Current Status of Science Diplomacy in the Republic of Armenia

Meri Martirosyan*

Introduction

Armenia has a long tradition of excellence in science, technology, and education. During the Soviet era, Armenian capabilities were oriented to a significant degree toward supporting the Soviet military-industrial complex. Research activities, particularly in physics, were well financed. Education in science and engineering received strong support. A number of industrial facilities operated throughout the country, providing goods for local consumption and for more distant markets within the Soviet Union. With the disintegration of the Soviet Union, Armenia became isolated from many of its markets, and exports rapidly declined. The budget for research and education plummeted and the technical talent, skilled professionals began to leave Armenia. Although many research and education institutions remained, their capabilities had eroded considerably. Funds to cover costs of experimental work were too little, and the funds that were available were not always directed to activities with high potential to build research capacity and lead to economic development.

Nevertheless, Armenian scientists who remained have persevered and have achieved impressive results despite severe financial limitations. Now more than ever, science and technology (S&T) are critically important to the future of Armenia. For the past decade, the international community has recognized Armenia's technical wherewithal and has provided substantial financial support for its maintenance. The International Science and Technology Center headquartered in Moscow has become the most important external source of funds for research, and the U.S.

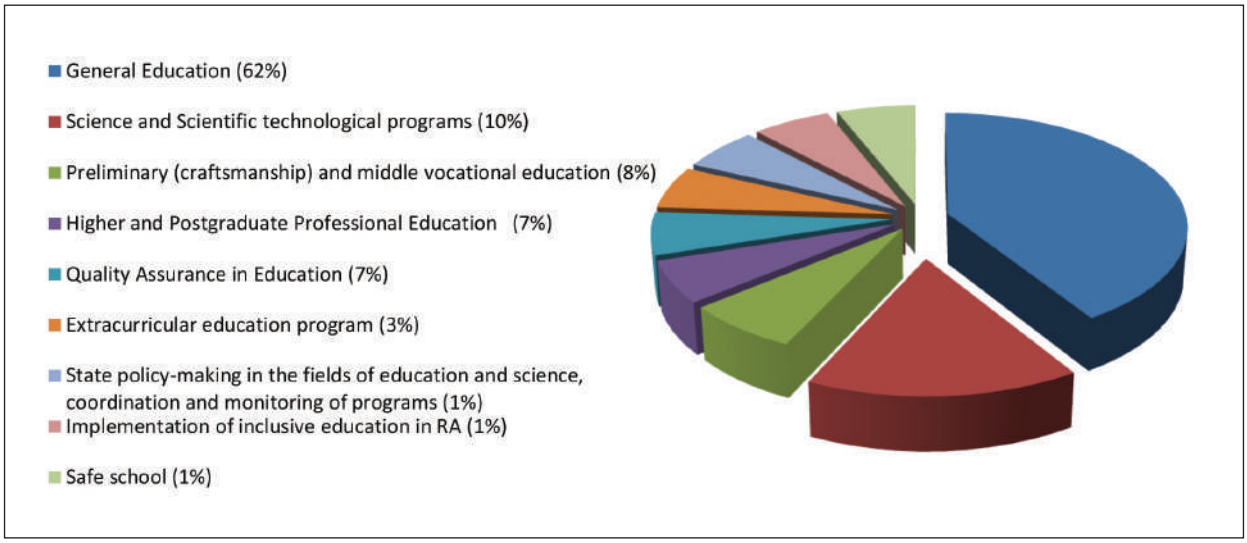
* *Junior Specialist at the Foreign Relations Division of the Foreign Relations and Diaspora Department, Ministry of Education and Science of the Republic of Armenia.*

Civilian Research and Development Foundation also plays a significant role in supporting research, both directly and through the National Foundation of Science and Advanced Technologies (NFSAT). Various projects supported by the World Bank, the European Bank for Reconstruction and Development, and bilateral assistance programs of a number of donors also have technology dimensions. Armenian Diaspora also played an important role in financing needy students and families of deceased and invalided soldiers of the Artsakh conflict and supporting Goris-Stepanakert highway construction[1]. There have been a few successes in recent years. Private entrepreneurs in the information technology sector have developed an industry with annual export sales reported at $50 million[2]. Also, on the international scene, the Byurakan Observatory named after the academician Victor Ambartsumian remains an important facility for optical astronomy. Modernization of the agricultural sector is leading to increased exports to countries of the former Soviet Union. Foreign students are paying substantial tuition to study at Armenian universities. Medical services are being offered to patients from nearby states as well as to Armenians. Small specialty companies are beginning to find niches in high-technology markets such as the production of fuel cells and the design and manufacture of circuit board components[3].

