Southern Perspectives on Science Diplomacy

RIS
Research and Information System
for Developing Countries
विकासशील देशों की अनुसंधान एवं सूचना प्रणाली

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"*Southern Perspectives on Science Diplomacy*", is a collection of articles authored by Participants of the ITEC Programme on Science Diplomacy. The programme was conducted by Research and Information System (RIS) for Developing Countries, under the aegis of the Ministry of External Affairs, Government of India, from January 6 to 17 January 2020. It was attended by 30 participants, representing 23 different countries. This thematic volume is an outcome of the aforementioned course, which was designed to give a holistic understanding of different dimensions of Science Diplomacy.

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Core IV-B, Fourth Floor, India Habitat Centre,
Lodhi Road, New Delhi-110 003, India
Ph.: +91-11-24682177-80, Fax: +91-11-24682173-74
E-mail: dgoffice@ris.org.in
Website: www.ris.org.in

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PREFACE

Prof. Sachin Chaturvedi

Director General, RIS

As is emerging, economic development is the outcome of accumulated strengths in Science and Technology and necessary skills to move forward with. It is with this objective, India since Independence has focused on Science and Technology and related human resource development and through the ITEC programmes is basically trying to address and share strength and experience.

In 2017 RIS initiated a mega programme of connecting partner countries with possible efforts through specialized course on Science Diplomacy. There are several connotations and imperatives associated with this vision. However, at RIS we have tried to interpret Science Diplomacy in a broad framework that gives indogeneity to the process and augments the national capacities for leveraging national innovation system for self-reliance and economic growth.

In the programme conducted in January 2020, there were 30 participants representing 23 countries from Asia, Africa and Latin America. As in the previous programmes, the agenda this year also had a mix of lectures, group discussions, field visits and technical sessions. Eminent experts, practitioners and policy makers addressed the participants on a wide variety of topics, including South-South Cooperation, STI for SDGs, Cyber Security, Internet Governance, Artificial Intelligence, Genome Editing, Nanotechnology, Traditional Knowledge, Digital India and Digital Economy, Space, Vaccines, Pharmaceuticals, Energy and Foreign Policy. As part of field visits, the ITEC participants visited ICGEB, International Solar Alliance and NAM S&T Centre.

As part of the programme, participants are encouraged to write papers and make presentations, besides having discussions with faculty of RIS. The idea here is to foster dialogue that can result in cooperation and to encourage mutual understanding as training programmes are also forums for mutual learning.

We are glad to present this volume consisting of 30 papers written by the participants. The papers deal with a variety of topics and themes, reflecting on the diversity in the views and perspectives. All of them have some specific pointers and suggestions on Science Diplomacy and bi/regional/multilateral cooperation.

We are grateful to the Ministry of External Affairs for supporting the ITEC Programme on Science Diplomacy at RIS. We congratulate the participants for this publication and thank them for their active engagement during the training programme. We also thank our colleagues for successful conducting of the progrmme and bringing our the volume elegantly and well in time.

Sachin Chaturvedi

International Cooperation and Prospects for Science Diplomacy between India & Argentina

Laura Martina Jeifetz*

Introduction

Diplomatic relations between Argentina and India have gradually improved with the return of democracy in the Latin American region. Since the 1980s, trade, and cooperation between the two nations have increased significantly. An important milestone, which shows a new impetus in bilateral relations between the two countries, is the visit of Narendra Modi, Prime Minister of the Republic of India, to Argentina and the official mission of former President Mauricio Macri to New Delhi. This paper maps the progress made between the two States with a special focus on international cooperation in Science and Technology. Also, it presents a brief analysis on prospects for bilateral cooperation in Argentina's Vaca Muerta oil and gas reserves.

History

The relations between Argentina and India mark their beginning in 1949 when the Argentine Foreign Ministry established its Embassy in New Delhi. However, an approach is noticed in 1924 when the Indian philosopher Rabindranath Tagore visited Buenos Aires (Rodríguez de la Vega Lía, 2019). In 1960, Argentine President Frondizi visited Delhi; being the first time a Latin American president visited that country. An important turn in the relationship between Argentina and India occurred in 1982 with the emergence of the war conflict over the Falkland Islands. On that occasion, Prime Minister Gandhi, after studying the conflict, spoke in favor of the Argentine position. With the return of democracy, Argentine President Raúl Alfonsín visited India. On that occasion, several treaties were signed. As noted, diplomatic relations were progressing positively over the years.

* *Universidad Nacional de Córdoba, Argentina*

Present

Focusing on the most recent past, it is important to highlight that Argentina hosted the 13th G-20 Leaders' Summit, held between November 30 and December 1, 2018. The States that represent 85 per cent of the product participated in global gross, 66 per cent of the world's population, 8 of investments and 75 per cent of trade (Argentina G20 Summit 2018). The topics addressed were the impact of new technologies on traditional work structures and their relationship with education, infrastructure for development and food security. Of course, the Indian State was an active member of this great event. In turn, within the framework of the G20, both the Argentine and Indian authorities reviewed the Mercosur-India relationship to expand trade ties and advance agreements related to science and technology between the two countries.

70th Anniversary: Argentina-India relations

On the 70th anniversary of bilateral relations, the former Argentine president visited India in February 2019 along with representatives of at least one hundred Argentine companies (Ministry of Foreign Affairs, International Trade, and Worship, 2019). The purpose of the trip through the Asian country was to achieve new markets for Argentine products. On the other hand, the Heads of State of these nations affirmed that relations between India and Argentina find their foundation in common principles and values of democracy, freedom, rule of law, respect for human rights and territorial integrity of the States. Fortunately, this was a great step towards strengthening ties between the two countries.

The two leaders also expressed satisfaction over pace of cooperation and mutual collaboration on issues of economy, technology, energy, mining, social security, academic exchanges, defence, and hydrocarbons, etc. This meeting between the two leaders culminated in several agreements of strategic interests. For example in defence sector, a Memorandum of Understanding on Cooperation in Defence, knowledge sharing in the fields of Science, Technology, Production and Logistics for Defence were signed. Besides bilateral cooperation in tourism, commercial and hotel sector were some of the important highlights of the meeting.

Undoubtedly, the fundamental purpose of this meeting was to strengthen economic and commercial relations between the two countries by improving and diversifying trade and investment through the elimination of trade barriers, facilitating greater access to markets, and recognizing the importance of the service sector. In terms of energy, Argentina joined the International Solar Alliance. This multilateral Indian initiative aims to reduce energy prices, boost the development of low carbon economies and facilitate the deployment of existing solar technologies at scale.

As regards mining, the representatives of the Argentine delegation expressed their willingness to provide geological information for Lithium exploration with the support of the local provinces. On this issue, the Indian authorities expressed their objective that at least 30 percent of their automotive industry will run on electric batteries by 2030.

Science and Technology

In the area of science and technology, the two countries agreed to set-up a Training Center in Advanced Areas of Information Technology in Buenos Aires. The Indian Government agreed to support this institution through the provision of software and necessary equipment for the development of four computer laboratories, the dispatch of a technical expert, and the training of Argentine experts in India (Ministry of Foreign Affairs, 2019).

Regarding information and communication technologies (ICTs), an exchange of knowledge and experience concerning new technologies was agreed upon. These include new technology areas such as artificial intelligence, big-data, block-chain, battery technologies, and financial and digital inclusion, which are highly relevant from the standpoint of Argentina's development.

As for cooperation in the outer-space, the two sides agreed to work together in the field of satellite remote sensing missions, which includes data exchange, application development, and calibration and validation experiments. The purpose of this

collaboration is to construct and launch satellites. In nuclear matters, it was established that Argentine technicians will be able to carry out academic training in India, and Indian experts will do the same in Argentina. Sequentially, research projects are planned to be carried out jointly.

This cluster of strategic alliances also included the pharmaceutical industry in order to cooperate and exchange knowledge in the field of drug production. The fields of action will be the exchange of information on generic medicines and medical instruments, mutual technical visits, cooperation in legal matters, among others. The presidents did not overlook agribusiness cooperation, and assistance scheme was established that would allow knowledge sharing in the agribusiness sector, in which Argentina stands out for its expertise. Among the areas of interest include biotechnology, genetic improvement, monitoring systems of fish activity, wine production, among others.

Finally, the two sides also agreed to work cooperatively in agricultural research. In particular, attempts have been made to obtain advances in scientific research, technology and product innovation, as well as the transfer of technology for the development and production of vaccines in India. The production of high-yield rice varieties, disease resistant herbicides, germplasm exchange, fish mari-culture along with the development of agricultural by-products, and marketing strategies were envisaged.

Although the agreements cover multiple areas, all of them are strategic and we reiterate that they will be highly favorable to both the countries, and tend to consolidate bilateral relations between the two countries. In short, the long-term objective is to improve the living standards of Argentine and Indian citizens.

Business Forum with India

As a continuation of this work agenda, in October the Business Forum with India was held in Buenos Aires to promote trade and investment. The Secretary of International Economic Relations, the Ministry of Foreign Trade, the President of the Argentine Investment and International Trade Agency, the Argentine Ambassador to India participated in that meeting. The Ambassador of the Republic of India in Argentina was also present in the forum (Ministry of Foreign Affairs, 2019).

The event saw participation from a number of entrepreneurs, especially the members from the Confederation of Indian Industries (CII) in various sectors. More than 400 conferences and work meetings were held with 250 Argentine companies with the objective of evaluating business opportunities.

Subsequently, in December, the local authorities met with the Indian Ambassador to Argentina, Dinesh Bhatia met in the province of Mendoza. The objective was to improve bilateral trade ties between the two countries and encourage local development of technologies required in countries such as Republic of India. Among other potential areas of cooperation that the authorities identified include agribusiness, mining and metal industry (Mendoza Government, 2019).

Oil and gas

An issue that generated high expectations and media discussion was the willingness among the two countries to explore possibilities for cooperation in conventional and unconventional oil and gas resources, including the hydrocarbon value chain as a whole. Logically, we refer to second gas reserve and fourth unconventional oil in the world commonly known as Vaca Muerta, located in the middle of the Argentine provinces of Mendoza, Neuquén, Rio Negro and La Pampa. Currently, at least 20 companies operate this formation. Among them, Pan American Energy (Argentina), Fiscal Oilfield (Argentina), Total Austral (France), ExxonMobil (USA) (Argentina Government Minister of Treasury, 2019).

Thus, in the framework of the visit of Argentine delegation to India in February 2019, the former Argentine President invited his Indian counterpart Prime Minister Narendra Modi to consider investing in the Vaca Muerta oil and gas reserve. Consecutively, the Indian authorities acknowledged that there are great opportunities in the area of unconventional energy, and that they will try to find a way that their countries also participate in the reserve. In this context, both leaders ratified

their intention to work together to cooperate in this area, which they described as highly advantageous for both nations. Argentina, needs investments for the exploitation of these resources, since the cost of drilling is around USD $ 6 million. India, as of 2030 will be the most populous country in the world so its energy needs will also increase (Ocvirk Verónica, 2019).

Of course, India is not the only country that has shown interest in this valuable deposit. On January 8, 2020, a meeting was held between the Argentine Secretary of Energy, Sergio Lanziani and the future U.S. ambassador to that country, Jorge Arguello. On that occasion, both parties pledged to launch the site. The two sides intended to maintain an open dialogue about the energy opportunities offered by the Latin American country (Lamiral Carlos, 2020).

In principle, Argentina intends to strengthen international cooperation to secure for the Vaca Muerta project. A fact not less is the current conflict between the US and Iran, which will surely be a point to be considered by concerned parties. However, the sum total of these factors is not so simple. The new Argentine government, headed by President Alberto Fernandez, will face a great challenge in the management of these valuable resources. With this magnificent site, Argentina is guaranteed self-supply, but the truth is that it does not have enough money for exploitation. This requires a constant flow of foreign exchange from international oil companies.

In this way, the Argentine government plans to continue with the development of the Vaca Muerta reserve. However, it must offer good conditions to attract foreign investments. An important crossroad opens here: Argentina will have to negotiate in such a way that the local rate chart stays at an appropriate levels and guarantees access to the general population.

In this context, the Argentine government realised that it needs to introduce a bill in Congress to 'shield' Vaca Muerta. This indicates that the intention is to insulate the Vaca Muerta project from international market fluctuations, negotiate with oil companies, and stimulate a legal framework that attracts foreign investments. The key purpose of this law is to reduce government holdings from 12 percent to 8 percent, in addition to exempting oil companies from paying royalties on total billing. In turn, the bill contemplates tax advantages for oil companies (Robles Amelia, 2020). Undoubtedly, this new initiative poses a friendlier scenario for foreign companies.

Through this the possibility of exporting these resources also opens up. However, in case of the desire to do so with countries where there is no gas pipeline, an exponential investment would be necessary to transport the gas in a liquefied form. Resources in this geological area of the country are abundant but expensive. Another challenge in this context pertains to climatic and environmental difficulties. Today, the need is to base the energy matrix on renewable sources and with fewer carbon emissions, that is, neither gas nor oil. In turn, in some way, this type of development generates social inequality. For example, in rural areas near the Vaca Muerta complex, the oil personnel receive dollarised salaries whereas the salaries of teachers are much less than these values.

Conclusion

In conclusion, the relations between Indian and Argentina are on the upward trajectory. The agreements which were signed to form a consolidation and a strategic alliance will result in positive impacts for the internal economy of these nations, and an improvement in the living standards of the citizens of both countries. Subsequently, we recognise newer areas of cooperation such as the Vaca Muerta field. However, both countries must carefully agree on the terms of said negotiation in order to avoid negative consequences for local societies and the environment. The government of President Alberto Fernández must address such complex problems.

