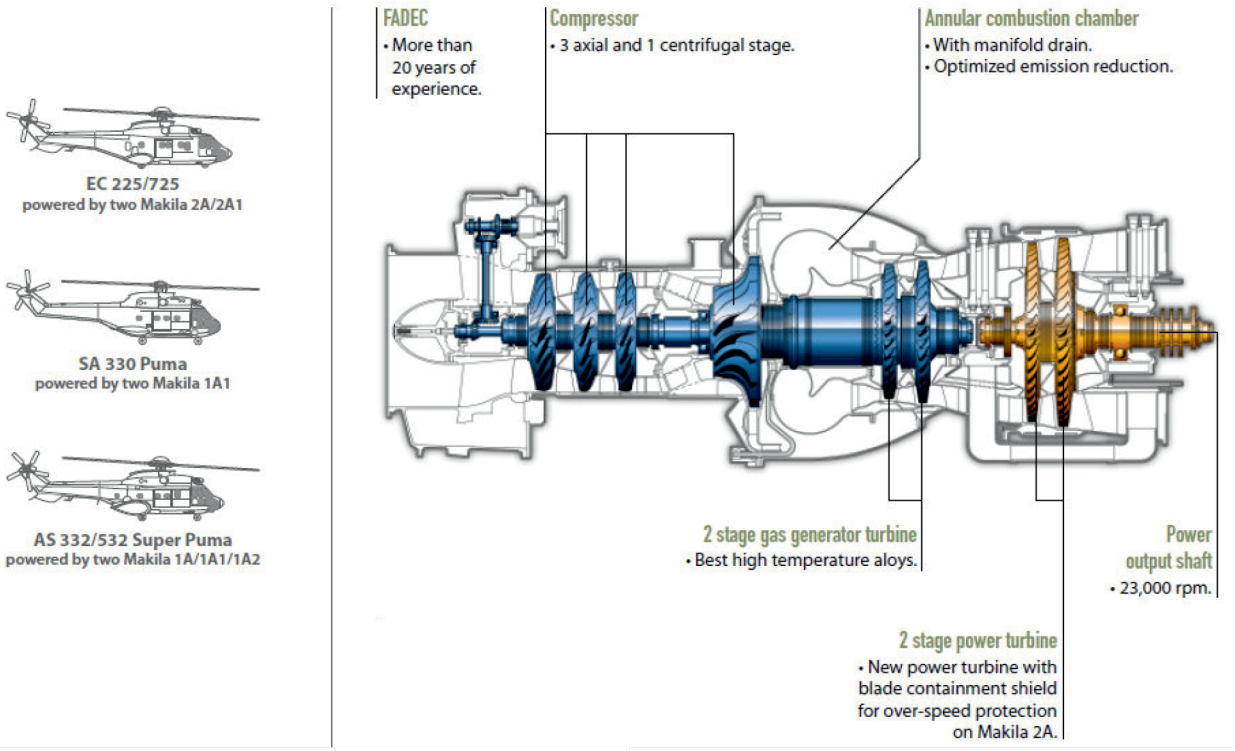
[3] Deloitte, Five-year history of A&D sector revenue and growth performance (UK: Deloitte, 2015), accessed December 3, 2015, http://www2.deloitte.com/content/dam/Deloitte/global/Documents/Manufacturing/gx-mnfg-a-and-d-financial-perf-study-2015.pdf.

This is actually the purpose of this paper. Using A&D as a starting point to go beyond a simple mapping of technological results and to examine the socioeconomic benefits created from cooperation between BSEC and EU A&D companies. This will be facilitated through the discussion of some cases that exemplifies this cooperation. Additionally, this paper will make a synoptic analysis of the bilateral trade of A&D products between the BSEC and EU member states.

Cases of Cooperation

a. Tusaş Engine Industries INC. (TEI) - Turbomeca

The first case of cooperation between EU and BSEC A&D companies considered, is the one between the Turkish company Tusaş Engine Industries INC. (TEI) and the French Turbomeca. The foundation of this cooperation was set on January 2009, when Turbomeca and the Turkish Ministry of Defence signed a contract for setting up a repair centre for the Turbomeca Makila 1A1 turbo shaft engines equipping the 50 Cougar helicopters operated by the Turkish Army. This new repair centre is based at Eskişehir and provides up to level 4 repair for the Makila 1A1 engines installed on the Turkish Cougar helicopters[4].



Turbomeca Makila 1A1 Turbo Shaft Engine and Helicopters Operating this Engine[5]

[4] Last modified November 20, 2015. http://www.safran-group.com/media/20090106_turbomeca-and-turkey-sign-support-contract-makila-1a1-engines-powering-cougar-state-helicopters

[5] Last modified November 20, 2015. http://www.turbomeca.com/helicopter-engines/over-2000-shp/makila/makila-1a1/1a2/1k2

With this cooperation the Turkish authorities managed to increase their autonomy in repairing the Makila engines thus reinforcing the industrial capabilities and technological autarky of the country.

b. Sedef Shipbuilding Inc. - Navantia

Another similar case is that of the cooperation between the Turkish SEDEF SHIPBUILDING INC. and the Spanish Navantia. SEDEF and Navantia teamed together in order to win the Turkish international tender for the design and construction of one LPD and four LCM landing crafts for the Turkish Navy. The joint venture managed to win the tender.

Navantia will provide the design, transfer of technology and technical assistance to SEDEF for local construction. Besides the design, which will be based on the vessel "Juan Carlos I" of the Spanish Navy, Navantia will also provide several components and systems, as the engines, the turbine and the IPMS (Integrated Platform Management System)[6].

It will be important to notice here that the joint venture between Navantia and SEDEF enabled the Turkish company to receive technology and to take part in a tender that they will not be able to win otherwise. Thus, Turkey managed to increase the nationalization of local defence procurements and decrease dependence from external markets, by partly achieving self-sufficiency in defence production.

c. METKA S.A. - Krauss-Maffei Wegmann - GmbH & Co. KG (KMW)

The next cooperation under discussion is that of the Greek company METKA S.A. and the German company Krauss-Maffei Wegmann. On 26 November 2013, METKA S.A. signed an industrial coproduction agreement with Krauss-Maffei Wegmann GmbH & Co. KG (KMW). METKA will supply defined metal structures of the hull and turret for 62 LEOPARD 2 main battle tanks for the Middle East market. The value of the agreement will reach 56.5 Million Euro.

METKA and KMW also cooperated in the producing of the LEOPARD 2HEL tanks for the Greek Army. This co-operation started in 2003. It was then that the two companies set the basis of their partnership that included extensive know how transfer and substantial investments on highly sophisticated machinery in METKA's two factories in Volos[7].

METKA and KMW cooperation helps towards the direction of preserving much needed jobs and supporting the transfer of skills and international best practices to Greek nationals, thus enhancing their technological level and improving their potential.

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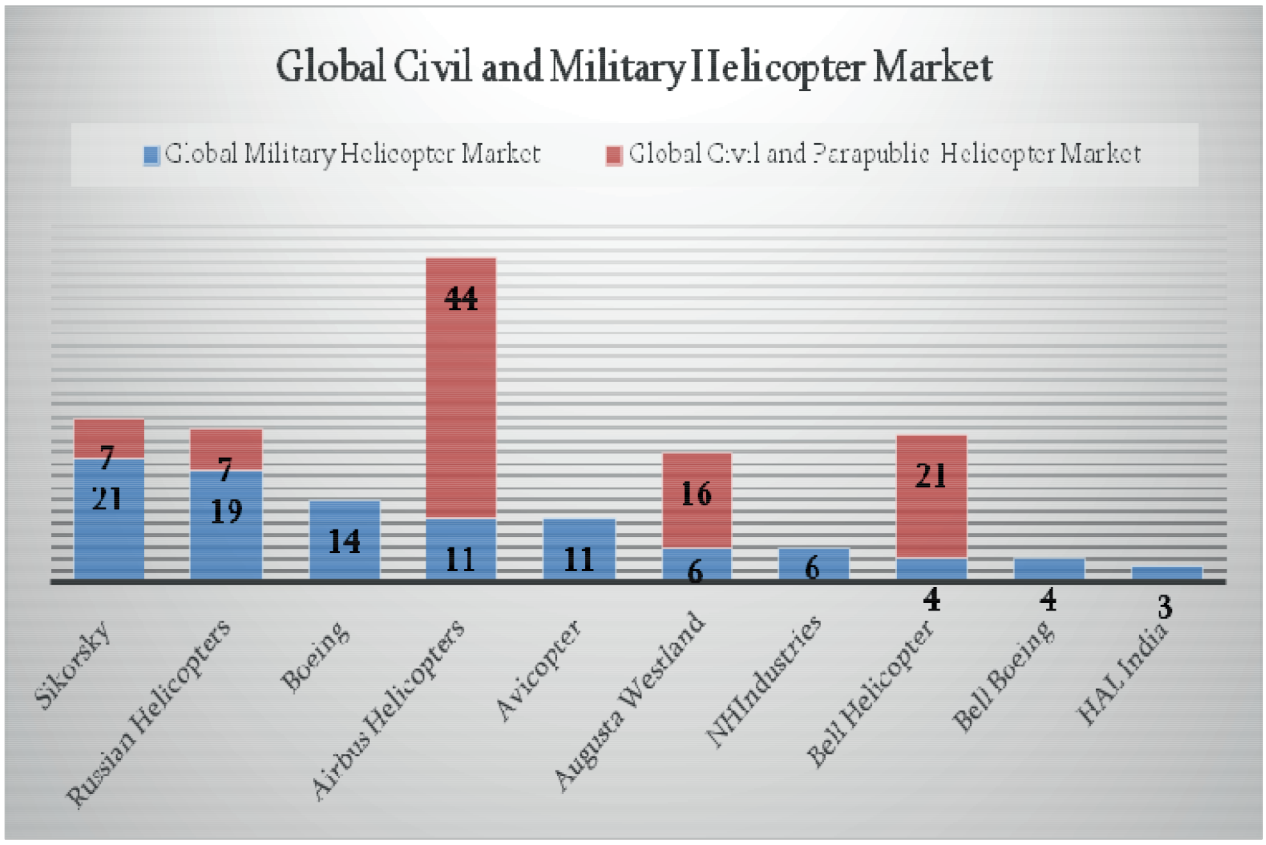
[6] Last modified November 30, 2015. https://www.navantia.es/noticia.php?id_noti=291