Foreign media in their publications often mentioned Armenia as a "Silicon Valley of the former Soviet Union". In 1994 the magazine "New York Times" published a story[4] of four Armenian brothers who, in the waning years of the old Soviet Union, when it first allowed some experimentation with private enterprise, decided to start a computer company with no money and, worse, no computers. Some seven years later, their company, named Aragast B had 100 employees whose accomplishments include writing software for banks in Siberia and selling computerized dictionaries to schools as far away as California.

The development of information technology, science and research remains a strategic priority for Armenian authority. It is anticipated that 8.8% of State budget of Armenia for 2019 will be allocated to education and science. The chart below shows the percentage of draft state budget of Armenia for 2019 allocated to education and science[5]:

Figure 1: Draft State Budget of Armenia for 2019 allocated to education, science and scientific technological programs



In the Republic of Armenia, the leading agency that is responsible for the governance of science, including the drafting of legislation, rules and regulations on the organization and funding of science is Science Committee (SC). The committee was established with the support of the Government of Armenia in 2007 and is operating under the Ministry of Education and Science of the Republic of Armenia. Shortly after the creation of the SC, competitive project financing was introduced to complement basic funding of public research institutions. SC is also the lead agency for the development and implementation of research programs in Armenia. During that period of time the SC elaborated the following key documents "Science and Technology Development Priorities for 2010–2014", "Strategic Action Plan for the Development of Science for 2011–2015" and "Strategy for the Development of Science for 2011–2020", which were adopted by the government of RA in 2010. The country's "Strategy for the Development of Science 2011–2020"[6] envisions that by 2020, Armenia will be a country with a knowledge-based economy and would be competitive within the European Research Area with its level of basic and applied research. It fixes the following targets:

- Creation of a system capable of sustaining the development of science and technology;
- Development of scientific potential, modernization of scientific infrastructure;
- Promotion of basic and applied research;
- Creation of a synergistic system of education, science and innovation; and
- Becoming a prime location for scientific specialization in the European Research Area.

In November 2016 Armenia gained the status of H2020 Associated Country. The agreement associating Armenia to Horizon 2020 was signed by Levon Mkrtchyan, Armenian Minister for Education and Science, and Carlos Moedas, European Commissioner for Research, Science and Innovation in Brussels. The Agreement entered into force from November 2016 after being ratified by the National Assembly of RA. Horizon 2020 is the biggest EU Research and Innovation programme ever with nearly €80 billion of funding available over 7 years (2014-2020)[7]. It is the financial instrument implementing the Innovation Union and it is open to everyone. Horizon 2020 also aims to enhance EU international research cooperation. Within the framework of this agreement Armenian researchers and innovators are allowed to take part in Horizon 2020 Research and Innovation programme under the same conditions as their counterparts from EU member states (before signing of this agreement Armenia participated in Horizon 2020 as a third country).

Besides Horizon 2020, Armenia cooperates with EU within a wide verity of other programs such as Erasmus + (EU exchange student program) aims to support actions in the fields of education, training, youth and sport for the period 2014-2020, including Tempus and Mundus. In order to achieve its objectives Erasmus + Program implements the following 3 Key Actions (KA) and other activities[8]:

- Learning mobility of individuals (KA1)
- Cooperation for innovation and exchange of good practices (KA2)
- Support for policy reform (KA3)
- Jean Monnet Activities
- Actions in the field of sport

Tempus – European Union's programme that supports the modernization of higher education in the EU's surrounding area. It promotes institutional cooperation that involves the European Union and Partner Countries and focuses on the reform and modernization of higher education systems in the Partner Countries.