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INTA-Driven Science for Diplomacy in Argentina

Orlando Samuel Miño*

Introduction

Science and technology pervade many aspects of diplomacy due to scientists acting like diplomats push the subscription of international agreements (Turekian, 2018). In practice, science diplomacy could mean many things, scientists use to serve as technical advisors or they might participate with decision in negotiations. However, scientists frequently cross international borders to attend meeting and conferences and, to work with colleagues. This approach of science diplomacy is primarily building fellow feeling also in an informal mode. This is the most popular practice in fact, that allowed carrying out the projects toward good scientific results (Copeland, 2016).

The science and technology institutions (STI) need to develop scientific projects to apply for many to work. Usually, the projects are supported if they are proposed as collaboration between two or more institution and, if the institution are from two or more different countries. It encourage to the scientist to work in multidisciplinary team from different labs and, they promote and demand a formal frame to work, it end in the creation of agreements between countries (Colglazier, 2018).

Most of the successful treaties based on science collaborations meet the needs of societies in a politically feasible approach (Moomaw, 2018). This approach need the active participation of professional on field in order to collect real information to attempt real problems. The territoriality of the institution involves become critical to this end.

Argentina is one of the largest economies in Latin America with abundant natural resources in energy and agriculture. In its territory of 2.8 million square kilometers, the country has extraordinarily fertile agricultural land, has significant reserves of gas and lithium, and has enormous potential in renewable energy. Is a world leading country in food production, with large-scale industries in the agriculture and

* *Researcher, Instituto Nacional de Tecnologia Agropecuar, Argentina*

livestock sectors. It also has great opportunities in some manufacturing subsectors and in the innovative high-tech services sector, biotechnology. Argentina, one of Latin America's largest economies is seeking its path of sustained inclusive economic growth (World-Bank, 2019).

Argentina has a long history of promoting Science and Technology Institutions (STI), which is reflected in high standards of quality and scientific production of public institutions such as "*University of Buenos Aires*" (UBA) and "*Consejo Nacional de Investigaciones Científicas y Técnicas*" (CONICET) qualified as the best STI of Latin American countries in 2019 (Fernandez, 2019; CONICET, 2019). In this context, the National Institute of Agricultural Technology (INTA) is the main public Argentinean STI with focus on the agricultural, agri-food and agro-industrial sectors that combine the STI with the social needs of the family farming, small and medium producers and, the export sector.

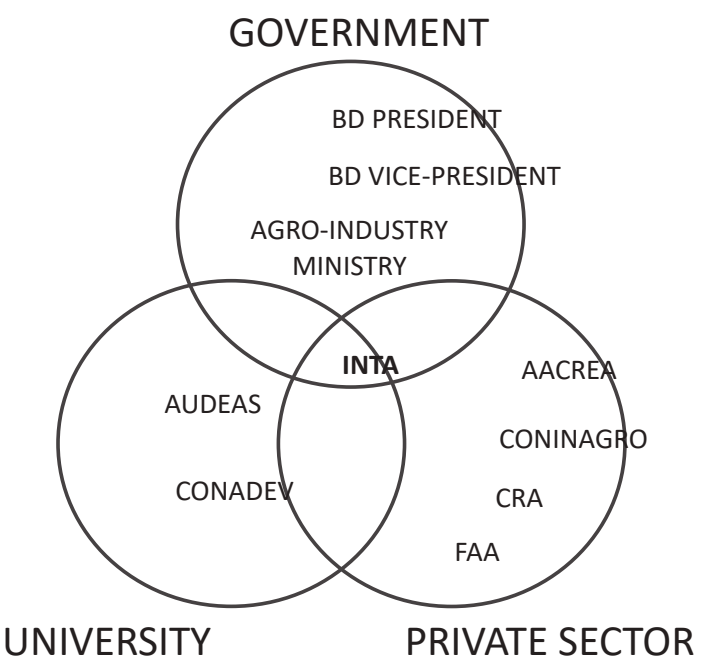
National Institute of Agricultural Technology (INTA) of Argentina

INTA is a singular institution that combine the research in science and technology with extension activities to bring solutions from research centers to the local agencies.

The INTA of Argentina is a decentralized public body with operational and financial autarchy, which is under the orbit of the Ministry of Agriculture, Livestock and Fisheries. In 1956, INTA was created by law in order to promote the development of agricultural research and extension, and the technification and improvement of agricultural enterprises and rural life. Its mission is to carry out and promote actions aimed at innovation in the agricultural, agri-food and agro-industrial sectors, to contribute integrally to the competitiveness of agribusiness chains, environmental health and sustainability of productive systems, social equity and territorial development through science and technology development and extension (Argentina, 1956).

A board of directors (BD) that is the highest governing body of the Institution leads the INTA. It establishes global policies and strategies and decides on the allocation of resources of the organization. It is made up of representatives from the public and private sectors, guaranteeing an active participation

Figure 1: INTA and triple helix concept.



Source: Author's own compilation

Figure 2: Territoriality of INTA

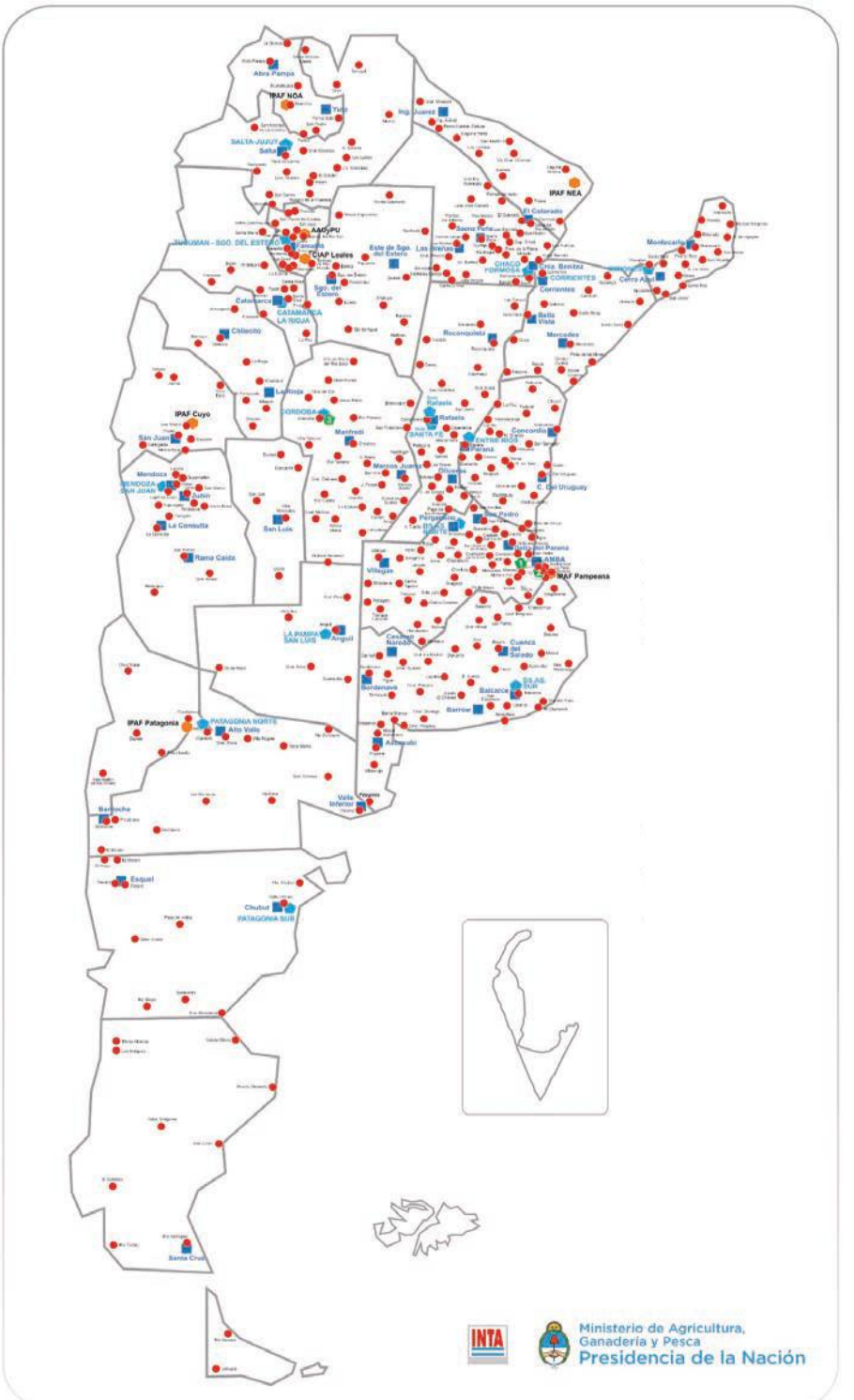


Figure 2. The map shows the territoriality of INTA across Argentina that is building through the 6 Research Centers (⬟), 15 regional centers (⬟), 23 Research Institutes (⬢), 51 Agricultural Experiment Stations "EEA" (■) and, over 377 rural outreach units "AER" (●).

of the productive and academic sector in the setting and prioritization of policies, as well as in the social control of their actions.

The BD is formed by a president, vice-president and a representative of:

• The Agro-industry Ministry.

• Argentina Association of Regional Consortium's of Agricultural Experimentation

(AACREA): It is an Argentine civil association that integrates the Regional Consortia of Agricultural Experimentation, known in Argentina and Uruguay as CREA Groups. They are work groups formed by agricultural producers to promote the technological development of production and efficiently coordinate the productive task (CREA, 2020).

• Agricultural Inter-Cooperatives Confederation Ltd. (CONINAGRO): It is an organization that brings together the agricultural cooperative sector of Argentina. It is an organization that brings together ten federations that, in turn, bring together 120,000 agricultural cooperative companies (CONINAGRO, 2020).

• Argentinean Rural Confederation (CRA): It is an organization formed by 14 confederations and federations (until 2013), which in turn are made up of more than 300 rural societies throughout the country (CRA, 2020).

• Argentine Agrarian Federation (FAA): It is an employer organization of rural producers in Argentina. Most of its members are small and medium rural owners (FAA, 2020).

• Argentine Rural Society (SRA): It is a civil association that brings together large landowners dedicated to agriculture and livestock in Argentina (SRA, 2020).

• Faculties of Agronomy from the National Universities (AUDEAS): It is an entity that brings together the officially recognized University institutions in the Argentine Republic (faculties, schools, departments, institutes) that offer higher education in agriculture and/or forestry (AUDEAS, 2020).

• Faculties of Veterinary from the National Universities (CONADEV): It is the Council that brings together the Deans of the Faculties of Argentine National Universities with Careers of Veterinary Medicine (CONADEV, 2019).

In this way, INTA integrates representatives from all sectors, including small and medium producers, export companies, associations, federations, agronomy and veterinary universities, as well as government representatives. This gives the INTA BD a complete representation of the entire agricultural sector of the country supporting the triple helix concept.

The scheme shows the triple hélix complex in the INTA board direction (BD). The president, vice president and a member designed by the agricultural ministry, represents the government. Two delegates, one for the Faculties of Agronomy from the National Universities (AUDEAS) and one for Faculties of Veterinary from the National Universities (CONADEV) represent the Universities. Argentina Association of Regional Consortium's of Agricultural Experimentation (AACREA), Agricultural Inter-Cooperatives Confederation Ltd. (CONINAGRO), represents the private sector. Argentinean Rural Confederation (CRA) and Argentine Agrarian Federation (FAA) and, Argentine Rural Society (SRA).

From the beginning, the INTA BD include the three university, industry and government institutions on their structure. This relationship, described as the triple helix concept, describe the potential of STI and economic development has when they working together. It concept propose that a Knowledge Society lies in a more prominent role for the university and in the hybridization of elements from university, industry and government to generate new institutional and social formats for the production, transfer and application of knowledge (Triple-helix, 2020).

INTA´s research and extension activities rely on its widespread presence across Argentina´s 2.8 million square kilometers of territory (territoriality). It are composed by 6 research centers, 15 regional centers, 23 research institutes, 51 agricultural experiment stations and over 377 rural outreach units (Figure 2) (Nicora and Espina, 2016). INTA cogenerates knowledge on the agro sector via alliances with local communities international STI.

The traditional knowledge is collected through the contact on the field with local communities in order to relieve and protect the natural resources (James, 2019). It function is possible due to the INTA territoriality. At the same time, INTA works in the territories to attend demands and opportunities with new knowledge and technologies, which paves the way to collaborating with other communities around the world that share similar problems. These two approaches of global collaboration, research and extension, respectively, enrich SD in a unique manner. The problems are flowing in a bottom-up sense, from the communities to the research centers and, the solutions found attend problems and need generated on the society itself. The science, technology and innovations generated by INTA are then spread through scientific publications, patents or products and, the public-public and public-private and, the local and international collaborations increase and enhance each other. To this end, the INTA BD has established 11 thematic axes that constitute the 2019-2022 work portfolio. It axes include the themes of agroecosystems, renewable natural resources and climate change, pests and diseases of animals and plants, added value in productive systems, technologies applied to agriculture and institutional management of innovation.

INTA-driven Science for Diplomacy in Argentina

Within INTA structure there is a National Coordination for Technology Transfer and Institutional Relationships that handles INTA´s relations with the public and private sectors, at regional, national and international levels. During the last four years period (2016-2019) INTA has done more than 200 international agreements with prestigious STI from more than 40 countries, including countries to promote the South-South cooperation (SSC) as India. These agreements include scientific cooperation, technology transfer, capacity building, trade and grants. Its work are in concordance with the five modalities of the development compact, supporting the development goals self-determinated in a south country (Chaturvedi, 2016).