[7] Last modified November 26, 2015. http://www.metka.com/interactive-documents/annual-report-2013-eng/files/assets/basic-html/page36.html

d. AgustaWestland and the Russian Russian Helicopters

Italian company AgustaWestland and the Russian company, Russian Helicopters, formed On November 6 2008, a Joint Venture (JV) named HELIVERT. HELIVERT was established to set up and run a final assembly line in Russia for the AW139 intermediate medium twin helicopter. The final assembly line is primarily aimed at satisfying market requirements in Russia and neighbouring countries. HELIVERT's plant, situated in an area of 40 000 sq.m. is located in Tomilino, Moscow region. Currently, the company employs more than 100 qualified employees. The first AW139 assembled in Tomilino performed its maiden flight in December 2012[8].

The joint venture helped towards the direction of developing new export products for the Russian industry, as it established new international marketing channels. This is mainly attributed to the fact that an indigenous company, HELIVERT could exploit the international network of two well-established companies of the helicopter sector, Russian Helicopters and AgustaWestland, in order to expand their market potential. It is indicative that AgustaWestland and Russian Helicopters captures together 23% of the civil and parapublic and 25% of the military helicopter market.



Source: http://www.airbushelicopters.com/website/en/ref/Key-Figures_94.html

e. Airbus Group Technology Licensing - AP Group Airbus Group Technology Licensing & ORPE «Technologiya»

Two cooperation agreements formalized by Airbus Group Technology Licensing during the MAKS aerospace show in the Russian town of Zhukovsky, that took place on September 2015.

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[8] Last modified November 29, 2015. http://www.helivert.aero/en/about/

The agreements will transfer the Group's extensive composites know-how and expertise to the Russian industry.

The first agreement was signed with the St. Petersburg-based AP Group, Russia's largest privately-owned company specializing in composites. AP Group will offer technologies, production methods and other capabilities to Russian industry from Airbus Group's available licensing portfolio.

The second agreement was signed with ORPE «Technologiya», a state research institute, which focuses on field research, development and production of polymeric composites, ceramics and glass. The agreement covered the transfer of technology in tooling, composite and glass production processes, as well as non-destructive testing[9].

There is a multitude of benefits to all players when it comes to transfer of technology. Undoubtedly, thought, the recipient of the technology is the one getting the biggest gains, as it is profits with the acquisition and/or development of new and better products, processes, and services that lead to increased efficiency and effectiveness, greater market share and increased profits. This is actually the case with the agreements AP Group and ORPE «Technologiya» signed with Airbus Group Technology Licensing as the two Russian entities benefit by becoming more responsive to the modern and sophisticated needs of the markets they serve, demonstrating their viability and worth.

f. Airbus Helicopters Romania

Airbus Helicopters has established a branch in Romania named Airbus Helicopters Romania. Airbus Helicopters Romania is a specialized maintenance and repair centre for a wide range of helicopters, civil and military, operating in Romania and elsewhere in Europe, Africa and the Middle East. Airbus Helicopters Romania was established in 2002[10].

On November 2015, Airbus further reinforced their position in the country by setting down the foundation stone of their new Romanian factory in Brasov, established to assemble the latest helicopter to join the H Family of aircraft – the H215.

According to a press release published by Airbus Helicopters, the 10,000m² factory will work under the control of Airbus Helicopters Industries, and will facilitate the H215 production from procurement to after-sales, including design office activities. The factory will provide jobs to more than 300 employees in the long term. The assembly line will be capable of producing up to 15 aircraft per year, starting from 2017[11].

The presence of Airbus Helicopters to Romania has some tangible socioeconomic benefits for the local society, such as the formation of a cooperative scheme that brings to the country sophisticated technology and tacit knowledge, the creation of new jobs and the enhancement

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[9] Last modified November 17, 2015. http://www.airbusgroup.com/int/en/innovation-citizenship/latest-news/Airbus-Group-Technology-Licensing-s-activities-in-Russia-expand-with-new-agreements.html

[10] Last modified November 17, 2015. http://www.airbushelicopters.ro/

[11] Last modified November 17, 2015. https://www.airbushelicopters.com/website/en/press/Romania-to-host-production-of-new,-robust,-and-cost-effective-H215-heavy-helicopter_1865.html

of the technological level of the indigenous industry, which is mainly achieved through the establishment of an advanced network of industrial capabilities in the country.

Cooperation between BSEC and EU A&D Industries: Political and Socioeconomic Benefits

Cooperation schemes between BSEC and EU industries provided valuable assistance towards the development of sustainable industrial capabilities and the creation of solid socioeconomic benefits for the local society. Summarising one can say that such cooperation schemes have managed to:

- Enhance the technological level of the local A&D industry, by modernizing the methods and processes of production;
- Transfer technology to the domestic industry;
- Grow the job market, by creating new opportunities for employees with high technological level;
- Create market opportunities for the export of goods and services;
- Increase the nationalization of local A&D procurements and decrease dependence from external markets;
- Augment capacity for Research, Design and Development related to A&D products and services
- Obtain technology and capabilities that do not exist in their current industrial base, as well as to establish cooperation and integrate their industries into international supply chain channels.
- Assist BSEC member states A&D companies to add viable and innovative products and/or services to their portfolios.

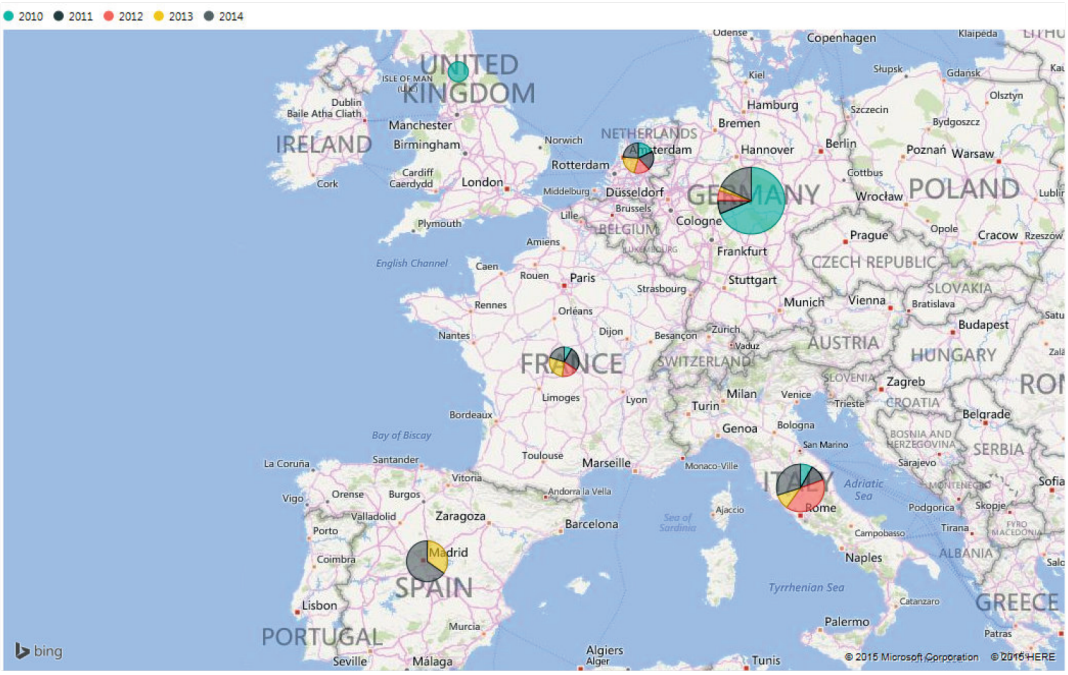
On the other hand EU companies succeeded in creating new strategic partnerships in new countries and in opening new markets for their products. Furthermore, they managed to compete and win international defence business opportunities, to remain globally competitive and not to expect solely from their internal market to provide business opportunities. After all we should not fail to notice that EU is facing the worst economic crisis since its creation, something that is limiting the available funds that national authorities can allocate on Aerospace and Defence. It is indicative that in 2013 the defence budget of the European Defence Agency (EDA) member states decreased by 1.7 billion Euros compared to 2012. In real terms, the total defence expenditure has been declining since 2006, dropping by over 32 billion Euros[12].