Erasmus Mundus Joint Master Degrees (EMJMDs)[9] programme is a cooperation and mobility programme in the field of higher education that aims to enhance the quality of European higher education and to promote dialogue and understanding between people and cultures through cooperation between Europe and the rest of the world. EMJMDs supports to:

- higher education institutions that wish to implement joint programmes at postgraduate level or to set-up inter-institutional cooperation

partnerships between universities from Europe and targeted Third-Countries;

- individual students, researchers and university staff who wish to spend a study/research /teaching period in the context of one of the above mentioned joint programmes or cooperation partnerships;
- any organization active in the field of higher education that wishes to develop projects aimed at enhancing the attractiveness, profile, visibility and image of European higher education worldwide.

Over the past decade, the government of the Republic of Armenia has made an effort to encourage science–industry linkages. The Armenian information technology sector has been particularly active: a number of public–private partnerships have been established between companies and universities in order to give students marketable skills and generate innovative ideas at the interface of science and business. Examples are Synopsys Inc. and the Enterprise Incubator Foundation:

Synopsys Inc. multinational specializes in the provision of software and related services to accelerate innovation in chips and electronic systems. In 2004, Synopsys acquired LEDA systems, which had established an Interdepartmental chair on microelectronic circuits and systems with the State Engineering University of Armenia. The Chair, now part of the global Synopsys University Programme, supplies Armenia with more than 60 microchip and electronic design automation specialists each year. Synopsys has since expanded this initiative by opening interdepartmental chairs at Yerevan State University, the Russian–Armenian (Slavonic) University and the European Regional Academy.

Enterprise Incubator Foundation (EIF) was established in 2002 within the framework of the World Bank's "Enterprise Incubator" project[10]. The mission of the company is to support the development of information and communication technology sector in Armenia through creating a productive environment for innovation, technological advancement and company growth[11]. Nowadays EIT has become one of the largest technology business incubators and consulting companies in the region, operating in Yerevan, Armenia. The Company has a big experience in building linkages between business and research communities in key technology markets. Moreover, EIF is conducting startup/team competitions such as Science and Technology Entrepreneurship Program (STEP) and Innovation Marching Grants Competitions[12]. The main objectives of EIF are:

- Developing effective information and communication technology infrastructure to enhance technological advance and transition to knowledge economy.
- Enhancing nationwide access to computers and development of e-society.
- Promoting Armenian enterprises and increasing their competitiveness in the global markets.
- Creating new channels for attracting foreign direct investment to Armenia.
- Building linkages with business and research communities in key technology markets.
- Fostering formation of start-ups and their further development.
- Developing managerial and professional workforce and fostering productivity improvement in Armenian companies.
- Improving access of local firms to best international practices and experience.

In 24 February 2017 Memorandum of Understanding on "Promoting the fields of Information Technologies, Informatisation, Telecommunication and Innovation" was signed between the Government of the Republic of Armenia and the Company "Technology and Science Dynamics" (TSD). According to the document, representative offices of **Armenian Science and Technology Center** Private Public Partnership program (ASTC) initiated in Yerevan, Armenia in 2017 by **Technology and Science Dynamics LLC,** will be established in the target markets through the state-private cooperation which will promote the increase of the investment rating of the country's economy and ICT sector and also ensure high level of awareness of the ICT sector. Taking into consideration the fact

that Armenia nowadays is a leading country in the ICT sector in the region, and it is one of the fastest growing sectors of the economy, this Memorandum will contribute to Armenia's more effective integration at international platforms, as well as well as the promotion of the investments. In order to arrange the activities of the representative offices more efficiently, the Government of RA will provide free office space in the embassies and consulates of Armenia in foreign countries, where possible. Today the first positive results are already obvious. Representative offices have already been established in five countries: the USA, Belgium, France, Italy and Bolivia[13]. According to the Minister of Transport, Communication and Information Technologies of RA, ASTC program is expected to be introduced in 17 countries presenting Armenian IT developments to the world.