In addition, INTA articulates with State Ministries to provide technical assistance to third countries and to carry out joint projects generated by Argentinean needs. Besides, articulate with the five agricultural attachés of the Argentina embassy (one of those located in India) in an agricultural surveillance of common need to work on and to generate international collaborations. INTA also participates in the Argentine Fund for International Cooperation (FO.AR) of the Argentine Ministry of Foreign Affairs, contributing to missions in 31 countries with 56 ongoing projects and 18 project-ideas currently in process during the 2016-2019 period. From its beginning, INTA contributes to Argentina´s a global insertion via strategic alliances with high reputation international STI from several countries around the world. Diplomat scientists are generated by INTA to interact with scientist diplomats in order to carry out science diplomacy (Turekian *et al.*, 2015). SD in INTA is a practice based on scientific activities that allowed building and strengthening relationships between countries. According to the institutional engagement described by Sutton and Lyons (2013), INTA SD accosts with the following topics: i) participating in government-sponsored international science activities; ii) impacting or advising on STI-relevant policy or capacity of other nations; iii) advising the Argentinean foreign policy objectives by working in priority countries, priority disciplines, and/or priority issues; iv) strengthening science diaspora connections between foreign STI personnel on their campus and INTA.

INTA aligns its science-related efforts with Argentina´s agro sector needs, with a prospective focus in high tech innovation and global sustainability. Coexistence of scientists with focus in future technologies and researchers grounded in today´s problems, allows INTA to promote SD in a singular innovative way. This is a bottom up approach pushed from researchers that undertake international collaborations with STI from priority countries, but also with different communities worldwide that struggle with the same problems.

However, scientists lack of politic and diplomatic practice and experience that needed for effective institutional relationships. On the other hand, traditionally trained diplomats have no scientific background (Moomaw, 2018). Last year's many

efforts have been made to improve scientists soft skills and diplomats scientific background, converging on what is called Science Diplomacy (SD) (Sutton and Lyons, 2013).

Finals remarks, INTA is a STI from Argentina that provides advice to inform and support foreign policy objectives (science in diplomacy). In addition, INTA promotes scientific cooperation, thus improving international agreements and collaborations that strengthen and boost institutional relations between countries (science for diplomacy) (Gluckman *et al.*, 2018). Considering scientists are the most common unknowingly ambassadors of the STI (Hoy, 2019), there is a need to strengthen their soft capabilities to improve Science Diplomacy.

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Climate Change and Climate Diplomacy: A Perspective from Armenia

Vazgen Boryan*

Introduction

The worldwide security scenario features a diverse set of converging risks, such as tensions among power centres, disagreements over geographical and political boundaries. These are not new risks. New risks and challenges, like rapid climate change, have emerged, which are, by no means, known in earlier humankind's history. And today, all of us are encountering great uncertainty and extreme vulnerability in the face of rapid climatic, technological and social changes. It is true that unprecedented innovations in science and technology make it possible to identify the risks and plan for appropriate responses in order to manage and minimize their negative impacts on countries. Scientific evidence leaves no doubt that the climate is changing: melting glaciers, increasing temperatures, drought, sea-level rise, and more frequent and more intense extreme weather events, and when they blend with political, monetary and ecological factors, they directly affect millions across the world, adding to, livelihood insecurity and sociopolitical tensions. In many regions, water will be scarcer, storms and floods would create more damages, and droughts will affect more adversely. These impacts threaten economic development, undermine livelihoods, and make the world more insecure and unpredictable. Therefore, Climate change is one of the key policy challenges in today's era. These are obvious to anyone who is aware of our planetary crisis and as this is too well known I am not giving a long of references to substantiate this.

Climate change is also one of the biggest security threats of the 21st century and "addressing climate change-related security risks is an important dimension of agendas to sustain the peace, stabilise communities, and prevent conflict" (Ivleva, D., et al. 2019). Therefore, a common strategy and binding goals are necessary on a planetary scale.

* *Master of Arts in Psychology, Cadastre Committee, Armenia*

Starting in the 1970s, climate science has matured, building on advances in numerical modelling and satellite imaging. The raid developments in computer technology coupled with expansion of satellites and related infrastructure in monitoring the atmosphere revolutionized our understanding and responding to global climate change.

But to understand and prepare for the challenges of climate change, it was necessary to share scientific knowledge beyond borders and work on policy issues on a global scale. Hence climate change studies had to be done at different levels, leading to the understanding of global climate change. The realisation that while studying changes at regional levels was necessary but not sufficient to get the true global picture resulted in consultations and meetings. This resulted in the United Nations setting-up the Intergovernmental Panel on Climate Change (IPCC) in November 1988. The IPCC's role is to publish reports that provide a clear and up-to-date picture of the current state of scientific knowledge relating to climate change. IPCC was formed as the global Panel with participation from states and the scientists were to provide the knowledge that would inform policy and 'translate' the scientific findings for policymakers, highlighting the threats, options and challenges. In that sense, IPCC was not just a scientific body. Policymaking and policy response is ingrained in its mandate. Thus climate change politics is inseparable from science and functioning of IPCC. IPCC housed in WMO and based in Geneva emerged as the global eyes and ears on global climate change.[1]

The international community kicked off the fight against climate change in June 1992 in Rio de Janeiro, Brazil, at the second Earth Summit. Following the conference, 166 countries signed the United Nations Framework Convention on Climate Change (UNFCCC), which acknowledges humanity's role in global warming. The Rio Conference resulted in two other important conventions on biodiversity and desertification. The parties to the Convention have met annually from 1995 in Conferences of the Parties (COP) to assess progress in dealing with climate change and in limiting emissions of Green House Gases (GHGs).

In 1997, the Kyoto Protocol was concluded and established legally binding obligations for developed countries to reduce their greenhouse gas emissions in the period 2008–2012. The Kyoto Protocol has had two commitment periods, the first of which lasted from 2008-2012. The second one was from 2013-2020 and is based on the Doha Amendment to the Protocol, which has not entered into force. The 2010 United Nations Climate Change Conference produced an agreement stating that future global warming should be limited to below 2.0 °C (3.6 °F) relative to the pre-industrial level. The Protocol was amended in 2012 to encompass the period 2013–2020 in the Doha Amendment, which as of December 2015 had not entered into force. In 2011, parties adopted the "Durban Platform for Enhanced Action".

As part of the Durban Platform, parties have agreed to "develop a protocol, another legal instrument or an agreed outcome with legal force under the Convention applicable to all Parties" (COP 2012). Finally after much protracted negotiations and compromises, in 2015 the Paris Agreement was adopted, agreeing in on, emission reductions from 2020 on through commitments of countries in Nationally Determined Contributions (NDCs), with a view of lowering the target to 1.5 °C. That it has taken 27 years from forming of IPCC and twenty three year after UNFCCC, for Paris Agreement and this tells us that the progress has been uneven and slow, even as it was becoming clearer, year by year, that climate change could have grave consequences for survival of humankind.

The Paris Agreement entered into force on 4 November 2016. Still, the progress is tardy and with the USA leaving the Agreement, there are doubts about achieving the targets. IPCC continues and the outcomes from IPCC assessments have been mixed. After analyzing the science and diplomacy nexus in IPCC, Ruffini states, "The IPCC has helped to guide and structure the discussions between states under the Climate Convention. The influence of science has, thus, proven to be important in some aspects, but failed in others. The IPCC' successive reports did not decisively impact the course of international climate negotiations. Similarly, while scientists have worked hard to publicize the predictable damage of global warming, policymakers to date have not taken radical decisions to reverse this trend" (Ruffini 2018).

With the Paris Agreement in force, the need for international co-operation in achieving the targets is obvious. International co-operation and co-operation at regional levels are *sine qua non* but these do not occur on their own. Climate Diplomacy has been defined as "climate diplomacy as encompassing a rich understanding of how to shape the national interest debate, through engaging new constituencies that can leverage change.

Among the actors in global climate change negotiations and policy setter, the European Union is an important one. While that is obvious, what is not widely known is that EU pursues climate diplomacy actively and this is part of its commitment to the de-carbonization of economies and societies. As the EU is engaged in using diplomatic channels and other sources to convince countries that the Paris Agreement should be complied with, it has more or less integrated climate diplomacy in its global engagement on climate change. In 2016, the Council of the European Union defined three strands that climate diplomacy has to build upon after COP21 (Climate Diplomacy, 2019):

- Continuing to advocate climate change as a strategic priority in diplomatic dialogues, public diplomacy and external policy instruments;
- Supporting the implementation of the Paris Agreement, in the context of low-emission and climate-resilient development;
- Increasing efforts to address the nexus between climate, natural resources, prosperity, stability and migration.

Moreover, early diplomatic engagement is imperative for confronting the geopolitical consequences and security implications of climate change. To address these challenges, a new profile of climate diplomacy is evolving for making use of a full range of policies, including development cooperation, conflict prevention efforts, and humanitarian assistance, in addition to more traditional measures of climate change adaptation and mitigation. These new approaches for foreign policy go beyond the traditional realms of climate policy. Moving from a risk analysis of climate-related threats to timely preventive action requires a greater commitment to integrating climate change concerns into development, foreign, and security policies (Carius, A, et al. 2017).

"Examples include strengthening diplomatic networks, building new alliances with partners, and raising awareness – not only of potentially negative climate change impacts but also of opportunities to embark on a sustainable transformation of our societies" (Adriázola et al. 2014).

It is also becoming increasingly clear that development and growth policies need to be climate-compatible. In fact, climate action presents great opportunities to grow the economy sustainably. Using cross-sectoral convening power, bilateral relations and multilateral fora, diplomats can promote a better understanding of these opportunities beyond the environmental policy community, and scope and facilitate bilateral cooperative action. Such an integrated approach will help to further foreign policy objectives, and support implementation of the Paris Agreement, while ratcheting up ambition over time (Carius, A, et al. 2017). Thus, Climate Diplomacy can go a long way in helping to create the conditions for sustainable transformations.

Science, Data and Climate Change

While the technology necessary to monitor the climate effectively is already here, political will is still needed to transform our society into a system which openly shares data - noting that more than half of the data collected by government-operated Earth-observing satellites is still not freely shared. Open data policies are crucial to address the cross-cutting issue of climate change and to provide input for better decision making across many domains.

A bright illustration of how science helps to cope with climate-related issues is Copernicus Climate Change Service which supports society by providing authoritative information about the past, present and future climate in Europe and the rest of the World. It provides climate data and information on impacts on a range of topics and sectoral areas through our Climate Data Store (CDS). The CDS is designed to enable users to tailor services to more specific public or commercial needs (C3S 2019). Climate projections are obtained by running numerical models of Earth's climate, which may cover either the entire globe or a specific region e.g. Europe. These models are referred to as Global

Source: https://climate.copernicus.eu/about-us

Climate Models (GCMs) – also known as General Circulation Models – or Regional Climate Models (RCMs), respectively.

In setting priorities for making projection results available, C3S has put a strong focus on providing quantitative information about the uncertainties in projected outcomes, taking into account various sources. Such uncertainties arise from differences in emission scenarios, differences among the formulations of numerical models, and the natural variability of the climate system on decadal scales. Although the available climate observations already provide a vast amount of information for the generation of climate services, it is legitimate to ask what can be done in the future to improve the quality and quantity of such information. For example, are climate services going to benefit from a substantial increase in the resolution of climate models, or should more resources be allocated to the production of larger ensembles which provide a better estimate of uncertainties?

Climate Change and the Commitments of Armenia

Armenia is a country of climatic contrasts: because of intricate terrain, one can find high climate diversity over even a small territory. The country has almost all types of climate, from arid subtropical to cold high mountainous climates. The geographical location of Armenia (a landlocked mountainous country with vulnerable ecosystems), and the country's need to ensure its national security, necessitates the prioritisation of climate change. Geographically, Armenia is peculiar for its high seismic and exogenic processes, which provoke earthquakes, landslides and erosion. The landslide hazard zone covers one-third of the country, primarily in foothill and mountain areas. Nearly 470,000 people are exposed (around 15 percent of the total population) to landslide risk. Hydro-meteorological disasters have become more frequent and intense in the last few decades. Floods, mudslides, and debris flows threaten half of the country's territory, mainly in medium-altitude mountainous areas, where they typically occur once every three to ten years. About 15 percent of agricultural lands in Armenia are prone to droughts, worsening the situation with the erosion and salinity of lands. While the landslides are very rare in Armenia, they are typically caused by floods, which are more common and occur once in 6.5 years approximately, causing on average 0.7 million US$ of losses per year (Yerevan, 2018).

Armenia ratified the UN Framework Convention on Climate Change (UNFCCC) as a non-Annex I country in 1993, UNFCCC Kyoto Protocol - in 2002, Doha Amendment of Kyoto Protocol and Paris Agreement in 2017. The current national program for Intended Nationally Determined Contributions (INDC) under the UNFCCC was adopted in 2015. It is an integrated strategy aimed at ensuring effective adaptation to the adverse impacts of climate change

and fostering climate resilience and low greenhouse gas emissions in a manner that does not threaten food production. Armenia issued three National Communications on Climate Change (in 1998, 2010, and 2015), and Biennial Update Reports on UNFCCC in 2016 and 2018. The Council with its working groups establishes a consistent process for coordination of climate change policy, enhances cooperation at the international and regional levels, as well as professional training and education on climate change-related issues. Armenia adopted a national disaster risk management strategy in line with the Sendai Framework for Disaster Risk Reduction 2015-2030. The strategy sets seven broad objectives, including (i) reduction of deaths from disasters; (ii) reduction of the number of people suffered from disasters; (iii) reduction of economic damages from disasters; (iv) reduction of the effects of disasters on essential infrastructures and services including health and educational institutions; (v) development of local disaster risk management strategies; (vi) international cooperation; (vii) enhancement of early warning systems.

Since the UNFCCC ratification, once every five years the Government of Armenia approves the list of measures for implementing the country's commitments under the international environmental conventions including the UNFCCC. The last one, approved by the RA Government Protocol Decision N 49-8 of December 8, 2016, includes inter alia the measures to be implemented within 2017-2021 in fulfillment of the obligations and provisions arising from the UNFCCC and Paris Agreement and assigns the responsible agencies. In particular, the list includes the activity for "Preparation of the Second Biennial Update Report as well as upcoming biennial reports and their submission to the Convention". Climate change is a challenge with many dimensions and hence a number of ministries are in charge of dealing with climate change-related issues. Therefore in 2012, the Prime Minister of the Republic of Armenia adopted Decree N 955 "On the establishment of an Inter-agency Coordinating Council on the implementation of the requirements and provisions of the UNFCCC and the approval of the composition and rules of procedures of the Inter-agency Coordinating Council".