A&D Industry: BSEC and EU Bilateral Trade

According to the Stockholm International peace research institute, in 2014 EU recorded an amount of defence exports totalling approximately 7.9 billion US dollars. Exports to BSEC

[12] European Defence Agency (EDA), Defence Data 2013 (Belgium: EDA, 2015), accessed December 10, 2015 http://issuu.com/europeandefenceagency/docs/eda_defence_data_2013_web/1?e=4763412/12106343

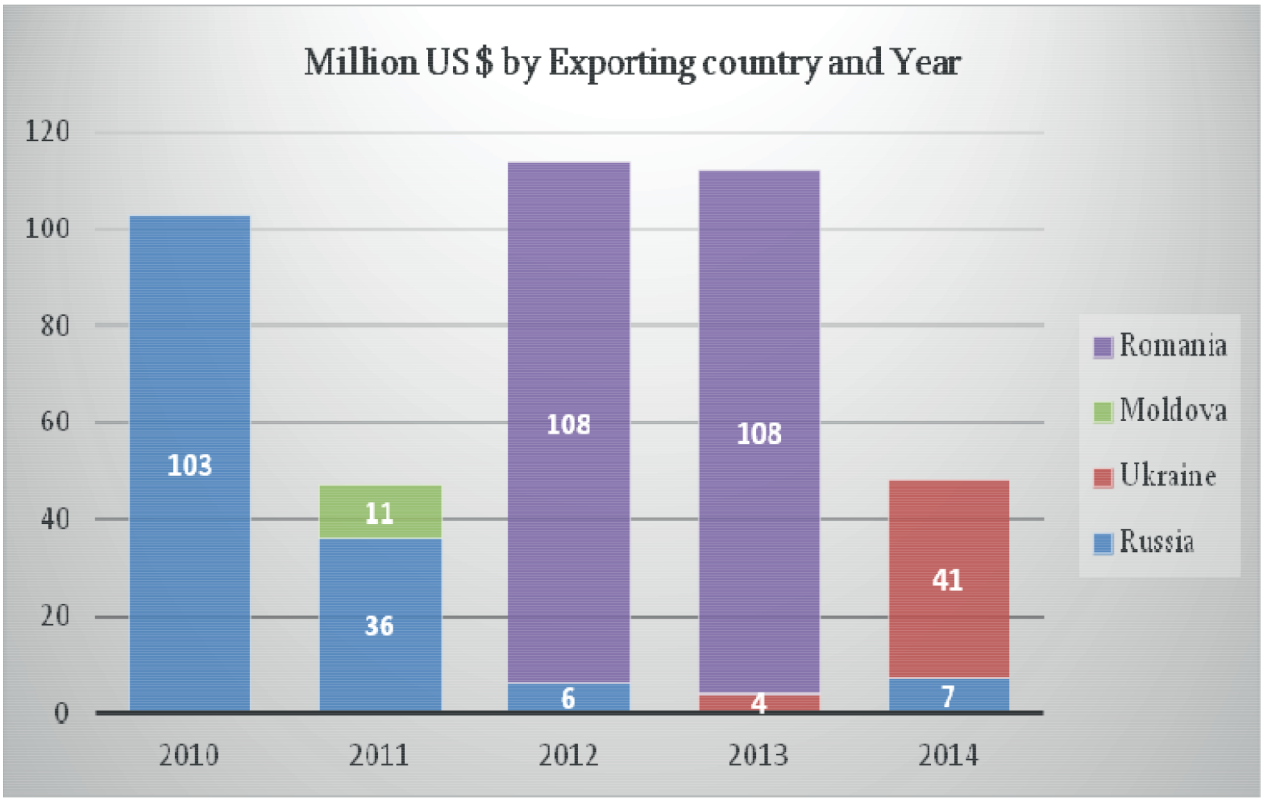
member states represented only 8% of the total exports. Germany was the country exporting the biggest amount of defence equipment to BSEC countries for the period 2010-2014 accounting for the 35.7% of total exports. Italy with 22.5%, Spain with 17.8%, Netherlands with 10.6%, France with 9.9% and UK with 3.4% followed.



Million US $ by EU Exporting country and Year[13]

On the other hand, Romania, was surprisingly the BSEC member state, that exported the biggest amount of defence equipment to EU countries. Romania was followed by Russia, Ukraine and Moldova.

[13] Source: Stockholm International Peace Research Institute (SIPRI) Database and own estimations.



Million US $ by BSEC Exporting country and Year[14]

Romania was the biggest exporter of A&D equipment to EU mainly because in 2013 they delivered to Netherland two offshore patrol vessels that were designed in Netherlands and produced in Romania in the Damen shipyards in Galati. This export exemplifies the synergies created through the establishment of strategic partnerships between A&D companies of BSEC and EU countries. In 1994, Damen started cooperating with Galati shipyards by subcontracting hulls of cargo vessels. This cooperation worked out very well and in 1999 the shipyard officially joined Damen Shipyards[15]. An ambitious investment plan followed which mainly focused on the improvement of efficiency and on the working conditions. The cooperation matured in such an extent that resulted in the production of a vessel that was exported.

Cooperation between BSEC and EU A&D Companies: The way ahead

Summarising one can say that despite the fact that an extended network of cooperation schemes has been created between A&D companies from EU and BSEC member states multilateral trade was rather low. Nevertheless, one should clearly and safely conclude that synergies created between BSEC and EU A&D companies would further mature helping towards the direction of developing and manufacturing innovative products, the creation of new jobs and the transfer of technology and knowledge. The cases discussed in the above sections, exemplifies the direction towards which the cooperation between BSEC and EU A&D industries should be directed.

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[14] Source: Stockholm International Peace Research Institute (SIPRI) Database and own estimations.

[15] For further information about Damen Galati Shipyards, visit: http://www.damen.ro/

The internationalization of A&D industries is a fact that cannot be ignored as the level of cross-border cooperation between distinctive entities and the merger between corporate actors of different national origins leads to the creation of new, internationalized entities that make new, sophisticated products, services and capabilities available. BSEC and EU A&D industries should further exploit potential synergies and create projects and products that will provide added value to the society of BSEC and EU member states.

Chapter 4

Sturgeons as a Common Natural Resource for Black Sea and Lower Danube Countries

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Abstract

Harvesting sturgeon for their highly prized caviar and hydromorphological alterations (navigation, hydropower plants, embankments) represent the major threats for sturgeons in the Danube; additionally, water and sediment pollution and sedimentation in the Danube River, Danube Delta and Black Sea pose additional threats for sturgeons and their habitats. Sturgeons were already important in the Mesolithic and early Neolithic, and the Ancient Greeks also mentioned their great economic importance in the Danube region. From the Middle Ages until the end of the 18th century sturgeons represented a valuable Danube River resource. Significant declines in sturgeon populations were reported in the early 19th century due to intensive fishing. River modification in the Djerdap/Iron Gates Gorge for navigation in the late 19th century negatively impacted sturgeon migrations, while construction of hydropower dams at rkm 943 in 1970 and rkm 863 in 1984 halted sturgeon spawning migration at rkm 863. Nowadays, all anadromous sturgeon species in the Danube are critically endangered. Many national and international projects were devoted to sturgeon conservation in the Danube River and Black Sea in the past decade to reverse their declining trends. This paper represents a synthesis of past and current activities.

Keywords: anadromous fish, sturgeon caviar, fish passage, sturgeon aquaculture, natural resource

Introduction

Archaeozoological data and fish bones belonging to sturgeons discovered in settlements along the Danube prove that Danube River sturgeons were important as early as the Mesolithic and Early Neolithic age (Lenhardt et al. 2014). According to Bacalbasa-Dobrovici (1997) Greek writers mentioned the great economic importance of sturgeons, explaining that inhabitants were allowed to fish at the mouth of the Danube and export salted fish to Greece and Rome without charge. Sturgeons also represented a very valuable natural resource in the Middle Ages, and until the end of the 18th century (Bacalbasa-Dobrovici 1997, Haidvogl et al. 2014). However, intensive fishing caused a decline in sturgeon populations at the beginning of 19th century (Bacalbasa-Dobrovici 1997) while at the end of the 19th century the first negative anthropogenic impacts took place through river regulation in the Djerdap region

(Lenhardt et al. 2014) and channelization of the Sulina arm for navigation. Moreover, the construction of the Iron Gates hydropower dams without fish passes at rkm 943 in 1970 and rkm 863 in 1984 tremendously shortened the sturgeon spawning migration route, bringing them close to extinction. The dramatic decline of sturgeons drove Romania to ban commercial sturgeon fishery for a 10-year period in 2006, which was followed by Serbia and Bulgaria (Smederevac-Lalić et al. 2011). Ukraine has also banned commercial sturgeon fishery, with all sturgeon species being included in the Red Book of protected species.