The Foundation for Armenian Science and Technology (FAST) launched in 2016. FAST amplifies and empowers scientific advancement and technological innovation in Armenia and beyond. FAST is building an ecosystem of innovation to lead scientists, technologists and innovators in Armenia and beyond to success on the global stage. With a focus on entrepreneurial endeavors, FAST empowers innovators to bring cutting-edge, commercially viable and globally competitive solutions to life. We partner with academic, governmental and non-governmental organizations alongside global players to explore and create what's next. The Co-founder of FAST, Mr. Ruben Vardanyan in one of his interviews said "FAST has to become a platform for bringing about the technological breakthrough in Armenia in the areas of IT and computer science, artificial intelligence, high-tech materials, robotics biotechnology, advanced engineering and manufacturing technologies"[14]. Mr Ruben is a businessman and philanthropist and also the co-founder of the "Initiatives for the Development of Armenia" (IDeA).

Chess Mandatory in Schools

A country of about three million people, Armenia is considered one of the strongest chess nations today. Among countries, Armenia has one of the most chess grandmasters per capita. Armenian authorities say teaching chess in school is about building character, not breeding chess champions[15]. During these years significant work has been accomplished, such as psychological research to assess the effectiveness of teaching chess and the influence of chess as a school subject on the development of children's logic, creative thinking, accountability for their action, intellect and other qualities. Since the academic year 2011-12, chess lessons have been made part of the curriculum in every public school in Armenia, making it the first country in the world to make chess mandatory in schools. Over $1.5 million was spent to implement the program in the country. Today, every primary school in the country has chess as a part of its curriculum for children above the age of six. In the opinion of Armenian GM Smbat Lputian "Bringing chess into schools is the best way to build the future, if we teach children discipline, patience, strategy and focus from a young age, we can create a world where everyone is a grandmaster". The education minister says "We hope that the Armenian teaching model might become among the best in the world"[16]

Giving importance to the return of traditional songs and dances to daily life and making them part of a living culture through preservation, elaboration and popularization, and to the promotion of development of national self-consciousness, in *2014* "National Song and Dance'" subject was introduced for the 5-7 grades in schools in Yerevan and in the provinces. The program aimed at strengthening national values in children from an early age. The ministry of education called the program "Armenian know-how." The subject "Folk songs and dances" is one of the best ways of educating worthy citizens of Armenia.

Conclusion

Science is a priority not only for economic but also for strategic growth of Armenia. At the same time, the Armenian culture has long respected literacy and learning, and looking towards knowledge-based economy is a realistic approach for both the government and international

donors. New projects aimed at developing the means for technological innovation in Armenia and the mobilization of scientific, technological and financial resources of the Armenian and international communities should be encouraged by the Government of the Republic of Armenia. In this regard, the opportunities should be given to Armenian scientists, particularly to younger ones, to undertake basic and applied research, development and discovery, use their scientific and research potential to address critical national issues.

Endnotes

1 Embassy of Armenia to the United States of America, http://usa.mfa.am/en/hayastan-fund/

2 "Executive Summary." National Research Council. 2004. *Science and Technology in Armenia: Toward a Knowledge-Based Economy*. Washington, DC: The National Academies Press. doi: 10.17226/11107., https://www.nap.edu/read/11107/chapter/2#3

3 National Research Council. 2004. *Science and Technology in Armenia: Toward a Knowledge-Based Economy*. Washington, DC: The National Academies Press. doi: 10.17226/11107.