The Council is composed of representatives of 13 ministries, 3 state agencies adjunct to the Government and 2 independent bodies – the Armenian Public Services Regulatory Commission and Armenian National Statistical Service. The Council ensures high-level support and policy guidance thus giving sustainability to the preparation of the national communications and biennial update reports. To support the operations of the Council on the fulfillment of the reporting requirements including the process of producing GHG inventories, a working group was also established comprised of the representatives of the ministries, state agencies as well as climate change experts and consultants.

These steps taken by Armenia confirm that it is committed to the global goals on reduction of emissions. Translating this into action is a major challenge in terms of resources, institutions, and, for Armenia, pursuing reductions in emissions, planning and achieving adaptation and mitigation strategies is not a matter of choice. There are no other options.

I suggest that Climate Diplomacy can be harnessed for inter alia, helping Armenia to reduce the emissions, build and enhance resilient capacity. This calls for developing a strategic plan on climate diplomacy. This can be an integral part of the climate change strategy and that of Science Diplomacy. Under this Armenia can enhance its global engagement on climate change and work with the EU on climate change mitigation and adaptation. Climate diplomacy should enable more access to funds and technology, capacity building in tackling climate change and deepen collaboration in climate change matters. Given its location and on account of strategic importance, it will be logical if the EU supports Armenia to tackle climate change. The modalities for the same can be worked by the EU and Government of Armenia.

Conclusion

The 17 Sustainable Development Goals and 169 targets set out in the 2030 Agenda explicitly elaborate on economic, social and environmental dimensions of development. Sustainable Development Goal 13 emphasizes the urgency of taking action to combat

climate change and its impacts by calling for actions to strengthen resilience and adaptive capacity with respect to climate hazards.

Undoubtedly, moderating or avoiding the risks associated with climate change is urgently needed. With cutting-edge technologies on hand, international diplomatic community and scientific community are able to prevent the negative impacts arising from climate hazards and in slowing the process of climate change, thus reducing the risks of conflicts, livelihood insecurity and sociopolitical tensions.

Endnote

1 For reasons of space I am not discussing the classic on this topic 'Structure and Agent in the Scientific Diplomacy of Climate Change : An Empirical Case Study of Science-Policy Interaction in the Intergovernmental Panel on Climate Change' by T. Skodvin (Springer 2000)

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Science Diplomacy and Role of Civil Society in Armenia: The Case of UYSSA

Avetik Harutyunyan*

Introduction

Modern Science forms a person's worldview, is closely connected with technological progress and helps to make predictions for the development of society and the development of programs, to solve problems facing humanity. Science is also diplomacy. The diplomacy of science is designed to resolve issues on the principle of soft power in such a way that weapons are not used for this purpose. But is science always safe for humanity? Unfortunately, weapons of mass destruction (WMDs) were also created as a result of the development of science, while the funds spent on the creation of weapons could be directed to fight against poverty and disease or to other socially useful purposes.

Diplomatic relations cannot and should not differ from research concepts and practices. At the same time, international relations can influence the diplomatic mission of science, turning science into a kind of successor to diplomacy, or a leading link. International scientific programs implemented in different countries help stakeholders to communicate with each other, exchange scientific information, as well as get acquainted with the culture and achievements of science of the country. The important components of the formation of scientific culture - in different countries are the exchange of scientific resources (personnel, equipment, experience in the organisation of scientific research, etc.), the implementation of joint scientific projects and expansion of scientific ties that contribute to the development of relations between these countries.

High mobility of science and scientific personnel is a precondition for effective development of science both today and tomorrow. Scientific ties between countries are formed and developed primarily by scientists themselves, acting in their countries as kinds of ambassadors of science.

* *Founding Chairman of the Union of Young Scientists and Specialists of Artsakh,Doctor of Philosophy in Law, Associate Professor, Republic of Armenia.*

It is closer to our understanding of the current definitions of science diplomacy. According to Nina V. Fedoroff, Science and Technology Adviser to the Secretary of State and to the Administrator of the U.S. Agency for International Development, "Science diplomacy is the use of scientific interactions among nations to address the common problems facing humanity and to build constructive, knowledge-based international partnerships" (Fedoroff, 2009). Science diplomacy, in the age of accelerating science and technology, is increasingly becoming a central element of the foreign policy and soft power and is emerging as an active area of study and policy considerations (Sikka, 2017).

Scientists and diplomats have different training and ways of thinking. Diplomats are risk-averse, change-resistant, practical, and focused on argumentation, persuasion, and influence. Scientists are risk-tolerant; they value experimentation, trial and error, and discovery and change (Hosker, 2016).

The Importance of Science for the State

The role of science in modern society is undeniable and it plays an important role in many sectors and spheres of human life. The more developed the country, the more attention it pays to science, directing scientific knowledge to improve people's lives and technological progress. And, undoubtedly, the level of development of science can serve as one of the main indicators of economic, cultural, civilised, educated, modern development of society. Everything around man is the achievement of science. Science is a bridge between nations and peoples to establish and develop relations, and it does not matter whether the country is recognised by the international community or not.

As Zafra Margolin Lerman mentioned, "Borders are only lines on a map. Nature and the environment don't recognise these borders, and therefore, issues of climate change, air pollution, water quality and diseases require collaborations among nations for their solutions - only science diplomacy will succeed in solving such issues" (Lerman, 2015).

The state is a living organism and the active and effective functioning of its individual elements is essential for its normal functioning. As an example, we present the example we set up for our organisation – "Union of Young Scientists and Specialists of Artsakh", an NGO was founded in 2015, January 13. The aim of the Union is to unite young scientists and specialists from Republic Artsakh and Armenia to promote their professional growth and international integration. It should be noted that in Artsakh we were the first to speak about science diplomacy and continue to develop this direction with our activities.

People in the Republic of Artsakh are also engaged in science and, like other nations of the world, have equal rights to present and disseminate the results of their research and communicate with their colleagues.

Based on the three effective programs presented below, we show that through consistent work, a non-governmental scientific organisation can contribute to scientific research in the country and contribute to enhancing the scientific climate.

Annual International Youth Scientific Conference: The Past, Present and Future of Armenian Statehood

Since 2016, every year in September the Union organises the "International Youth Scientific Conference: The Past, Present and Future of the Armenian Statehood" in the capital of Artsakh Stepanakert, and the fifth conference will hold on September 24-27 this year (UYSSA, 2020). During the previous four years, more than 360 scientists and specialists with fairly wide geography participated in the Conference, with the number of participants increasing from year to year (Armenia, Artsakh, Belarus, Germany, France, Poland, Russia, South Ossetia, Ukraine, and USA). In general, the Conference was attended by more than 360 well-known and young scientists from more than a dozen countries. Of course, this event is important not so much numerically as in terms of content.

The project is topical in terms of Artsakh international recognition and development of science diplomacy in the country. The fact that such a large-scale and purposeful event will be organised in Artsakh for the fifth time stands for the relevance of the idea, necessity, importance and diversity of scientific results, the scientific and practical significance and mission of the Conference.

The purpose of the Annual Youth Conference is to transform the achievements and theoretical and practical problems of the statehood in general, and Armenian statehood into particular into the materials for scientific research, as well as to provide the scientific substantiation of the range of tasks that can be of practical importance in the development of a strategy to confront modern challenges in various fields. The main mission of UYSSA is to make Artsakh recognizable to the world through science diplomacy, to raise the share of scientific thought, to ensure a worthy change of generations in science, to provide a platform for high-quality specialists and, thus, to promote the development and popularization of science, which is the organization of the above-mentioned conference fully aimed at.

The conference is a unique platform where the prominent scientists of the world come together along with the young and promising representatives of the sphere from Artsakh and acquire the opportunity to discuss a wide range of issues concerning Artsakh and Armenia. The project provides the possibility for the participants to enlarge the sides of cooperation and to work out mutual research programs.

By means of the project, the professional growth of the Artsakh young scientists and specialists is assured as well as the cooperation links with the representatives of the spheres from different countries are provided.

Back in 2016, we proposed to establish the Institute of Artsakh Science Ambassador and in 2019 the first ranks and gold medals of Artsakh Science Ambassador were awarded to two prominent representatives of science from Germany and Poland.

Artsakh E-Library

The aim of Artsakh E-Library lies in gathering academic and fictional library on Artsakh thus making the website a credible source of information on Artsakh for international visitors, enhancing the research on Artsakh as well as fighting against fake information flow on Artsakh conflict, state-building and other aspects.

The "Artsakh E-Library" website (www.artsakhlib.am) was created in 2018. To this day, the multidisciplinary database of the site contains more than 6.200 materials. About 50,000 visitors of the site viewed the pages more than 200,000 times, which is a good indicator for the newly created electronic library. Browsing the literature from the site is for free. AEL also has a Facebook page with about 3,000 likes, as well as a working group which periodically publishes the site's information resources. The website provides the opportunity to subscribe to it for both Armenian and foreign scientists and representatives of the sphere which in its turn develops a platform for cooperation and communication between the users.

The most important principle of the AEL replenishment is the continuity and diversification of sources of replenishment of the collection. The importance of the program is primarily due to the fact that the site contains informative materials about both Artsakh and Armenia, which are distributed through social networks, providing visitors with the necessary information. By the way, members of the organization assist persons applied by e-mail or social networks in the search and provision of materials. It should be noted that the organization has agreements with Armenian Universities, several publishers, individual periodicals, as well as with foreign universities and Think Tanks that provide their materials to AEL for their further promotion.

Artsakh E-Library also promotes the development of scientific thinking among students, young scientists and those who deal with science.

The project is topical in terms of Artsakh international recognition and development of science diplomacy in the country. At the same time, the materials on the website are available for FREE for everyone. The ideology of the project lies in the fact that the information should be available for free for those who deal with science and education, namely pupils, students, teachers, lecturer, PhD students, researchers etc.

The trilingual "Scientific Artsakh" journal

The trilingual "Scientific Artsakh" journal of the organization has been published since 2018. The Founder is Yerevan State University and its

publication is recommended by the Scientific Council of YSU. The Journal is one of the few Artsakh journals included in the list of "Scientific publications acceptable for publication of the main results and theses" approved by the Republic of Armenia High Attestation Committee and is published 4 times a year. A total amount of 120 articles presented by scientists from more than 10 countries for four issues is expected to be published during the year.

Among other priorities, "Scientific Artsakh" is intended to provide the international community with exclusively objective information about the problems of Armenia and Artsakh, as well as to promote Artsakh abroad through science. «Scientific Artsakh» is, so to speak, our non-shooting, but having a large circle of influence «weapon», which should be spread as far as possible in many countries.

Both Armenian and foreign authors can publish scientific works in the journal. Scientists from Republic of Armenia, Republic of Artsakh, Germany, Switzerland, Islamic Republic of Iran, Poland, South Ossetia, Russian Federation, USA, Belarus, and Ukraine has already published their researches in the journal. The involvement of foreign scientists corresponds to the mission of the UYSSA, so the main result of our work should be that foreigners, saying "Artsakh", do not understand the conflict, but the country endowed with all the qualities inherent in the state and not yet recognized at the international level, where people live and create, as well as are engaged in science. Presentation to the international community in such a way will favourably change the perception of Artsakh's independent existence and self-sacrifice. We also continue to reach reasonable agreements with reputable foreign scientists to publish their scientific works in our journal. At the same time, with the assistance of the Ministries of Foreign Affairs of Artsakh and Armenia, we can widely disseminate and popularize the "Scientific Artsakh". The online version of the journal is also available to readers.

The prominent scientists of the world provide their articles for the publication in "Scientific Artsakh" journal thus promoting the international recognition of Artsakh by means of scientific recognition. The e-articles of the journal are available on Artsakh E-Library website for free.

The project itself is a huge contribution to the development of science diplomacy in Artsakh and promotion to the international recognition of Artsakh by means of science.

Conclusion

Summing up, I want to believe that science diplomacy can contribute to the establishment of peace in the world, the formation of good neighbourly relations between peoples, the preservation and sustainable development of the planet Earth. In conclusion, it is appropriate to mention the following winged words of the political and spiritual leader of India Mahatma Gandhi: "We are destroyed by seven deadly sins... Science without humanity... Politics without principle, Commerce without morality, Worship without sacrifice…".

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Scientific Outputs versus Political Decisions: A Brazilian Perspective

Angelita Gomes Freitas de Castro*

Introduction

Over the years, several cooperation and collaboration have been noticed within the global society. After the period of monarchy, a limited group was responsible for the conquest of civil and political rights and duties based on the principle of liberty. Then the social, economic, and cultural rights raised supported on the idea of equality, mainly because of the needs of others societal groups. The third catalogue of fundamental rights do not focus on a specific number of individuals, it transcends the individuality; the solidarity is the tenet that drives the set of global issues, such as environment, world's heritage, culture, and others. The evolution is a continuous process and, despite the natural and primitive tendency of the natural selection, postulated by Charles Darwin, the humankind seems to abandon self-interest for the collective and universal goods, confirming the idea of a borderless world (Pennisi, 2009). A lot of effort has gone into achieve the Sustainable Development Goals (SDGs), located on the the 2030 Agenda for Sustainable Development. The United Nations' document is one of the pillars of several regimes and it will be considered as the framework for the discussion, where SDG 13 (climate action), 14 (life below water) and 15 (life on land), are given more importance.

The magnitude of the Brazilian territory and its natural wealth possess significant importance for the whole world. Although the expression *lungs of the planet* have been contested, it is known that the Amazon forest is relevant to the entire ecosystem due to its diversity. According to this reality, the epistemic community worldwide has worked on various aspects and showed not only the probable scientific impacts, through means of research. The complexity of the concern about the environment requires the comprehension of the political aspect too. Many countries have dealt with domestic changes under protests, for instance, and these events have created waves of hate and attacks; it somehow taints the political maneuvers and the external behavior consequently.