An Action Plan for the conservation of sturgeons in the Danube River Basin (SAP) was published in 2006 (Bloesch et al. 2006) as the key document for sturgeon conservation and protection. However, despite the attempts of Danube countries to implement part of the measures, the efforts to stop the decline of sturgeons were without success.

In the frame of the integrative EU Strategy for the Danube Region (EUSDR), the Danube Sturgeon Task Force (DSTF) was established in January 2012 by a group of sturgeon experts, NGO delegates, representatives of the International Commission for the Protection of the Danube River (ICPDR), EUSDR – Priority Area 6 (Biodiversity) and national governments. The main aim of the DSTF is to foster the activities relating to sturgeon conservation in the Danube River Basin and the adjacent Black Sea by enhancing coordination and harmonization of measures (http://www.dstf.eu/). Based on SAP, a strategic program for the protection and rehabilitation of Danube sturgeons was published in 2013 by the DSTF (Sandu et al. 2013).

Many national and international projects were devoted to sturgeons of the Danube River Basin and Black Sea, and this paper summarizes the results of three international projects relating to sturgeon stocking, behaviour and ex-situ conservation, and discuss them together with results from other projects relating to sturgeons in this area.

Material and Methods

This paper summarizes activities performed within the frameworks of three international projects concerning sturgeons from the Middle and Lower Danube Region, as well as from the Black Sea: "Evaluation of survival and distribution in the Black Sea of young sturgeons stocked experimentally in the Lower Danube", Romania (2013-2015) financed by the Romanian Fisheries Operational Programme; "Fish behaviour preparatory study at Iron Gate Hydropower dams and reservoirs" (2014-2015) financed by the European Investment Bank; and "Ex-situ survey to preserve sturgeon genetic diversity in the Middle and Lower Danube" (2015-2016) financed by the European Union and the City of Vienna.

Migration of Young Sturgeons Stocked Experimentally in the Lower Danube

This project was lead by the University of Galati, Galati, Romania. In addition to institutions from Romania, scientists from Ukraine, Bulgaria, Turkey, Georgia and Serbia were also included in the project.

The main activity consisted of monitoring the distribution of young sturgeons belonging to three anadromous species: Russian sturgeon (*Acipenser geuldenstaedtii*), beluga (*Huso huso*) and stellate sturgeon (*Acipenser stellatus*) juveniles in the Black Sea. For this purpose, 220,000 young sturgeons were marked and experimentally restocked in the Danube River between 2013 and 2015, part of them being recaptured during this study. Overall, 1,632 wild

(53.43%) and stocked (46.57%) sturgeons were captured and sampled for genetic analyses in the river and the coastal waters of the Black Sea, in Romania, Ukraine, Turkey and Georgia.

Fish Behaviour Preparatory Study at Iron Gate Hydropower dams

This project was lead by the Danube Delta Institute, Tulcea, Romania. The goal of this project was to acquire more knowledge on sturgeon behaviour downstream of the Iron Gates dam, located between Romania and Serbia, the first major barrier disrupting sturgeon spawning migration. This represents preliminary information for a feasibility study investigating the possibility of restoring sturgeon migration across the dams. Restoring river connectivity and free movement of fish species between different habitats is a legal requirement under several EU directives: Water Framework Directive, Habitat Directive and Marine Strategy Framework Directive, and was included as one of the key measures of the Danube River Basin Management Plan (ICPDR 2015). A functional fish passage at the Iron Gates dams will allow sturgeons to recover access to additional habitats located along about 800 km of the Danube River, up to the Gabcikovo dam.

Specific objectives involved testing and adapting different telemetry techniques (radio and acoustic) on sturgeon, in order to achieve the detection resolution required to precisely determine the preferred location of fish pass entrances at the Iron Gate hydropower and navigation systems, and to prepare and train sturgeon tagging and tracking teams from Bulgaria and Serbia to become partners in the future larger telemetry study on sturgeon behaviour in relation to the Iron Gate hydropower and navigation systems. During the project, Bulgarian and Serbian teams were actively engaged in all activities. Cooperation was established with Norwegian experts, Romanian, Bulgarian and Serbian partners, and local fishermen from all three countries. Collection of all existing available data on local conditions relevant to sturgeon behaviour at the Iron Gates dams, including a 3-D bathymetric and flow survey, was performed. Comparative analyses of range, resolution, accuracy, practicality and the possibility for optimisation of equipment and the deployment of radio, acoustic and manual telemetry/tracking systems for sturgeon in the context of supporting fish migration on the Iron Gates was done.

Possibility for Ex Situ Preservation of Sturgeon Genetic Diversity

The leader of this project is the International Association for Danube Research (IAD), and institutions from Austria, Serbia, Bulgaria, Romania and Ukraine were included in project activities. The objectives of the project were to obtain an overview of existing ex-situ facilities in the Middle and Lower Danube areas, to gain the support of local stakeholders and fishery authorities for sturgeon conservation and to develop a roadmap for future actions in ex-situ conservation.

Project activities included: exploration of ex-situ opportunities in Serbia, Bulgaria, Romania and Ukraine with an inventory of existing facilities, brood stock and expertise as well as field surveys in selected hatcheries and discussions with hatchery stakeholders. Workshops with national stakeholders were organized in Romania, Bulgaria, Ukraine and Serbia to disseminate information and acquire local support for sturgeon conservation.

Activities also included mobilization of political support for ex-situ conservation and discussion of the conclusions from field visits with DSTF experts, as well as elaboration of a roadmap for future actions and dissemination at a high-level event to gain the support of decision makers. Additionally, activities included dissemination activities aimed at the broader public and local stakeholders.

Discussion

Many projects concerning sturgeons in the Danube River and Black Sea were conducted at the Danube Delta Institute (Tulcea, Romania) where a Sturgeon Research Group was established in June 1994. Projects related to acoustic telemetry of sturgeons, annual monitoring of spawning success and young of the year migration downstream to the Black Sea, estimates of the status of sturgeon stocks in the NW Black Sea and Lower Danube River, development of sturgeon aquaculture in Romania, the Supportive Stocking Programme of Romania with "young of the year" of endangered species of sturgeons and sturgeon molecular genetics were performed by this group. Sturgeon research groups were also established in Bulgaria, Serbia, Ukraine and Turkey with the aim of contributing to investigations of sturgeons at local and international levels. In addition to research institutions, NGOs are also involved in working towards better protection and conservation of sturgeons in the Lower Danube Region. The Life project "Saving Danube Sturgeons" (2012-2015) has been implemented by the WWF in Austria, Bulgaria and Romania and was financed equally by the European Union and the WWF. The project represents joint actions in Romania and Bulgaria that aim to raise awareness about the overexploitation of Danube sturgeons and the need to cease overfishing of sturgeons and the illegal trade of their products.

In addition to these projects relating to sturgeons, there are also several submitted proposals that will hopefully be accepted and sturgeons, as flagship species of the Danube River, will be revived in the following decades and preserved for future generations as well.

Acknowledgements

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Chapter 5

Enhancing Effective Implementation of Sustainable Energy Action Plans in European Islands through Reinforcement of Smart Multilevel Governance

www.smilegov.eu

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Abstract

SMILEGOV project was built on the idea that cooperation between different levels of governance (i.e. national, regional, local) plays a key role towards reaching the 20-20-20 EU goals in the area of energy and climate change. SMILEGOV represented a unique opportunity to gather 12 islands clusters from the EU and beyond. Through the project islands invested in their human and cultural capital to overcome different kinds of barriers that impede or significantly delay the actual deployment of sustainable energy plans and projects in their territories. The project assisted this process of knowledge sharing among European islands of different size and capacities by enhancing multi-level cooperation among levels of administration and stakeholders and thus foster local sustainable development. It helped formulate an enabling environment for enhanced multi-level and multi-lateral governance (MLG), by providing island authorities with concrete tools and methodologies to improve their cooperation with other levels of administration (regional, national) and stakeholders and successfully implement sustainable energy plans and projects. These results are now available on the SMILEGOV website. These results are now available on the SMILEGOV website. The example of islands and the experience gained on the cooperation and the knowledge sharing on sustainable energy projects is useful and can be applied to other areas of Europe.

Keywords

Smilegov, multilevel governance, island sustainable energy plan, i-seap, pact of islands, smart islands, capacity building, bankable sustainable projects, islands clusters, innovative sustainable technologies

SMILEGOV

The Project idea in a nutshell

The approach and methodology that SMILEGOV applied was founded on a basic premise: the need to set up a structure that catalyses the exchange of knowledge between islands of different capacities acting on different administrative levels through intensive capacity building. The process of developing capacities among partners and cluster members bare significant and tangible results, creating an important precedent for sustainable local development in islands.

The role of good multilevel cooperation is identified as one of the key points for consistent (between different levels) and eventually effective sustainable energy planning at local level. Especially, when it comes to island communities this role proves to be crucial for the balanced development of the island, the resources management, the economic growth and the quality of life for the citizens and visitors.

SMILEGOV, based on success stories and close European cooperation **strengthened local capacity** and work towards the improvement of multilevel cooperation in European islands aiming to **facilitate the implementation** of their sustainable energy action plans towards the EU 20-20-20 goals.