4 Business Technology: Thriving in What Was the Soviet Silicon Valley: by Raymond Bonner. April 27, 1994 https://www.nytimes.com/1994/04/27/business/business-technology-thriving-in-what-was-the-soviet-silicon-valley.html

5 "Hetq" investigative journalists, source: Ministry of Finance of RA, https://hetq.am/hy/article/98583

6 V. Sahakyan, State Committee of Science, Ministry of Education and Science of Armenia, November, 2015, http://www.scienceportal.org.by/upload/2015/November/07_Sahakian.pdf

7 European Commission, Press release database, 2016, Brussels: http://europa.eu/rapid/press-release_IP-16-1785_en.htm

8 European Commission, EACEA: https://eacea.ec.europa.eu/erasmus-plus/actions_en

9 Erasmus Mundus Association, https://www.em-a.eu/en/erasmus-mundus.html

10 World Bank Group, http://projects.worldbank.org/P044852/enterprise-incubator-lil?lang=en

11 //http://www.academia.edu/9530040/How_to_create_innovation_ecosystem_in_Armenia_case_study_of_a_technology_park/

12 Science and Technology Entrepreneurship Program (STEP), http://www.eif.am/eng/projects/step/; IMG Grands, Science and Technology Entrepreneurship Program (STEP), http://www.eif.am/eng/projects/step/

13 Armenian Science and Technology Center, ASTC: http://armstc.org/

14 Mediamax, June, 2016; https://www.mediamax.am/en/news/interviews/19036

15 The Guardian, https://www.theguardian.com/world/2011/nov/15/armenia-chess-compulsory-schools/

16 Chessbase, India, July 2018; https://chessbase.in/news/Nas_Daily_features_Armenia_s_Chess_in_Schools_program

References

Armenian Science and Technology Center. 2019. "Overview". Retrieved on January 15, 2019 from http://armstc.org/

Bonner Raymond. 1994. "Business Technology: Thriving in What Was the Soviet Silicon Valley". The New York Times. Retrieved on January 16, 2019 from https://www.nytimes.com/1994/04/27/business/business-technology-thriving-in-what-was-the-soviet-silicon-valley.html

Chessbase India. 2018. "Nas Daily features Armenia's Chess in Schools program". Retrieved on January 16, 2019 from https://chessbase.in/news/Nas_Daily_features_Armenia_s_Chess_in_Schools_program

Gevorgyan Areg. 2014 "How to create an innovation ecosystem in Armenia: case study of a technology park". Unpublished Master Thesis Report. Lausanne: MTE Ecole Polytechnique. Retrieved on January 16, 2019 from http://www.academia.edu/9530040/How_to_create_innovation_ecosystem_in_Armenia_case_study_of_a_technology_park

Embassy of Armenia to the United States of America website. 2019. Retrieved on January 10, 2019 from http://usa.mfa.am/en/hayastan-fund/

Enterprise Incubator Foundation. 2019. 'About Us'. Retrieved on January 9, 2019 from http://www.eif.am/eng/projects/step/

European Commission. 2016. "Armenia joins Horizon 2020 to work with EU in research and innovation". Retrieved on January 16, 2019 from http://europa.eu/rapid/press-release_IP-16-1785_en.htm

European Commission. 2019. 'EACEA- Introduction'. Retrieved on January 16, 2019 from https://eacea.ec.europa.eu/erasmus-plus/actions_en

Erasmus Mundus Association. 2019. Erasmus Mundus Association website. Retrieved on January 16, 2019 from https://www.em-a.eu/en/erasmus-mundus.html

Ministry of Education and Science of Armenia website. 2015. "Better Policies for More Innovation Assessment-Implementation-Monitoring: R&D

Sector of Armenia-State Programs" Retrieved on January 16, 2019 from http://www.scienceportal.org.by/upload/2015/November/07_Sahakian.pdf

National Research Council. 2004. "Science and Technology in Armenia: Toward a Knowledge-Based Economy". Washington, DC: The National Academies Press. Retrieved on January 16, 2019 from https://www.nap.edu/read/11107/chapter/2#3

World Bank Group. 2019. 'World Bank- Introduction'. Retrieved on January 16, 2019 from http://projects.worldbank.org/P044852/enterprise-incubator-lil?lang=en

Mediamax. 2016. "Ruben Vardanyan: FAST must become platform for a technological breakthrough" Retrieved on January 16, 2019 from https://www.mediamax.am/en/news/interviews/19036

The Guardian. 2011. "Armenia makes Chess compulsory in schools" Retrieved on January 10, 2019 from https://www.theguardian.com/world/2011/nov/15/armenia-chess-compulsory-schools/