* *Legal advisor, Federal Prosecution Service, Brazil.*

Brazil has faced protests and riots, especially from 2015 on, when the impeachment process of the erstwhile president Dilma Rousseff began. In 2019, Brazil faced two mammoth situations directly evolving the epistemic communities and the environment. The Northeast oil spill and the Amazonian forest fires, both noticed in the second semester of that year, are paradigms for the present discussion, where the aim is to tackle the connection betwixt scientific outputs and political decisions in a framework designed by the SDGs.

SDGs: A Global Agenda

Comprehending the SDGs as constitutive elements of the framework considered for this paper requires a historical approach. The humankind has conquered a great number of fundamental rights and duties. After the decline of the absolute monarchy, a catalogue of civil and political rights has raised in the society, coordinated by the core principle of liberty, deriving from it the right to vote and being voted, to have a propriety, to express ideas and others, forging the first generation of human rights, according to the rationale of the Theory of Human Rights (Vasak, 1978). The social, economic and cultural aspects forge the second list of fundamental rights, where the equality is the basilar tenet; discussions related to culture, education, health *etc* are the important point of this second generation of human rights. The third and last generation postulated by Vasak (1978) explicates the collective and solidarity rights; in this sense, planetary scale issues are the centre of the analysis, such as environment, space resource and everything that can be thought as the humankind's good and heritage. It is important to note the word *generation* can suggest the commencement and the end of a group or moment; in the case of the fundamental rights, the steps shall be interpreted as a continuous stage of the evolution, reason why some authors prefer thinking about *dimensions*, what demonstrates a interlacing of conquests (Sarlet, 2003).

In compliance with all categories of rights above, the 2030 Agenda for Sustainable Development is the *locus* of the 17 SDGs, all linked to the ideas of prosperity and peace. Reducing inequalities, maximizing education, industry, innovation, infrastructure, economic growth, zero poverty and hunger, creating partnerships for the implementation of the goals of the agenda, protection of the life below water, climate and life on land are the goals and examples of the set of all the dimensions of the fundamental rights together.

The very start of this sort of this cooperation among nations for the development is seen after the Second World War, with the European Recovery Program (ERP), or the Marshall Plan. Thus in the 60s, the North-South cooperation took place and highlighted the binomial developed and developing countries. In the 70s, Robert Strange McNamara, within the World Bank, traced a plan in which the needs of the developing countries were the pillar of the activities of the institution. Later, in the 80s, the International Monetary Fund (IMF) applied the structural adjustments policies (Keohane, 1984). The next decade was marked by the sustainable development and by the United Nations Conference on Environment and Development, also known as the Rio Conference or the Earth Summit, held in Rio de Janeiro in 1992. In 2000, the United Nations signed the Millennium Declaration, where the 8 Millennium Development Goals (MDGs) brought a new vision of humanity and social contract betwixt the leaders of the world and the peoples. This last universal task force turned into the 2030 Agenda from the year 2015 on, as planned.

Considering the enormous quantity of documents related to the planetary scale issues and the importance of the topic since the end of the warfare, the idea of considering the 2030 Agenda and the SDGs as a basis of the framework to face the main topic of the paper seems to be accurate, because of your idea of being a blueprint regarding the future.

Epistemic communities, Politics and Science Diplomacy

The vast dimension of Brazil's territory and its natural wealth reflect its importance to the whole world, particularly when talking about the environmental aspects, and the events related to this area have easily become points of discussion in several national and international arenas. The first event taken as a paradigm, the crude oil residue spill, firstly noticed on 30th August 2019 on the country's Northeast coast, has turned into a global issue to do

the possibility of threaten the largest marine hot spot in the South Atlantic Ocean. The second one refers to the fire in the Amazon rainforest, observed its apex in August 2019. Though each situation has touched different ecosystems, they have elements and concerns as common links. The studies produced by specialists have been published in journals, and the outputs have pointed out that the unknown origin of the oil spill in the ocean and forest degradation, are on the increase. Moreover, the potential short and long-term hazards are well known or at least comprehensible and audible everywhere, pointing to a complex future in case of negligent or emissive conduct by the States, population, organizations and others players.

Simultaneously to the disasters, the political leadership and the research outcomes have not gelled well; information and the conclusions of the researches related to the fires, particularly provided by the National Institute for Space Research within the Ministry of Science, Technology, Innovation, and Communications were not taken into account to address the issue. About the crude oil situation, experts did not confirm the origin of the spill at the very first moment, besides all efforts in this sense. It is relevant to note that national political decisions are to be based on rational domestic scientific research as well as the concerns of the international scientific community. In addition, considering the previous impeachment process and the extolling of political ideologies, the main argument for rejecting the scientific outcomes points to the politisation of the science.

It is clear the existence of a loophole between the activities of the epistemic communities and the political deportment in the current analysis, circumstance that arguably causes issues for the population of the country and diplomatic discomfort.

In light of this, Science Diplomacy is a credible alternative to communicate the two fields. The universal aspect of science cannot be questioned, because it must work in favour of the society. The collaboration between science and politics is possible through the creation of lawful platforms, and partnerships (Siddhartha, 2019). The joint endeavour of public and private sectors is required in this sense, regarding the high costs of some researches and the need of using of advanced technologies – startups, think tanks and other institutions, who would play a critical role in this context. The cooperation is the fulcrum of the system and the using of science, technology and innovation (STI) to solve or at least decrease global problems should avoid the so called politisation of science and the deportments alike seen in the situation in Brazil.

Conclusion

The humankind's conquests regarding the rights and duties present an evolution from the individual to the collective social body. One of the uppermost symbols of this worldwide consciousness is the 2030 Agenda for Sustainable Development, *locus* of the 17 SDGs.

The framework designed by them exposes global problems require global solutions and the situation demands cooperation among not only the nations but also among them and the private sector, what includes think tanks, organisations, universities, companies and others. This interaction is requested based on the idea that the implementation of the SDGs calls for the intelligentsia of experts on science, technology and innovation. In this sense, it is possible to affirm that this set of capabilities is a critical tool to achieve the global goals. In Brazil, the two examples given brought to light the lack of communication and confidence between the government and the domestic and international epistemic communities. This brief paper suggests that the Brazilian players step up their cooperation and collaboration for leveraging STI in benefit of the society.

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Internationalisation of Research in the Colombian Tertiary Education Sector

Luisa Fernanda Echeverría King*

Introduction

Higher education institutions (HEIs) are facing a process of global transformations in the field of research, by globalization and the knowledge society; however, in every region of the world different characteristics and trends are presented. Colombia owes its science, technology and innovation scheme to the collaborations with countries around the world. The Colombian PhD programs, which mostly began to develop in the 1990s and 2000s, were an outcome of Colombian cooperation with Spain, United States, France and Germany. Historically, these countries have been popular destination for Colombians to obtain higher education training primarily at the postgraduate and doctoral level.

Internationalization is a central vehicle for scientific diplomacy, as it is a transversal process to the missionary and support functions of an institution, whose main objective should be to improve the quality of the processes, projects and programmes of a given university. According to Knight (2015) "internationalization at the national, sectoral and institutional levels is defined as the process of integrating an international, inter-cultural, or global dimension into the purpose, functions or delivery of postsecondary education" (p. 2). For universities and tertiary education institutions, international collaborations in science, technology and innovation are linked to their international positioning strategy, as well as respond to institutional priorities and government plans. Woldegiyorgis, Proctor & De Wit (2018) explain that one of the rationales for the internationalization of research, is a more competitive agenda related to the increased productivity of individual researchers, their institutions, and their nations. To promote the internationalization of research, it is necessary to have two specific conditions, according to the authors Castro, Jonkers and Sanz-Menéndez

* *Advisor, Servicio Nacional De Aprendizaje, Colombia*

(2015): well-related researchers and institutional conditions, in order to support researchers, who manage international resources for research:

> Most of the evidence about the internationalisation of scientific research often considered it to have been driven primarily through individual level self-organized networks of scientists. This, however, is not the only aspect of the internationalisation/Europeanisation process. Organizational level strategies can also play a role. Here, strategic internationalisation understood as the commitment of resources at the organizational level is different from encouraging or rewarding individual 'spontaneous' international collaborations (p. 5).

Scientific diplomacy has been described by various authors in different ways. Safdari and Elyasi (2019) describe scientific diplomacy as a way of representing the particular interests of countries internationally. Similarly, Gluckman, Turekian, Grimes and Kishi (2017) explain that the scientific diplomacy exists in order to highlight national interests internationally and to address the specific needs of countries. The idea of knowledge networks for science, according to Vessuri (2013) has allowed a horizontal culture to develop between researchers from different countries, where researchers becomes important agents of change and approaches different cultures through their work.

This article focuses on science diplomacy in Colombia, highlighting the internationalization of research in the tertiary education sector. It notes that the internationalization of research has become an important requirement that universities have to demonstrate when thinking about the accreditation of programs or institutions.

Universities and the Higher Education Sector

Universities have been a historical epicenter of scientific diplomacy in Colombia. Institutions such as the *Universidad Nacional* or *Universidad de Antioquia* in Medellín, which received support and funding from countries such as Germany and the United States, created academic programs, laboratories, research groups among others with support from entities such as DAAD (German Academic Exchange Service), USAID (United States Agency for International Development), and support from various embassies and cooperation agencies. This supported the promotion of international mobility among researchers from Colombian universities to collaborating countries, providing them with an access to high-level training and research activities.

Historically, scientific diplomacy related with higher education has been observed mainly at the level of capacity building, with examples such as scholarships to access masters and PhD studies abroad. Likewise, Colombia offers in consideration to its international cooperators, the possibility of accessing full scholarships for postgraduate and doctoral programs in Colombia; This program is managed by the Colombian Institute of Educational Credit and Technical Studies Abroad (ICETEX, 2020), an entity delegated by the Colombian government to oversee, disseminate and manage oversees scholarships for Colombians as well as for foreign researchers who intend to access scholarships in Colombia.

In 2015, the Colombian Ministry of National Education published a compendium of guides to support the knowledge creation in Colombian higher education institutions, with the aspect of internationalization. One of them, the *Guía de Internacionalización de la Investigación* (2015), which was conceived for the subject of internationalization of science, there are various tools to promote international cooperation in science, technology and innovation which can be followed by Colombian higher education institutions. Some such as tools are, the mobility of researchers and students; the attraction of scientific diaspora; organizing scientific and technological missions abroad; and the promotion of high-level training such as masters and PhD programs.

According to a report published in 2013 by the Ministry of Education of Colombia, on the field of internationalization of research in higher education, universities collaborate with specific countries depending on the area of expertise for research. In the areas of engineering and technology, Colombian institutions cooperate with the United States, Spain, Italy, Brazil and Germany. In the area of agricultural sciences, it does so with the United States, Brazil, Mexico, Spain and Venezuela. In the case of social sciences, with the United States and Spain.

Regarding the implementation of instruments for the promotion of internationalisation of research, HEIs reported mainly having created specific funds to support the mobility of researchers, followed by the implementation of economic incentives to researchers by publications in indexed international journals and by the implementation of specific funds to provide counterparts to researchers participating in international projects (Ministerio de Educación Nacional, 2013).

There are some successful strategies for science diplomacy in the Latin American region, such as the *Alianza del Pacífico,* which was created in 2011 by the governments of Chile, Colombia, Mexico and Peru with the objective:

> To transcend the commercial sphere with the objective of strengthening joint and coordinated actions among the promotion agencies, as well as cooperation aimed at promoting the strengthening of the competitiveness and innovation of SMEs. Similarly, it seeks to promote research on climate change as well as facilitate student and academic mobility, migratory transit, among others (Alianza Pacífico 2015, p. 5).

This alliance has an axis of scholarships that allow for student and research-oriented mobility between partner countries. On a yearly basis, 400 scholarships are offered to students, researchers and teachers hailing from the four Latin American countries, wherein each country awards 100 scholarships. The focus study areas are business, finance, international trade, public administration, political science, tourism, economics, international relations, environment and climate change, innovation, science and technology, and engineering. In this way, the platform supports academic and research activities in Higher Education Institutions (HEIs) among the four countries cooperating under the *Alianza del Pacífico.*

Another program that has been very important for the establishment of collaboration networks among researchers and students from Colombia, Mexico and Costa Rica, is the *Programa Delfin*. The objective of this program is to strengthen collaboration between higher education institutions and research centers of participating countries. The mission of *Programa Delfín* is to promote academic mobility among professors, researchers, students for sharing of knowledge and scientific and technological dissemination, technological innovation and the development of postgraduate courses in Latin America. Led by Mexico, *Programa Delfin* since 1995 has been responsible for mobilizing students from universities and technological institutions to conduct research through exchanges during the summer, providing them with support and staff for their projects (Vergara, 2019). While the program began operations nationwide in Mexico, it soon expanded its spectrum to Colombia and Costa Rica. Today the program works at the network level by grouping and exchanging researchers and students. In 2019, 211 Colombian students were mobilized to Mexico; Colombian universities received 536 Mexican students for the support of research projects. In 2019, the virtual platform of *Programa Delfin* had 896 active and available researchers to receive international students within the framework of research projects (Vergara, 2019). Salinas-Polanco, Castillo-Vera, Márquez-Sandoval and Vizmanos-Lamotte (2014), consider that the participation of students in research during the summer is an important strategy to train professionals to become capable of being sensitive, analytical and able to solve problems present both in personal life and in society.