For the support of this process, **clusters of European islands** set up in the largest part of the European insular regions: The Atlantic (Canaries, Scotland), the Baltic Sea (Denmark, Sweden, Norway, Finland, Estonia) and the Mediterranean (Italy, Malta, Cyprus, Greece). The formation of clusters of islands and the exchange of knowledge at local and regional level, the identification of Strategic Guidelines for overcoming existing barriers through the assistance of advanced islands, as well as the process of learning from the experience of models areas ("learning from the experts") were the guidelines for the exploration of this path.

SMILEGOV and the Pact of Islands

SMILEGOV was built on the need to facilitate the implementation of the sustainable energy action plans developed by the 62 European islands that had created the Pact of Islands, a voluntary European initiative to reduce CO_2 emissions by at least 20% by 2020, and to enable significant progress of at least 50 projects that derive from these plans and were facing problems for implementation. Islands that have no experience in energy planning and have not had the chance to elaborate on sustainable energy projects yet were also be invited to join the SMILEGOV clusters. Those islands received training through an e-learning platform with the aim to strengthen the local capacity, be inspired to develop an action plan for the reduction of their CO_2 emissions and were also invited to join the "Pact of Islands" family. For each cluster, a cluster leader was the coordinator of this process.

Besides A ☺, What More ?

By joining a local SMILEGOV islands cluster, islands:

- Became a member of the greatest European sustainable islands network.
- Strengthened its collaboration with neighbouring islands and island communities.

- Benefited from the workshops for energy planning and financing of sustainable energy projects.
- Had an insight view of success stories and good examples for island sustainable projects.
- Had members of the staff receiving certified training on energy planning and project development through an e-learning platform.
- Still have access and guidance through the existing Pact of Islands guidelines and tools and receive technical assistance during the sustainable energy planning process.

Who Are We: The SMILEGOV Partners

SMILEGOV gathers 12 geographical islands cluster, each of them led by a project partner. The project main consortium was composed as follow:

1- Network of Sustainable Aegean Islands – DAFNI, Greece,
2- Conference of Peripheral & Maritime Regions - CPMR,
3- Region Gotland, Sweden,
4- Ölands Municipal Association, Sweden,
5- Hiiumaa Saare County Government, (Saaremaa) Estonia,
6- European Small Islands Federation - ESIN,
7- Samsø Energy Academy, Denmark,
8- Canary Islands Institute of Technology – ITC, Spain,
9- Regional Agency for Energy and Environment of Madeira - AREAM, Portugal,
10- Cyprus Energy Agency, Cyprus,
11- Local Councils Association, Malta,
12- Scottish Islands Federation – SIF.

Islands Clusters and Capacity Building Activities

The SMILEGOV clusters counted 163 island members in total from 16 Members States and two neighbour¬ing countries. The concept of SMILEGOV was also to connect experienced islands clusters, mainly from Scandinavian countries with less experienced clusters or with different levels of experience through capacity building activities in order to provide guidance and methodology on how to increase the efficiency of multi-level cooperation and to facilitate their sustainable energy projects implementation. In order to facilitate the collaboration among the clusters and their members.

a two-tier structure was adopted. The first one grouping the more experienced Scandi¬navian islands, Samsø, Gotland and Öland into a "task force", who are front runners in local sustainable development and rep¬resent role models for many other island areas. The second one grouping the rest of the partners who yet need to further build capacity on efficient MLG in order to overcome barriers to energy planning and project implementation. The second tier was comprised of islands that had no previous experience in sustainable energy planning but joined the clusters and benefitted from the project's activi¬ties under the supervision of the cluster leader.

Each cluster conducted a preparatory work to identify priority areas, then Capac¬ity building activities were set up in different ways (plenary and local workshops, field trips, distant e-learning, bilateral meetings) tar¬geting different audiences each time. To conduct efficient transfers of knowledge and to secure the learning process among the leaders of less experienced island clusters, Scandinavian partners produced a diverse set of methodological capacity development tools. Concrete elements were used to provide guidance on how to ensure smooth development and delivery of sustainable energy projects and plans and build trust, overall, in the impor¬tance of local action for islands' sustain¬able development. Those tools included Good practices on enabling conditions for MLG - good multilevel governance, Strategic guidelines, Toolbox to support project development - focused on four key topics, overcoming MLG barriers, making use of in¬novative financing tools and strengthening stakeholders' engagement and analysing projects' bankability - , and an E-learning platform. The last on-line tool was prioritized in order to provide access to knowledge and training to remote areas and particularly scattered islands were accessibility constraints did not facilitate physical meetings.

In terms of activities, four plenary workshops were organized to train the cluster leaders on specific themes so they can be transferred afterwards in the framework of local/regional cluster capacity building workshops. Study visits took also place mostly back-to-back with the plenary workshops in Gotland, Malta, Samsø and Madeira, they gave plenty food for thought to the participants. On top of that a visit of the small Swedish islands to Samsø and a visit of the Estonian islanders to the Scottish ones strengthened the bonds of the islands family.

Identification of Bankable Projects and Shinning Projects

SMILEGOV clusters identified and evaluated the progress of sustainable energy projects which were selected regarding the technology used, the level of maturity, the exact barrier / problem and the administrative levels involved. More than 50 bankable projects benefited

from the assistance of the SMILEGOV clusters to overcome barriers and get all the technical expertise and experience of advanced islands to progress in an effective realization. The identified bankable projects cover a wide range of innovative technologies and financing schemes. From the promotion of electric vehicles and relevant infrastructure, efficient street lighting, biogas for transport and heating, desalination with wind and hydro plants these projects demonstrate the potential of islands to act as test beds for innovative sustainable energy projects that can bring long-term benefits to island economies and local population. Monitoring is still periodically carried out by clusters leaders, to ensure progress and to propose corrective measures if necessary.

Moreover, 12 shinning sustainable energy projects, one per cluster leader, which had significant progress along the "U-curve" project development concept were highlighted during the SMILEGOV project.

Among concrete and successful examples, the Geothermal District Heating project in Lesvos in the Cluster of Greece, is about extending and operating an existing non-operational pilot district heating network which uses as source of heat a geothermal field in the town of Polichnitos in Lesvos. The dubious ownership scheme of the installation together with the reaction of local stakeholders put the project in a permanent hold. With the support of the SMILEGOV the project has demonstrated significant progress with the involved parties having reached good consensus regarding the next phase of the pilot project after realising the win-win conditions of the project. The local society and stakeholders have been engaged to the project and a good maturity has been reached regarding the ownership and funding scheme.

In the cluster of Sweden, during the last years there has been great progress within biogas on Öland, and this goes for the whole chain through distribution, consumption and production. In the period of 2017-2027 the regional buses, including school buses, will most likely run on biogas. Furthermore in Mörbylånga is has been decided to change for 20 biogas vehicles in the public fleet. For Mörbylånga there is an agreement signed to establish the first filling station for biogas on Öland. This opens up the start-up of a new section among the green businesses and a sustainable income for local farmers. Both in Borgholm and in Mörbylånga local farmers are planning to start production of biogas. Matching the demand with the production in the right timing and space has been a significant challenge in Öland. The Gotland experience transferred through SMILEGOV to Öland was a great inspiration.

In the cluster of Estonia, the Combined Heat and Power production project in Vormsi, will replace the old firewood boiler with two small Combined Heat and Power (CHP) producing electrical power of 90 kW and heat power 200 kW. The two CHP plants are fuelled by woodchips which is also very good, because ~60% of the island is forest area. Investment is 400,000 – 450,000€, which is a significant amount for a small commune. For this, a cooperative will set up, which faces some difficulties due to Estonian law. SMILEGOV partners with extensive experience in setting up and operating cooperatives provided useful support.

Other inspiring projects that are overcoming their implementation barriers, recommendations and project results can be found by visiting the SMLEGOV website www.sustainableislands.eu.

SMILEGOV was not just a project about sharing knowledge; it is still a live and active process gathering the Smart Islands community of EU and beyond, marking the beginning of a long and successful islands cooperation, paving the way to sustainability in the EU.

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DISCLAIMER

Section 2:

"Science, Gender & Innovation"

Chapter 6

Stimulating Women Excellence in an Economy under Crisis. Evolving Trends and the Case of Greece

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During the widespread crisis, economic and social, that lately arose in European countries and societies, we are all trying to find an inspiration, to look forward, to hope, to dream, to stay vivid and creative. Within this frame, women, the half of the human capital of our societies and economies are still left apart from the high level decision making meeting rooms. Women, this dynamic human capital, that during the last decade not only conquered education equality but even surpassed men in academic education, need even more inspiration and empowerment than any other, in order to deploy their skills. For doing this, they first have to overcome the stereotypes and change the prejudices that still dominate our societies, remnants of previous centuries.

Achieving women's inspiration has mostly to do with shooting down the Myths, stereotypes and prejudices. Girls and Math, Girls and Technology, Women and industry, career and family, are only few of them that keep women behind. It is certain that if we look for the personal paths of women that are nowadays distinguished in science, math, engineering, business, we will find that these are women who were brought up in very open minded families and school environments, where there was trust in girls and their abilities.

A dominant question nowadays should be how important is it to inspire and empower women today? The answer is that today this is more critical than ever. First of all, because after so many major and difficult steps during the last decades, towards equal opportunities in education, economic and social life, today we realize that the last steps towards equal opportunities seem to be the most difficult ones. And secondly, because today, more than ever, during this global crisis, society and economy need all of its human talent.

In order to understand what should be done, we first need to assess the reality and realize the challenge.

In 2016, we can say that women can do everything. We do have examples proving that women can succeed in every sector. Women who reached the top globally in politics, law, finance, science, high technology, entrepreneurship, business and management. Therefore, the question is not any more whether they can do it. The question is how many of them did it so far. And the reality today is that women reaching the top are still very few.

No one can deny that in crisis or not, the most wanted parameter in western economies is human talent. Numbers and facts show that in 2016 and for the last years, Europe faces a

TALENT DRAIN that perhaps hasn't realized it yet or even hasn't properly reacted yet. We are talking about the Women's Talent Drain.

How many of us in the Western world have realized that 60% of the Universities graduates in USA, Europe, Greece, are female and just 40% of them male? That means that according to their academic education, 50% more women than men are highly educated, available to enter and stimulate economy. Even when we look for the higher level of the PhD degree holders in EU, 61% of them are female and the 39% men.

On the other hand -or should we rather say….on the other "dark" side of the moon?-, when we come to real life and real economy, highly educated women start vanishing…. They vanish from decision making positions, from high career levels, from Boards. And this certainly constitutes a "Talent Drain"!

In European companies, women just hold the 2,4% of the CEO or Chair-man seats, compared to the 97,6% of the male CEO and Chairmen. In Europe that wants to be proud for its democracy, equal opportunities, civilization, human talent resources, in Europe that wants to improve its competitiveness and innovation, these statistic numbers are probably the most stunning ones, but not the only ones. They are just the most indicative ones. Fewer women in entrepreneurship, fewer women in politics, fewer women in academics, the more we ascend in high level decision making positions, the fewer women we find. The high level decision meeting rooms are men dominated if not exclusively a male affair. Is this because women cannot do it? Certainly not… Bright, skilled, committed women have reached the top of all sectors, as mentioned before. And among them, an interesting finding is that among the 50 top women in business globally, -CEOs and Chairmen-, 30% of them are leading multinational technology giant companies, such as Hewlett Packard, IBM, General Motors, Procter&Gamble, Dupont, Google, Yahoo, Facebook. They proved that they can do it in every sector. They are highly educated and skilled, they are committed, they are effective. But they are still very few, they are still the exception to the male rule and they still constitute the…one digit statistic!

What does this finally mean? Does this lack of equal opportunities constitute a lack of democracy and civilization? EU recognizes both of them, but most of all, recognizes that it constitutes a financial drain and that more women in the workforce would help Europe's economic engine move again. It has been estimated that if more women get involved in the European economy, it would bring an increase of 13% on the EU GDP, for the period 2010-2015 (Strategy for equality).

Apart from the studies of the European Commission, other studies also bring very interesting conclusions: A study by Nick Wilson, professor of the Business School at University of Leeds, who examined 17,000 British companies that wound up, showed that:

- Companies with a highly feminized management seem to have been better prepared and protected against financial crisis
- A larger proportion of female managers appears to balance the risk-taking behavior of their male colleagues
- Having at least one female director on the board could reduce a company's chances of going bankrupt by about 20%

That is why, Professor Wilson, brightly underlined that "High Heels means Low Risk" and that Women on Board is "Not Just the Right Thing, it is the "Bright" Thing", especially in periods of crisis or rather in order to prevent crisis!

Apart from the role of women executives in large companies, looking at the entrepreneurship performances we can make some very interesting observations as well. One of the best studies, -reference point on entrepreneurship in Greece-, is the annual Entrepreneurship overview by IOBE, the Foundation for Economic and Industrial Research. In the 2014 review that focused on women entrepreneurship, the findings are extremely interesting:

Although there is a global interest of policy makers in female entrepreneurship during the last years, statistics in all western countries show that entrepreneurship is a male affair and that fewer women become entrepreneurs. The same observations are made for Greece as well, according to IOBE Study. But the most interesting observation isn't about quantity but about quality characteristics.

Starting with the quantitative figures about Greece:

Among start-uppers, statistics show only 1 woman for every 2 men (32.8% vs 67.2%) or otherwise, only 4.4 % of total female population becomes a start up-er, half score of the 8.63%, of male population.

Similar findings for the established business: established businesswomen constitute just 10% of the female population, while established businessmen are the 20% of male population.

Taking into account the statistics of the European Commission on the female academic scores mentioned above (59% of university graduates and 61% of Phd degree holders), the IOBE study underlines that "*The fact that this highly qualified population is not encouraged entering entrepreneurship according to their knowledge and experience, means that start up business quality is lower than what it could be*".

But the good news is, that despite the low quantity scores, -similar as in all European countries-, the quality characteristics of female entrepreneurs in Greece (innovation, technology level and job creation perspectives), are really impressive:

- More women entrepreneurs hold a postgraduate and a PhD degree, 19.05 vs 11.63% for men.
- More women entrepreneurs belong to the higher family income category 38,1%, while more men belong to the lower family income category 41,86%
- More women entrepreneurs make use of new technologies in their production process 42,86% vs 31,4% for men
- More women entrepreneurs offer a completely new product or service in their clients, 38,1% vs 15,12%, for men
- Women entrepreneurs face lower competition intensity, something that fully complies with their trend in new products and new technologies.
- More women run companies with highly export orientation (76-100% sales comes from exports) 9,52% vs 7% of men entrepreneurs).
- They expect to create more jobs in the next 5 years (50,62% vs 45,28%).

The conclusion of this very important study that IOBE underlines is that "*Women appear more likely to develop new market and this finding strengthens the argument for the empowerment of women entrepreneurs and should be taken into account by policy makers"*.

These few findings and observations only give a short glimpse of the reality and the challenge. Men and women, all together, under a constructive team spirit, have to take into account the above findings and arguments in all new decisions, strategies, plans and goals, leaving apart old fashion perceptions and mindsets. The most important of all, is this last one: we should all overcome the mindsets established not only during the last years but through the decades and the centuries.

Nowadays, during this crisis that all Southern Europe countries face, with Greece suffering the worst kind of crisis, our Economy, our Business, our Society cannot afford wasting or underusing human resources, human talent, high skilled capacities. Our female universities graduates and our female PhD degree holders should not be left apart, should not be left underemployed or should not be downsized in their career.

Because, giving the opportunity to this female population to deploy their skills and capacities in real life and real economy… it's not the right thing, it is the bright thing"!

Chapter 7

Women at Crossroads or How to Choose the Way to the Top

Ioanna Lagoumidou *(Greece), Lawyer (www.lagoumidou.gr), President of 'Business & Professional Women (BPW) - Athens"*

"*Any woman who understands the problems of running a home will be nearer to understanding the problems of running a country*" said Margaret Thatcher and we can certainly add "Any woman who understands the problems of running a home will be nearer to understanding the problems of running any organization".

The number of women in top positions in our society has never been greater. Significant improvent at women's position has occurred in our days. Nevertheless, behind the efforts and expectations, the results are still lagging.

Olympic swimmer, Summer Sanders, when asked about the role of expectations in her gold medal career, she said, "*I knew that to become an Olympian, I had to expect a high level of performance and dedication from myself, and it was those expectations that motivated me through years of training to achieve my dream*."

Women must realize that they possess the keys of their life and of the fulfillment of their expectations. If they don't see themselves as leaders or able to succeed, others won't see them as such, either.

While gender is hopefully becoming less and less of an issue in today's business world, and while every entrepreneur who achieves success is inspiring, we recognize that women still have many unique obstacles to overcome as entrepreneurs. We must admit that many of them have broken through barriers and found the ultimate success in entrepreneurship! These women can inspire all the others as well as become their mentors to teach them the elements of which a successful strategy to the top, consists of, or developing the necessary tactics and pursue to the right execution of them.

In the EU countries:

- Women are 4 times more likely to work on part-time jobs
- They face a 16% of gender pay –gap
- Only 34,4% of self-employed are women
- Only 30% of new startups are women owned
- Women are just 20,2% of companies board members.

It is necessary that women execute pressure to the public authorities to create a more supportive environment for them, more facilitative on access to finance that consists one of the main problems of women entrepreneurs to start.

But the real impact is in the small personal decisions we all take to be inclusive, building job

descriptions that are appealing to women, including women in short lists and tackling unconscious bias in the workplace all make a massive difference.

Thanks to the electronic revolution, smart working (distant work, e-work etc) delivers a range of measurable benefits both for the employees and the employers for the women business-owners as well as the women employees.

It decreases the cost of business and the absenteeism, and at the same time it makes new markets reachable.

It is obvious that women work hard, have high emotional intelligence, so they are better leaders as they count on human beings , they are passionate about people.

But it appears that we have to take our “Silk Road” to the top as the ancient merchands did. The Silk Road at that time, consisted of an extensive network of trade routes, connecting the East and the West. It was adventurous, promising rewards through various dangers. To succeed on the Silk Road they needed fierce resilience and solid planning, alongside a top-quality team and excellent materials and resources. These requirements still hold true for women’s Silk Road to the top. It can be achieved by enlarging our repertoire of skills and behaviors, enriching our leadership qualities in the long term, learning to say “no” without the fear of looking like a bitch.