Currently, programs such as Horizon 2020 of the European Commission are also considered an important opportunity for interaction between Colombian and European researchers, in order to solve problems for societies from around world. Within the framework of the Marie Slodowska-Curie Horizon 2020 program, which seeks to structure the training of researchers, so as foster mobility and professional development, 241 Colombian researchers have participated in these actions, between 2014 and 2020 (Fonseca, 2019). The majority of the scientific collaborations in the framework of this program are conducted with Spain (42 collaborations), Germany (24) and Great Britain (22). Likewise, issues such as the Sustainable Development Goals lead international cooperation for science, technology and innovation not only in Colombia, but in the world. According to the *Libro Verde* (Colciencias, 2018), a document with guidelines on scientific policy in Colombia, the focus of science, technology and innovation should

be the progress in solving complex problems that lead the country (Colombia) towards sustainable development.

At the government level, entities such as the *Servicio Nacional de Aprendizaje* (SENA), which is a vocational education oriented institution, cooperate with governments and agencies around the world for south-south, as well as north-south cooperation projects that generate knowledge exchanges for the strengthening of government projects. In the case of SENA, in 2019, there were more than 35 cooperation projects with foreign governments, especially in the areas of orange economy, industry 4.0 and digital transformation besides the agro ecological and agribusiness sector (SENA, 2020). Likewise, Colombia transfers knowledge to countries, especially in Central America and the Caribbean, on topics such as tourism, handicrafts, coffee production, etc.

According to a document published by the Spanish Agency for International Development Cooperation (Agencia Española de Cooperación Internacional para el Desarrollo, 2017), the Scientific Diplomacy in the Latin American and Caribbean region can be improved, if the following aspects are taken into account:

For the governments:

Recognize the value of Research, Development and Innovation (R + D + I) as:

- Key element to contribute to the prosperity and development of countries and to the generation of knowledge-based societies.
- Fundamental dimension in political decision making through expert scientific advice, based on evidence.
- Facilitator of international relations and key element for the external image of a country through a reinforcement of scientific diplomacy.
- Fundamental part of the industrial sector for the advancement of science, technological development and innovation.

For the academic and scientific sector:

- Expand the training of students, scientists and researchers beyond scientific-technical capabilities including skills in communication, management, leadership, multidisciplinary teamwork, negotiation, emotional intelligence and other qualities.
- Promote the exchange of experiences and training practices between scientists and public managers.
- Strengthen international and national networks of scientists and national academies of science to propose technical and scientific solutions to common problems in Latin America and the Caribbean to politicians and decision makers of public policies.
- Involve foreign scientists and nationals abroad in strengthening national science and technology systems and in the governance of universities and research centers through flexible formulas.

Challenges and Way Forward

It should also be noted that an important challenge facing the Latin American and Caribbean region is bilingualism, which is very important when cooperating with international partners. Likewise, some scientific diplomacy schemes depend on their own co-financing by governments or higher education institutions; this is why it is necessary to propose more financing programs that promote the internationalisation of research, as well as improve the relationship between scientists, politicians and civil society. According to a study by Gacel-Ávila and Rodríguez-Rodríguez (2018) on the internationalisation of higher education in Latin America and the Caribbean, most of the tertiary education institutions that participated in the the study (56 per cent) reported of not having an institutional policy to systematically promote internationalization of research. Further, the study notes that the institutions did not have sources of funding to support the participation of researchers in international cooperation projects.

As a ray of hope, a document published in December 2019 in Colombia by a group of national and international experts called the *Misión de Sabios* (Gobierno de Colombia, 2019) recommends for the strengthening of research center networks, which would work hand-in-hand with industries and collaborate with international partners to promote the achievement of economic and sustainable development of Colombia.

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Enhancing Educational Cooperation through Science Diplomacy: A Case Study of Colombian Police Academy

María Ángela Lorena Mosquera Montoya*

Introduction

The internationalisation of education is today: a necessary condition for the development of scientific practice in a world increasingly interrelated, as well as a way to improve the quality of scientific and technological activities, human resources training, circulation of information, the creation a strengthening of capabilities, projection of outcomes of greater synergies in the international framework of the cooperation (RICYT, 2007).

With this been said it is important to know that from the last decade the internationalisation process has taken a special relevance in the Colombian academic system and education institutions, in fields such as academic mobility, internationalisation of the research, management of the internationalisation and international cooperation. In addition to this, new disciplines and new areas of study has arisen to the public scenario that pretend to enhance solutions of common problems that are mutual in the world like global warm , natural disasters and famine between others.

Therefore, today's world need interdisciplinary professionals that can have the knowledge to respond to new challenges that old generations did not face, taking out the best of the areas of social studies and natural science generating new knowledge that will help humanity.

This is the case of science diplomacy that is the use of scientific, technological and academic collaborations among countries, regions and societies to address common issues and to build sound international partnerships.[1]

In this order of ideas, having in mind the meaning of the internationalization of education and science diplomacy, common points are shared between both disciplines were they help each other to enhance cooperation in education above all in science, technology and innovation.

* *International Relations Advisor, Graduate Police Academy "Miguel Antonio Lleras Pizarro".*

Nevertheless, why is it International Cooperation important in education?

■ Because if the problems are global, the answers and solutions must also be shared internationally (Cañon, n.d.)

■ Because the problems and challenges that humanity has are international although they manifest locally and only the ST+I can provide relevant and quality solutions (Cañon, n.d.)

■ Because the most relevant and highest quality knowledge is achieved with international scientific collaboration (Cañon, n.d.)

Normativity of ST+I in Colombia

Taking this to account, Colombia has developed normativity of ST+I to motivate internationalisation and scientific research that is one of its most important pillars. As the document vision Colombia II centenary says: internationalisation in ST+I is a widely used tool used by countries to bridge technological and cognitive gaps. It covers multiple aspects and several modes of operation that involve linking the international dynamics of generation, appropriation and use of knowledge.[2]

There is also the Colombian policy for Science, Technology and Innovation Conpes 3582 de 2009 this is a system, which core task is the promotion of science, technology and innovation that contributes to economic growth and social equity (…).

This new perspective forces to create and adopt new policies related to internationalisation and focused in international cooperation and with order and priority that are based on the offers of the international scientific market according to the Colombian needs, that will help with the development of the ST+I policy in this country.

Through the law 1286 of 2009, the national government of Colombia makes some changes to the Science, technology and innovation policy and creates Colciencias, the administrative department that makes all the alignments in the country over this topic. From its foundation, they have stablish a series of objectives where two of them have directly influence in the subject of this paper,

"No. 3 to base and favour the projection and strategic insertion of Colombia in the dynamics of the international system that incorporate knowledge and innovation and generate possibilities and emerging challenges for the development of countries and their international relations, within the framework of the global knowledge society".

"No.10 Strengthen the country's ability to act comprehensively in the international field in aspects regarding to science, technology and innovation".

Based on the above, we can analyse the importance of international relations, cooperation and science, in the formulation of the public policy of ST+I for the Colombian government. That can lead to build policies of science diplomacy in the country, because now days this topic is weak even though international cooperation for education and research can be linked in a way with science diplomacy in this country.

However, it seems that the government has seen the importance of science diplomacy and recently has decided to stablish the Ministry of Science, Technology and Innovation

Its main subject is to guarantee the conditions so the scientific, technological and innovate developments of to the productive sector and will favour competitiveness and entrepreneurship, the new entity would become operational on January 24, 2020 with emphasis on the development of the country's science.[3] Surely, this government position will improve the understanding of science and technology in Colombia and will certainly develop the concept of science diplomacy that at this time is weak in the country.

Case of study: Graduate Police Academy "Miguel Antonio Lleras"

The Colombian National Police is a very atypical institution due to the 50 years of internal armed conflict this country went through, its main mission is written in 1991 Colombian National Constitution in its article 218 establishes, "The police is an armed group with civilian character". Unfortunately, this national police took part of the conflict and has special tasks that in other countries will be done by the army.

Due to the importance that education has in the

society, police commanders build an education strategy that helped constantly renewed their knowledge in public safety, citizen security and new crime tendencies. With that perspective, the general director decided to create an education unit lead by the national directorate of police academies (32 academies around all Colombian national territory).

Added to this, the Colombian National police is called to develop every day a strong component in science, technology and innovation that allows to lead rigorous research studies that helps build knowledge that contributes to the police task and therefore the service provided by the institution (Tomo 5 desarrollo cientifico y tecnologico policial, 2010)

Aligned to the creation of the educational system of the Colombian National Police The Graduate Police Academy was created which main purpose is to develop high- quality academic programs based on Police Science and scientific research, aimed and promoting an holistic human training for police men, women and the community in general. In order to guarantee socially responsible professionals to face changes and challenges of a globalized world with the ability to transform its environment for the benefit of coexistence and citizen security[4].

The police education system works just like a university with all the credentials given by the Colombian ministry of education and even is one of the 30 institutions accredited in high quality education with other relevant colleges with high standards in Colombia. Therefore, the graduate police has to accomplish some parameters given by the education ministry to renew its accreditation every five years.

Unlike, to other police forces in the world that use a third party often a well-known college to train them, Colombia has its own police university with 32 academies, four of them benefiting Colombian ethnic groups.

One of the most recognised is the graduate police academy its good will has been increasing from time to time, that is the reason why the National Police Academies Directorate stablish in 2015 the internationalisation policy.

The main objective of this policy is to look at cross-border police education as a mandatory condition to fulfil the substantive functions and missions of higher education that constitute the continuous improvement of quality education, learning, teaching, scientific research and the police service to the society (Direccion Nacional de Escuelas, 2015).

At the same time, in the graduate police academy was conformed the International Relations office as a transversal process of all the missional process done by the academy.

This office is seen as a key tool to enhance education quality and competitively, allowing the inclusion of the National Police of Colombia in the globalised process and into the society of knowledge (Direccion Nacional de Escuelas, 2015).

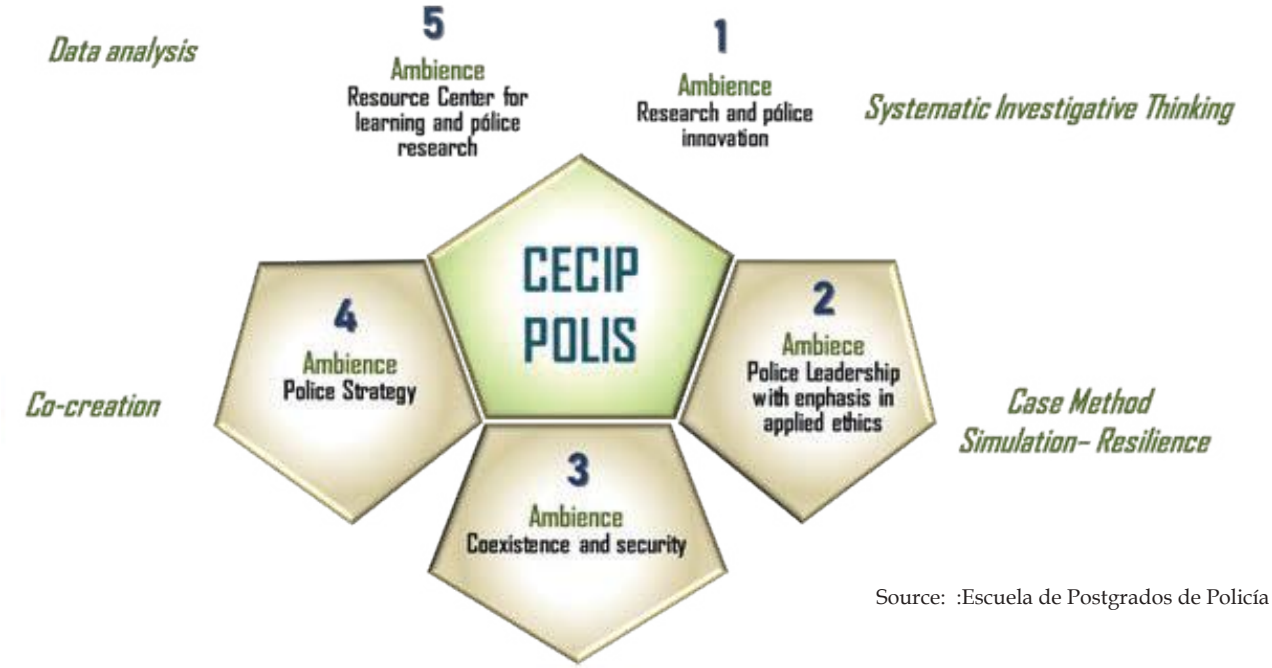
At the beginning, the international relations office had difficult times because there was nothing just a lot of work to do. However, there has been a significant evolution over the years, from zero alliances the office now has 26 re with the accredited diplomatic mission stablish in Colombia (Escuela de postgrados de policia, 2016) such as India, China, Indonesia, Korea, Morocco between others, what has improved international cooperation directly impacting police science this could be look like a link to science diplomacy.

Likewise, To improve and motivate the generation of new law enforcement knowledge the National Police of Colombia has created the law enforcement internationalisation of education network called RINEP , where academic research is develop to help improve police service around Latin American region, now a days there are 38 different police departments from all over Latin America.

Research is one of the main tools of work where we can say science diplomacy subject is being develop in a way, what it is pretended to do in the research in this network is basically fight new globalisation challenges, like: new threads to non-traditional security, lack of confidence in police, analysis of the crime and violence changes in the globalised worlds.

These topics are important for police studies because they are different and they give and added value to the institution making an innovation for it.

Figure 1, learning environment has 5 different ambiences



Source: :Escuela de Postgrados de Policía

Coupled with this the Graduate Police Academy due to the importance that innovation has in the world has change the curricula of the course denominated "Operational Direction of the Police Service", including an innovation module. This allows the academy to be a part of the parameters that the OCDE has establish for Colombia.

According to the OSLO manual in its third edition (2015) in relation to organizational innovation states that "refer to the implementation of new methods. These can be changed in company practices, in the organization of the workplace or in its external relations of the company", immediately afterwards it indicates that to succeed in innovation depends in part on the variety and structure of its links with the source of information, knowledge, good practices, technologies of human and financial resources.