We have to overcome the frames imposed by the stereotypes and the culture. We must advocate all women that we are treated not as “wife of” but as business professionals.

We have to highlight that we carry the passport to our own happiness and success. We have more power than we might think in changing the outcome.

I am inspired by Mahatma Ghandi’s words “*Be the change you want to see in the world*”.

Aim high and achieve higher.

Chapter 8

Science and Gender: Promote Equity and Access to Equal Opportunities

Najiba Mustafayeva *(Azerbaijan), PhD candidate, Research fellow, Center for Strategic Studies (SAM)*

Abstract

Despite some progress in recent years, achieving gender equality in scientific research remains an important challenge for policy-makers and the scientific community at large. Concordantly, the promotion of women at all levels of academic research has become a priority on the science agendas of many national and international social and political institutions. Although the number of female scientists has increased, true gender equality has not been achieved. Overall, women are still under-represented in many research fields, generally receive lower salaries, are less likely to have full-time contracts and have fewer opportunities to gain influential positions than their male colleagues.

The absence of women in leadership positions tends to be more acute in science and technology occupations than in other fields. Gender segregation may be slowly eroding, but women are still unable to fully develop a scientific career on equal terms with men.

Key words: career, education, gender, gender segregation, women researchers

Introduction

Despite some progress in recent years, achieving gender equality in scientific research remains an important challenge for policy-makers and the scientific community at large. Concordantly, the promotion of women at all levels of academic research has become a priority on the science agendas of many national and international social and political institutions. Although the number of female scientists has increased, true gender equality has not been achieved. Overall, women are still under-represented in many research fields, generally receive lower salaries, are less likely to have full-time contracts and have fewer opportunities to gain influential positions than their male colleagues.

A vast amount of statistical data relating to gender issues in research shows that women are still suffering from two types of discrimination: horizontal segregation—women are significantly represented only in certain fields, notably biology and medicine—and vertical discrimination, which is commonly described as the ‘glass ceiling' or ‘leaky pipeline'. Although women and men begin their scientific careers in fairly equal numbers in most countries of the world, the ratio of women to men gradually decreases higher up the career ladder.

Women in Science, an interactive data tool, presents the latest available data for countries

at all stages of development. Produced by the UNESCO Institute for Statistics (UIS), the tool lets us explore and visualize gender gaps in the pipeline leading to a research career, from the decision to get a doctorate degree to the fields of research women pursue and the sectors in which they work. The UIS is developing a series of new indicators about the dynamics that shape women's decisions to pursue STEM careers – from their educational pathways to the social factors, such as starting a family and workplace environment. It should be noted that this tool presents internationally comparable data produced by the Institute. This means that the indicators can be accurately compared across countries with very different contexts for women in science. The Institute seeks to work with all countries to improve the availability of accurate data that can be compared internationally[16].

According to this data, just 28% of the world's researchers are women. While a growing number of women are enrolling in university, many opt out at the highest levels required for a research career. But a closer look at the data reveals some surprising exceptions. For example, in Bolivia, women account for 63% researchers, compared to France with a rate of 26% or Ethiopia at 13%. In Sweden, for example, women form the majority (61%) of students enrolled in a Bachelor's programme, but their numbers decline as they move up the education ladder, accounting for 49% of doctoral students and only 37% of researchers. The data tool reveals this trend across every region, highlighting the conflict that many women face as they try to reconcile career ambitions with family-caring responsibilities.

Women researchers also tend to work in the academic and government sectors, while men dominate the private sector which offers better salaries and opportunities. This is the case even in countries with high shares of women researchers. In Argentina, for example, 53% of researchers are women. However, they account for only 29% of researchers employed in the private sector.

The current approach to gender equality in science involves not only supporting women, but reforming scientific institutions and overcoming gender biases in knowledge production. Gender biases in research limit scientific creativity, excellence, and benefit to society. It also hinders women`s advancement in science inasmuch as women are currently the majority of scientists whom acknowledge the relevance of sex and gender analysis.

Gender segregation in education and scientific careers

The last decades have witnessed impressive advances of women in education, the enforcement of equality legislation, the progressive loss of importance of physical attributes for productivity, changes in family roles and the challenging of traditional gender norms by feminism. Taking into account these trends, our common efforts must be focused on gender segregation: gender stereotypes, choice of study field, gender division of labour and time constraints, and covert barriers and biases in organizational practices. In highly paid professional occupations there is evidence that the influence of the above-mentioned factors of segregation is diminishing, especially among younger cohorts of women. However, women remain more severely underrepresented among researchers

[16] Women in Science. UNESCO Institute for Statistics. URL: http://www.uis.unesco.org/ScienceTechnology/Pages/women-in-science-leaky-pipeline-data-viz.aspx

than among other highly qualified professionals.

The move towards gender equality in science cannot be taken for granted. Most studies emphasize that gender differences in scientific careers are decreasing for recent cohorts, with women's and men's professional and family trajectories more aligned with each other than ever. This, however, does not mean that women have equal opportunities to attain academic status equal to that of men. Gender inequalities persist in education insofar as the gender ratio differs across fields of study. The existence of an above mentioned 'glass ceiling' affects women trying to progress to senior positions. The absence of women in leadership positions tends to be more acute in science and technology occupations than in other fields. Gender segregation may be slowly eroding, but women are still unable to fully develop a scientific career on equal terms with men.

A large strand of the literature refers to gender differences in scientific careers, with a focus on three critical moments: choice of studies, which remains largely gendered; the 'rush hour', i.e. the early stage of the scientific career, in which family and career demands most often collide, a fact that disproportionately disadvantages women; and career advancement, which shows persistent gender inequality.

Gender segregation in education is widely acknowledged as one of the roots of gender segregation in science. In spite of desegregation trends over the last decades, study field choices remain largely gendered. Research on gender segregation in education has been extensive although many studies point to important conceptual problems. First, gender segregation in education is almost always presented from the perspective of the educational choices made by girls, even though gender segregation is also due to boys' preferences for certain fields of study. If the aim is to change these trends and introduce more of a gender balance in all study fields, then it is with respect to the entire set of factors upstream of the study field choices that genuine theoretical and social questioning should take place; while doing so, equal attention should be given to both girls' and boys' choices. Working towards a more mixed composition of all study fields should not mean an alignment to the male model.

The review of the literature, shows that family and career tensions play an important role in explaining the low rates of women embarking on a scientific career. These tensions are especially acute in the early stages of the academic career, from the first university degree to the first tenure-track position, a long period of career formation with intense productivity and mobility demands that coincides with women's childbearing years and social expectations about the right moment to establish a family. It encompasses the process of obtaining a PhD, carrying out fellowships abroad, being recruited as a post-doc in a scientific institution and competing for a tenure-track or a similar independent research position. Access to a tenure-track position is indeed one of the major critical points. It is a deeply-rooted assumption that future career progression relies very much on performance in this period, a fact that disadvantages women: in addition to biological childbearing, most women continue to bear the primary responsibility for care giving and household responsibilities. Many studies show that the family-or-science dilemma is not only gendered, but exacerbated by institutional constraints and implicit academic norms, values and expectations that take the traditional male life-course as the norm. The myth' of total availability in the scientific lifestyle penalizes involved parents, but also women as potential mothers. Many young women end up believing that science is incompatible with family life and feeling that they have to leave academia if they wish to have a family. And

indeed, family related mobility and time constraints may act as a filter in early selection procedures.

The literature review also stresses that family and career tensions cannot explain vertical segregation in science. The list of publications show that the professional and family trajectories of those women who manage to remain in science are more aligned than ever to that of men. Overall, the available empirical studies do not show any clear evidence that women without children have better career prospects than their other female colleagues or that they succeed in catching up with men in their careers. Marriage and children do not appear to have a significant influence on women's scientific productivity and academic performance.

To explain gender differences in scientific careers it is necessary to investigate more complex mechanisms, such as discrimination and cumulative advantage and disadvantage. In this way, research goes beyond the universalistic criteria and strict norms that govern the formal procedures of recruitment and promotion in academia, analyzing power relations, gate-keeping practices and informal networks as a source of tacit knowledge, support and recognition[17].

Gender discrimination is seen to operate at two distinct, although closely connected, levels. The first is the lack of informal support in career advancement that leads to discouragement. The second refers to bias in formal assessment procedures that leads to unequal access to research funding or academic positions. The definition and assessment of scientific excellence (the recognition of merit) is not independent of gender relations in academia and society at large. Overall, research concurs that women's poorer networking resources is a powerful, albeit subtle, explanatory mechanism for understanding women's greater attrition and slower career progression compared to men's. It works through an accumulative logic of 'non occurrences' and slight exclusionary practices that progressively disadvantage women's careers and cause a sensation of isolation, difficulty in assuming the risks inherent to the scientific career and low professional self-esteem. Women's slight disadvantages from the early stages of the scientific career might turn into wide differences in career outcomes.