This Manual also addresses the types of innovation that can be generated from an organizational development, which give benefit in terms of product, process service and management (Manual de Oslo, 2015). In the Colombian landscape, companies and especially educational institutions have managed to generate their own definition according to the internal purpose of innovation.

In the same hand, it is important to define innovation for the educational this includes various aspects: technology, teaching, pedagogy, processes and people. An educational innovation implies the implementation of a significant change in the teaching-learning process. It must incorporate a change in the materials, methods, contents or in the contexts involved in teaching. The perceived difference must be related to the quality of novelty of the improved element, the contribution of its value to the teaching-learning process and the relevance that the proposed innovation will bring to the educational institution and external interest groups.[5]

According to the before mentioned the police officers that study an academic program in the police academy have to develop an innovation project that will be presented in an innovation fair. Will be evaluated from juries' experts in topics and with special guest like the experts of the embassies and the police attaches. With the purpose of finding funding and partners to work their project in an international level

Also, the Graduate Police Academy according to the innovation process that is been held in the classes has recently construct a building specialized Science, Technology and Innovation, this is denominated the Police Science building "Polis".

As depicted in the figure 1, learning environment has 5 different ambiences

It is important to say that this building is already a reality and has already the acceptance of the Colombian authority of science, technology and innovation authority. In addition, the graduate police academy through its international relations office has achieved funding for some of these ambiences with the alliances that this area has with the embassies obtaining an English language lab, Korean language lab and the complete endowment of the leadership ambience.

With the before mentioned, it can be observed how thorough the international relations process there has been an educational strength for the Colombian police officers, above all in science, technology and innovation, which allows to make a relation with science diplomacy even though the development of this topic has been very weak in this country.

Conclusion

The importance of science, technology and innovation has allowed countries like Colombia to develop their own policy. However, this has been slow and weak since its development. However, this gave a turn around this year where the ministry of science, technology and innovation has been created, which allows to think that national government wants to improve this area in the country.

As the graduate police academy works, as a university has to accomplish all the parameters that the national ministry of education gives to it in order to have its academic accreditation. For this manner, polices has developed its own police that has helped the institution to be a part of the society of knowledge, with the generation of new and innovate knowledge.

Even though, science diplomacy is weak in Colombia through the development of this paper is present with international cooperation in education to enhance science, technology and innovation in the graduate police academy and with the resources they are giving the academy that will help with a better development of the science diplomacy topic in the academy through the international relations office of this police unit.

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Enhancing Productive Capacities through STI and Science Diplomacy in Cuba

Cinthya Rafaela Toca Sánchez*

Introduction

Firstly, it is important to highlight the situation to which Cuba is subjected to due to the siege imposed almost six decades ago by the extraterritorial application of the economic and financial blockade imposed by the USA. Therefore, we seek alternatives to develop trade based on an equitable distribution of the wealth generated among its inhabitants.

In Cuba, there is a political will to promote trade. Our economy is open; it has no limits in trade, as long as it complies with the principles of the WTO and respect for sovereignty. It implements an open Foreign Trade, it is inserted in the international context, working internally to increase and diversify the commercial exchange in all the regions. Although the development of the national industry is promoted as a way to stimulate the domestic economy, expand jobs and allow the insertion of the results of science, technology and innovation, as well as boost the momentum to the private sector.

The design of trade policies in Cuba is based on replacing imports, promoting trade in services and increasing the supply of exportable products and services for market diversification.1

Cuba is a signatory of the Trade Facilitation Agreement of the WTO and as a developing country; it works on the implementation of the commitments made in pursuit of it. At this moment the installation of the Single Window of Foreign Trade is being developed, as a mechanism to make the procedures related to the import and export of merchandise more flexible and expeditious. This entails permanent training for institutions and operators of commerce in general, for the leading role they play.2

* *Deputy Director, Ministry of Foreign Trade and Investment, Cuba.*

Non-tariff measures are of great importance because they are translated into authorizations or special permits granted as a precondition for importing a product. The obtaining of these permits must be with simple, transparent and predictable systems. On the other hand, the rules of origin to determine the origin of a commodity, and the phytosanitary and zoo sanitary norms are intended to protect human, animal and plant life and health, through the control of pests, diseases and toxic substances of plants, animals and foods. In all this, Cuba works in accordance with the commitments subscribed to by the WTO and the regional agreements of which it is a signatory.

STI in Cuban Trade Policies

The trade support institutions in Cuba are the Chamber of Commerce (www.camaracuba.cu), Procuba (http://www.procuba.cu/es), and Center for Overcoming Foreign Trade, also the Research Centers of the Cuban and world economies and the National Institute of Economic Research. All of them, from their profile, bring benefits to the development of foreign trade, some from promotion, market research, experiences of international practice and the training of officials and entrepreneurs.

The National Development Plan3 for 2030 and the National Exports Strategy4, as well as the Foreign Investment Law, conceive information and communication technologies as the axis for development. The computerisation policy of the whole society that includes the business sector is being implemented at the moment: one-stop shop, electronic Government, maximization of social networks. The creation of technological science parks is encouraged where national companies are inserted, at the same time the creation of high technology companies and the university-company link is promoted.

Cuba benefits and stimulates the advancement of new technologies, it even creates software to make viable the management of the company that carries out foreign trade, however, the economic and commercial blockade to which we are subject, hinders access to cutting-edge technology. It is another reason why the development of the intellect and the national industry constitute a necessity in which we work intensely in our country.

In little more than 30 years, the Cuban economy went through two total processes of technological reconversion with characteristics and costs not happened before in Latin America.

The crisis of 2008 and the intensification of the North American blockade have made the need to recover the country's production capacity even closer: between 2009 and 2018, economic growth barely exceeded 2 per cent per year, while the coefficient of investment is around 10 per cent of GDP. In that context, the market and the private sector, together with foreign direct investment, have played a more active role in the country's development strategy. Currently, the private and cooperative sector accounts for 31 per cent of national employment. In Cuba, the development of productive capacities is based primarily on the promotion of human capital.

Innovation plays a decisive role in the Cuban economy. In the National Assembly of Popular Power (http://www.parlamentocubano.gob.cu/), the Committee on Education, Culture, Science, Technology and Environment meets, where the Science, Technology and Innovation policy that defines the priorities in these areas, as well as establishing development strategies, has recently been approved and the results of scientific research, based on good practices that ensure the quality of national productions and increase exports. In addition, this legal norm includes the creation of Technological Scientific Parks that seek to promote the creation of specialized companies based on new knowledge, new business models and capacities to create innovative companies, providing conditions for research, development (R&D), the innovation, technology transfer and scientific and technological services with high added value.

This policy recognizes the role of interface companies in the connection between universities and science, technology and innovation entities and the productive and services sector. In the same environment, the category of High Technology Companies is established, so it is defined that an entity of this type must show an intensive activity in research, development and innovation; have high technological standards; as well as close the cycle of research, development, innovation, production and marketing of products and services of high

added value with emphasis on the foreign market; among other particularities, as a support for the sustainable development of the country, based on the integration and linkage between all the actors that participate with the objective of increasing the value-added goods and services to increase efficiency of national production, exportation and increase the quality of life of the Cuban population.

It is easy to notice that in these conditions, in a small economy like Cuba, unable to guarantee the endogenous production of all knowledge, the development strategy must be based on the increasing incorporation of science, innovation and technology, as it is proposed in the National Economic and Social Development Plan until 2030. Foreign trade and foreign direct investment are decisive vehicles in the appropriation of this knowledge.

Conclusion

In conclusion, the ability to generate scientific or technical advances, innovate or attract talent are essential aspects of science diplomacy. Its main objective is to improve international relations and interests between two or more countries and their image abroad through the exchange of scientific and technological capabilities.

In that sense, taking into account the rapidity with which changes occur in the world where new global challenges affect all countries, scientific diplomacy is an essential tool for the effective application of the policies projected by Cuba and their insertion in the arena international, as well as the implementation of the planned objectives.

Endnotes

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3 The Ministry of Economy and Planning of Cuba govern the planning.

4 National Exports Strategy is prepared by Ministry of Foreign Trade and Investment of Cuba

The Management of Congo Water Basin: Opportunities and Challenges for Science Diplomacy

Bompongo Nkombe Adolin*

Introduction

At the outset, it would be worthwhile to have a better idea about what the terms "Diplomacy" and "Science" mean. Diplomacy is popularly defined as an art and practice of conducting negotiation between nations and application of the foreign policy of a state or a government; and Science as an organisation of the knowledge related to different categories of facts, objects or phenomena. The concept of Science Diplomacy is less known in the Democratic Republic of Congo (DRC), as much as in most of the developing and Francophonie Countries, even it has been used in many diplomatic activities since some decades.

Science Diplomacy is at the crossover of two disciplines, diplomacy and science (foreign policy, negotiation, research and knowledge), and can be defined as "the use and application of scientific cooperation to help establish links and strengthen relations between people, societies and countries especially in areas where there may be no other means of official level approach".

Since their independence, African countries have taken an active part in international relations. A way to register in the game of geopolitical relations of defining the challenges to be met and to go, like the other States, to the conquest of objects and situations favourable to allow the achievement of the fundamental objectives of development.

Water is an essential element for life, there is no need for long scientific treatises to demonstrate it. Today millions of people all over the world lack water, millions of children die every year from water-borne diseases. And some of the world's poorest countries suffer from drought on a regular basis. The world must find real solutions to these problems. We need to use water more efficiently. We need to

* *German Language Teacher and Head of Legal Issues Office Congolese Diplomatic Academy Ministry of Foreign Affairs*

free women and girls who are forced to fetch water, sometimes very far away, from this daily chore.

Today, there are problems of drought or the process of desertification in other countries close to the DRC, which causes a pressing desire to access surrounding waters, especially those of the Congo Basin.

This is why today a diplomatic reflection is necessary on the way in which management of these waters without forgetting the scientific data linked to the exploitation of these waters; namely the presence of hydroelectric dams which produce electricity for many of the countries in the Congo Basin.

Management of the Congo River Basin from a Diplomatic Standpoint

The Congo Basin is the catchment area of the Congo River in Africa. It covers 4 million square km where 93.2 million inhabitants live, with densities that vary widely depending on the area. The notion of Congo Basin can mean the hydrographic basin of the Congo River, which spans ten countries in Central Africa (Angola, Burundi, Cameroon, Gabon, Central African Republic, Republic of Congo, Equatorial Guinea, Democratic Republic of Congo, Rwanda and Tanzania).

The realisation of the vision of harmonised development which takes into account the dimensions of economic dynamism, justice and social inclusion as well as ecological sustainability is then decided on the level of these factors. The presence of resources does not submit to the boundaries drawn by man. On the contrary, minerals, rivers and fauna are often found on both sides of borders and generate consequences for property rights, create externalities and prevent the unilateral use of these resources. At the risk of conflicts, the exploitation or use of a cross-border resource must be regulated, shared or even co-managed, thereby reducing the sovereignty of a State.

Collective action, the division of responsibilities and the sharing of benefits, however, is not a strong tradition in the modern history of Central Africa. The young states of the sub-region, concerned with securing their own borders and building their nation, did not at first attach much importance to cross-border cooperation. However, the growing importance of the challenges created by the existence of resources, either by defining their own interests or by the action of external actors, including the conflicts they have experienced, has enabled States to perceive diplomacy as being in their own interest, especially if it is driven by the goal of peace and sustainability. It is, therefore, more than commendable in diplomatic, economic and even scientific relations between the Congo, the Central African Republic and the DRC that no misunderstanding has so far been recorded in the management of the common waters of the Congo and Ubangi rivers.

The states of the sub-region have therefore reacted in this direction by creating alongside and in addition to "large" interstate organisations forms of interaction and specialised cooperation organisations which aim at common use and in some cases even to the protection of natural resources. Mechanisms for inter-state collective action have already been created, such as the Central African Forests Commission (COMIFAC), the Congo-Oubangui-Sangha Basin International Commission (CICOS) and the Regional Fisheries Committee (COREP). These mechanisms provide both a framework for concerted action for the interests of Central African states as well as those of external actors. Governed by principles and norms, rules and decision-making procedures established by consensus, these new interaction frameworks demonstrate what types of governance and cooperation are perceived to be beneficial for the States of the sub-region.

The Democratic Republic of Congo: Center of Water Interests

Although the country is considered to be one of the largest drinking water basins in the world, the DRC is unable to take advantage of this opportunity to ensure socio-economic development for its populations and the rest of the African continent. Congolese are therefore called upon to position themselves to maximise the benefits that water offers to them, and to respond appropriately to the challenges and issues associated with this sector.

Failure would mean that the international community would impose itself, willingly or by force, to gain access to this heritage which some already qualify as world heritage, thus threatening the sovereignty of the DRC with regard to the management and development of its water resources. This scenario is undesirable and should be avoided at all costs.

At present, the DRC is facing a series of wars that are as deadly as they are harmful to the development of this part of the continent and of all African states and probably the world with the increasing demand for water following climate change in view. Considered as one of the lungs of planet Earth, the DRC is called upon to face major challenges in order to be able to exploit and above all preserve these resources for the good of its populations and the rest of the continent and why not the world.

A short while ago, the President of Chad made remarks that went in the direction of taking the waters of the Congo River, either willingly or by force, in order to meet the water needs of his population. However, this is undoubtedly a means of causing a conflict between the DRC and Chad when there are more diplomatic or scientific means of approaching this subject by turning to science technology.

From the above, we can understand that in the coming years' water would be for some States a source of conflicts, because certain States will want to base their supremacy on others especially if these countries are upstream of the important rivers.

Hydro-Diplomacy: A Concept to be Created in Science Diplomacy

We can say that Hydro-Diplomacy could be an essential constituent of Science Diplomacy by playing the role of peacemaker for water conflicts or even of policymaker for the commercial markets around water.