Recommendations and new approaches

Women's advancement in science is slow and cannot be taken for granted. With the overall purpose of promoting gender equality in science by facilitating non-linear careers and degendering, the main priority of research should be to build more consistent links between analysis and policy making. We must refine how to promote gender equality in science. The recommendations must be designed specifically to overcome political, administrative, financial, and cultural challenges and to speed the process of gender equality in all fields of science. These recommendations include:

1) Fixing the number of women in science by supporting women`s educational opportunities and careers. While critically important, this approach has also been

[17] Meta-analysis on gender and science research//Report. Directorate-General for Research and Innovation Capacities Specific Programme. European Union, 2012.

criticized for 'fixing the women': attempting to give women more education, more research money, and more training to better assimilate them to traditionally male domains.

2) Provide "extra hands" awards: dedicate funds for newly independent young investigators who are also primary caregivers to hire technicians, administrative assistants, or postdoctoral fellows.

3) Focus on education as a tool: academic institutions must educate their constituents on the issues women face in science. For example, gender awareness training should be a standard component of orientation programs.

4) Fixing the institutions: transforming structures and removing barriers in order to increase women`s participation in science by reforming research institutions, implementing programs designed to create positive and permanent changes in academic, social, and scientific climates: in classrooms, laboratories, departments, institutions and research organizations.

5) Fixing the knowledge: enhancing excellence by mainstreaming gender analysis techniques. This approach intends to enhance scientific excellence by mainstreaming gender analysis into basic and applied research.

Conclusion

The strong emphasis placed on work-life balance policies is oriented towards attracting and retaining female talent. The concept of gender diversity is also incorporated as a key element of good management of research and innovation policies. Diversity is required not only for economic reasons (improving efficiency by the optimisation of human resources, gender equity would contribute to competitiveness); diversity also improves the quality of science and research by increasing creativity and bringing science closer to society.

Enhancing scientific excellence also requires overcoming gender biases in knowledge production through the mainstreaming of sex and gender analysis into basic and applied research in the fields of life sciences and technology. This entails addressing sex and gender analysis as a resource to stimulate creativity in science and technology, and by doing so enhance the lives of both men and women. I believe that it is perfectly possible to arrive at a win-win situation where women researchers and the institutions in which they work benefit.

Chapter 9

Gender and Medicine

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Abstract

The presence of women in the practice of medicine goes back to the ancient times. Some women were canonized in the 10th and 11th centuries for their care during the European plagues. From the 13th century to the 18th century, healing women were considered as witches and forbidden access to the medical education of the time. This ban lasted until the first half of the 19th century, thereby justifying the inferiority of women. It was not until the end of the 19th century that women were able to have access to training in medicine.

Gender and Medicine

During the past 30 years, women have entered academic medicine in increasingly larger numbers. However, fewer women than men have succeeded in advancing in academic rank. In 1985, 10% of female medical school faculty held the rank of full professor. In 2006, 12% of female faculty were full professors. It has taken more than 20 years for the proportion of female faculty who are full professors to increase 2 percentage points. The limited advancement of women in the upper echelons of medicine is not substantially different from that of women in other areas of science, mathematics, and business. Within academic medicine, the demands of clinical practice, family obligations, and lack of mentoring have all been identified as factors that have a detrimental effect on women's careers.

Gender and Science

Men and women think and behave differently in the workplace. Early family socialization and schooling experiences result in different work styles and goals. These socialized differences lead women to place a greater priority on interpersonal satisfaction and integration than men do. Women are most often motivated by encouragement, whereas men respond to challenge. Men, through the male socialization model, value competition and individual achievement, whereas women more readily respond to collaboration and group affiliation. The high value that men place on individual achievement leads them to be much more concerned about rank and ranking behavior, whereas women are more inclined to engage in leveling or equalizing behavior. In both work and social settings, men quickly and informally establish a hierarchy that governs how they relate. In contrast, women quickly establish equalizing relationships, even with their obvious subordinates.

Gender and Medicine

Less than 50% of women achieved permanent positions compared with 70% of men. For permanent non-hierarchical and hierarchical positions, the female-to-male ratio gradually

decreased from 0.5 to below 0.2. Although more than 50% of trainee specialists were women, the number of female consultants remained 25% lower than that of men. Gender influence in career. Differences in gender values and ambitions have been suggested as reasons why fewer women than men reach the highest levels of medical positions. The predominant responsibility for child care is still borne by women and the issue of balancing career and family seems to be of paramount importance for women physicians in Europe. Gender roles contribute to unconscious assumptions that have little to do with the actual knowledge and abilities of an individual and negatively influence decision-making when it comes to promotion.

Gender and medicine career

Undoubtedly women in medicine have forged new pathways to allow physicians to balance career and family responsibilities. Medical centres have accommodated the needs of their workforce and adjusted policies to allow women to work part time. But time-to-tenure rules and family indicate that a balance between work and life must be applied to both sexes in order to promote equality of opportunity between men and women and that not penalise women in this career. If women in medicine are not seen to be succeeding in their careers, young women will not be motivated to achieve top careers. It has been demonstrated that political and government initiatives alone are not sufficient to advance the position of women in medicine. Strategies to address gender inequality must arise from the institution: attitudes of the managers, visible commitment, provision of support during and on return from maternity leave, and, finally, encouraging women to apply for appointments and promotions. Differences in work and opportunities, hierarchical and institutional support, lack of female mentor models and institutional gender bias may contribute to the slow career progression and limited visibility of medical women with respect to their male colleagues. Despite the feminization of medicine, women constitute the workforce, whereas the tasks of management and direction of the “production process” continue to be in the hands of men as occurs in the classical general social scheme. Gender equality has an impact on the way hospital medicine follows the feminization of medicine because gender barriers are no longer accepted by women as easily as prior to the 21st century. The full potential of the increasing number of women physicians will not be achieved without continuing efforts to improve the ways in which they are educated and trained in becoming specialists and the mentoring women receive. The feminization of medicine will involve a continuous renewal of the health system that should be foreseen in human resources policies.

Conclusions

The significant differences in medical positions held by men and women illustrate the ‘leaky pipeline phenomenon’, consisting of a disproportionately low number of women achieving leading medical positions. The full potential of the increasing number of women physicians will not be reached without continuing efforts to improve the hospital medicine environment. The reason for the continuation of the “leaky pipeline phenomenon” in the 21st century remains unclear. One may argue that the significant lack of equity shown by data imply that women have a lower level of training than men in hospital medicine. Women physicians tend to be more careful than men in addressing emotional issues and assessing the sociocultural aspects that go beyond objective pathology; they spend more time on care and

the promotion of a good relationship with their patients. Therefore, women may spend less time on research than men due to the conflict in the priority of their dedication to the patient for their professional satisfaction.

Thus, gender could play a role in curricular evaluation because the rules and merits helping men progress may not be as appealing or even feasible for women. As far as I am concerned, success (fulfillment of personal goals) at any profession is not related to the gender. It is related to the determination, love and passion one will show to his subject. As an ENT doctor, my passion has been the development of the methods I use in surgery to make it faster, safer and more precise, suiting the patients' needs.

Following the improvement in ENT area I focused mostly during last 15-20 years in endoscopic surgery in the nose, paranasal sinuses and larynx. Endoscopic approach using laser, radiofrequency and 3-D camera with wristed instruments in transoral robotic surgery (TORS) has the great advantage of less effect in normal tissues ensuring best functional results postoperatively.

TRANSORAL ROBOTIC SURGERY (TORS)

Head and neck surgery improved a lot during the last 20 years, focused in minimally invasive techniques and organ preservation.

How TORS started

There are many disadvantages of the open classic surgical methods and transoral laser surgery in head and neck area , External and long incisions, Very long instruments, Movement of the laser only in a straight line, View via microscope that it is outside from the operative field, and Surgical movements through the narrow laryngoscope.

Disadvantages of these methods

Some of the disadvantages of these open classic surgical methods are the difficult exposure of the operative field, long hospitalization, severe postoperative pain, difficulty in swallowing, recovery time and possible complications such as bleeding and oedema.

Advantages of TORS

Greater precision during delicate surgical procedures allows for more-precise movements in tiny spaces and the capability to work around corners. Enhanced view of the cancer and surrounding tissue.

Indications of TORS for benigh & malignant lesions

Tonsillectomy, uvulopharyngopalatoplasty, lingual toncillectomy, epiglottoplasty, removal of benigh tumors of the upper airway. Recection of tumors in the base of the tongue and the tonsils, resection for tumors of the epiglottic region, resection for tumors of the hypopharynx region, detection of unknown primary tumors.

Advantages of TORS

3D visualisation allowing precise dissection leading to maximum preservation of function and enhanced definition of safe margin for complete tumor removal, wristed instruments via the arms of the robot, camera inside the surgical field, tremor free technique, multi-handed technique, less risk of wound infection, less blood loss, minimal scarring, significantly less pain, avoidance of tracheostomy, quicker return to normal speech and swallowing, shorter hospital stay, shorter recovery time.

Conclusion

Today, TORS is the most modern and minimally invasive technique. Is a safe, feasible alternative technique to classic open surgery or TLS in patients, with early cancer of the head and neck, and in benigh diseases such as sleep apnea syndrome. The goal of endoscopic surgery is to provide to the patient same therapeutic effect with higher safety and accuracy thus less complications.

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