The previous century had witnessed deferential tensions, particularly in areas experiencing hydraulic imbalance, such as north and south of Africa, the Near East and Central America. According to the American geographer Aaron Wolf; the only known real water war goes back 4,500 years. These are two Mesopotamian cities about Tigris and the Euphrates in southern Iraq today.

Today we are witnessing the birth of terms like "battle for water" or "for water", "water, a new global strategic issue", "the geostrategy of water", "hydro policy ", " hydro diplomacy " or " hydro conflicts ". These terms generate two types of hydraulic conflicts: intra-state and inter-state.

For example, in the Middle East, water is like in Africa or India, a vital economic and strategic issue, which conditions everyday life. But it also takes on the dimension of a very special political tool for Turkey. Its position upstream of the transboundary rivers of the Tigris and the Euphrates, compared to the situation downstream of Syria and Iraq, gives Turkey control of the two rivers and allows it to use water, first, to the best of its own agricultural and industrial needs.

Therefore water also becomes an element of commercial relations since a whole network of various proposals, for exchange or sale, is being established in the region. But the millennial antagonisms and successive wars have created a climate of suspicion. So that all attempts at sharing or possible cooperation are in advance considered by the parties involved as a ruse to take advantage and not a diplomatic procedure.

Furthermore, it is important to mention that access to drinking water and sanitation was recognised as a human right by the UN in 2010. But sharing this strategic resource, because it affects the sovereignty of States, creates hotbeds of potential tension: in the Middle East, Central Asia, China, Africa, Latin America between Brazil and Argentina, and even between the United States and Canada.

Water diplomacy can save millions of lives because water is an essential element for sustainable development and necessary for security and peace. In the illustration, in South America, Lake Titicaca, the largest freshwater lake on the American continent, has long been a source of cooperation between Bolivia and Peru. Likewise, the 1960 Indus Waters Treaty between India and Pakistan survived three wars between the two countries.

It is time to establish internal and transboundary water management rules. Several legal instruments contribute to the ideals of Hydro Diplomacy. For

example, the 1997 Convention on the Right to Use International Watercourses for Purposes Other than Navigation. In addition, the Helsinki Convention on the Protection and Use of Transboundary Watercourses and International Lakes, developed within the framework of the United Nations Economic Commission for Europe, was last year open to ratification by all Member States of the United Nations (UN News, 2017).

Conclusion

If water requests diplomacy, its sharing requires diplomacy to invent. Because if we asked a handful of experts to quote a transboundary river or water table managed in a concerted and harmonious way between several States, the answer would surely be after a pause of reflection, "There is no any!". This explains the asymmetrical relations between riparian states because some are strong and others weak.

Water being the source of everything, it occupies a decisive place in human relations and between states. Historically, it has been seen sometimes as a border and a cause of conflict, sometimes as a rallying point and convergence. And if instead of the "wars for water" regularly beaten up here and there, Peace was imposed on the contrary, because of water! As of today, or in the very near future; the need for common governance of water-related issues is gradually starting to impose itself on the concerned actors; this is what we will surely call "hydro-diplomacy".

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How Science Diplomacy can Contribute towards Pharmaceutical Sovereignty of Ecuador?

Marjorie De Los Angeles Chávez Macias*

Introduction

Science diplomacy (SD) is the use of scientific, technological and academic knowledge to build collaborations among countries, regions and societies to address common issues and to build international partnerships. Besides, SD is also to address common problems facing 21st century humanity and in a building constructive international partnerships (Federoff, 2009). This is a transversal approach to the Sustainable Development Goals (SDG) including the field of health regulations and regulatory science, Good Health and Well Being. Its aim is to achieve universal health coverage and provide access to safe and affordable medicines and vaccines to all.

Objective

The aim of this work is to describe the potential cooperations between both the Republic of Ecuador and the Republic of India focused on to develop and strengthen the friendly relationship, trade and cooperation mechanism, in order to contribute and promote the country's sovereignty of Ecuador in the field of Health Technologies.

Access to Drugs and the Situation of the Pharmaceutical Market in Ecuador

To this end, is fundamental to understand the structure and dynamics of the Ecuadorian pharmaceutical market, its segmentation between the public and private sectors, and its relationship with supply and demand, both for generic and brand-name drugs. To achieve these goals, an observational and descriptive study was conducted using the information available at free scientific, institutional, technical-administrative, and economic databases.

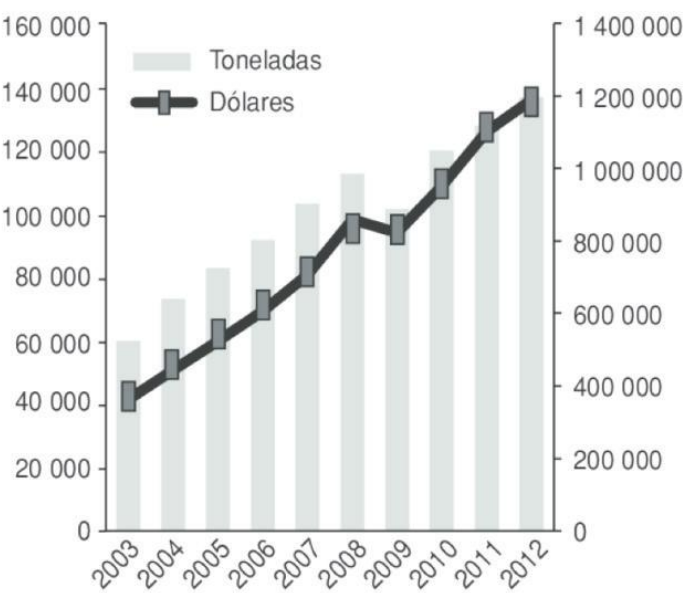
* *Rayuela Radio, Sub Director, Consejo De La Judicatura.*

In Ecuador, 69.6 per cent of dispensed drugs are brand-name and 30.4 per cent are generics. Of all registered drugs in the country, 1,829 (13.6 per cent) are considered over-the-counter and 11,622 (86.4 per cent) are for sale under medical prescription.

In terms of sales, 93.15 per cent correspond to brand-name drugs and only 6.85 per cent to generics. 90 per cent of the pharmacies are located in urban areas while only 10 per cent in rural areas. In the last five years, prices have increased by 12.5 per cent for brand-name drugs and 0.86 per cent for generics. Brand-name drugs are dispensed and consumed 2.3 times more than generics. Furthermore, the location of most of the pharmacies shows that there is a relationship or association between purchasing power and access to drugs. Although, the regulatory authority stipulates that 13 per cent of drugs should be over the counter, approximately 60 per cent of the population acquires drugs without a medical prescription.

The access to medicines is one of the indicators used to measure the standard of living of a country, as it reflects the efficiency and strength of a health system. Currently, the pharmaceutical market in Ecuador is undergoing state-driven changes, in compliance with its obligation to guarantee access to health for its entire population. Through the application of strategic sector policies, it has been possible to improve access and provision of medicines to the population of the comprehensive public health network (RPIS). This process has allowed the State to save, by reducing the cost of medicines by boosting the national production of active ingredients thus contributing to the change of the productive matrix. The supply of medicines in Ecuador has had an evolutionary process marked in the last fifty years: historically, some international laboratories supplied a few pharmacies. Later, and by regulations of previous governments, international laboratories were forced to install a production plant in the country as a requirement for the commercialization of their products. This led to the import substitution of finished products with that of raw materials and packaging, a model that has been maintained until now. At present, the Ecuadorian pharmaceutical market is characterized by a complex system of production, purchase, distribution and dispensing of medicines. (Prado *et al*, 2014)

Figure 1: Behaviour of the Ecuadorian Pharmaceutical market 2003–2012 (Tons – Dollars).



Source: Prado *et al* (2014)

Ecuador is a country where the demand for pharmaceutical products is designed to meet the needs of the public and private markets. However, despite the fact that the State is the main trading partner of the industry, the dispensation is made mostly through private companies, which increases the prices of medicines. This can be attributed to a disregard of the regulations in force by the prescriber or the dispenser in all Ecuadorian pharmacies. This suggests that there could be a direct relationship between capital, trade and the satisfaction of the demand of the population. Finally, and despite the fact that the regulating authority dictates that 70% of the drugs should be sold under medical prescription, this analysis shows the opposite (Figure 1).

The Pharmaceutical Industry of India

India is with current market size of $27.57 billion (last reported in 2016) is expected to reach a mark of $55 billion by 2020 at a CAGR of 15.92 per cent, according to a report by the Indian Brand Equity Foundation (IBEF). In the next three years, India is projected to be among the top three pharmaceutical markets in terms of growth rate and the sixth largest market globally in absolute size (Figure 2)

"Currently the industry is growing at a rate of 9-10 per cent year-on-year, which is a healthy growth because this is largely a volume led business. This is a fundamental advantage of an emerging market economy like India; given the large base, double digit growth numbers are not observed in developed countries like United States," said Kedar Upadhye, Global Chief Financial Officer, Cipla Ltd.

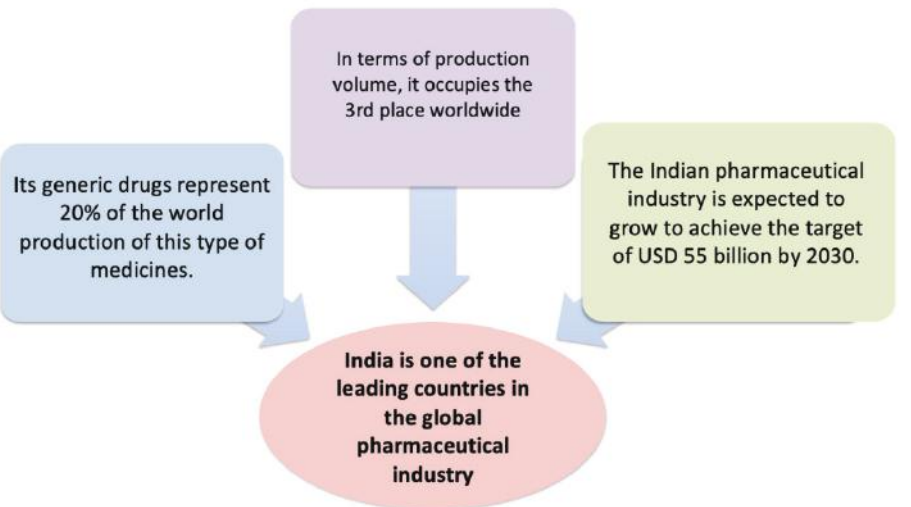
In addition, India accounts for 20 per cent of global exports in generics. In FY16, India exported pharmaceutical products worth $16.89 billion, with

Table 1: Leading Exporters of Pharmaceutical Prodcuts

Exporter	Exports in USBillions (2018)
European Union (27 countries)	136.7
Switzerland	45.3
United States of America	22
India	13.1
Canada	6.8

Source: Elaborated from the data of UN Comtrade Database. Classification HS 30

Figure 2: Pharmaceutical Industry of India



Source: IBEF, 2019

Table 2: Export of pharmaceutical products in USD Billions

Source: Elaborated from the data of UN Comtrade Database. Classification HS 30

the number expected to reach $40 billion by 2020 (IBEF, 2019).

Export of pharmaceutical products

According to UN figures for 2018, India is one of the largest exporters of pharmaceutical products - 4th place – worldwide (Table 1)

Pharmaceutical exports from India, which include: bulk medicines, active ingredients, drug formulations, biological products, Ayush, herbal products and medical/surgical equipment, reached US $ 19.14 billion in fiscal year 19 and US $ 3.1 billion in fiscal year 20 (until June 2019). (Table 2)

Indian Generic Medicines

Indian generic medicines have contributed for the improvement of the quality of life and the increase in life expectancy of millions of patients, around the world providing excellent medicines at affordable prices. 90 per cent of the generic antiretrovirals used around the world are produced in India.

The comparative table (Table 3) depicting the cost of treatment of some diseases in Ecuador and India is given the Table below. It can be easily seen that the costs are much lower in India.

Criteria for the Selection of Pharma Companies

The following criteria are taken into consideration while selecting pharma companies for establishing an alliance with Ecuador.

- International presence in highly regulated markets.
- Annual compound growth rate in sales in the last 5 years
- Production of generic drugs and active

Table 3: Treatment Costs in India and Ecuador

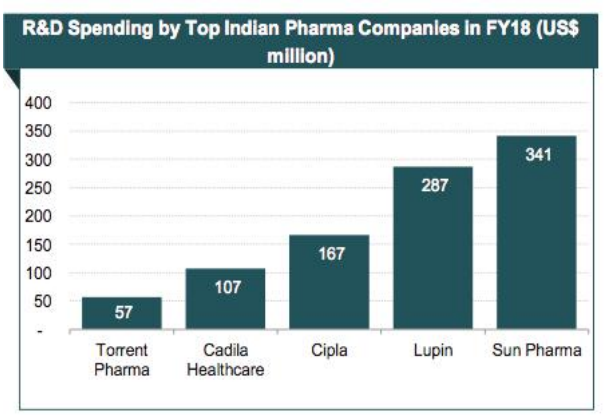
TREATMENT	COST ECUADOR USD	COST INDIA USD
Hepatitis C	USD 50.000,00	USD 4.500,00
Prostate cancer (Monthly Treatment)	USD 4.500,00	USD 750,00
Pulmonary fibrosis (Monthly Treatment)	USD 1.000,00	USD 90,00

pharmaceutical ingredients

- Investment in research and development
- -No link to proven incidents of production of counterfeit or poor quality drugs.
- Approvals and certifications in highly regulated markets for medicines and operation of production plants.
- Membership of the Indian Pharmaceutical Alliance: a group of pharmaceutical companies that have certifications in highly regulated markets, approximately 30 of the best 3,000 companies in India among producers and marketers of medicines belong to this alliance.

Examples of companies that have suitable profile for alliances with Ecuador: Sun Pharma and CIPLA.

Sun Pharma: Emphasising on Research and Development

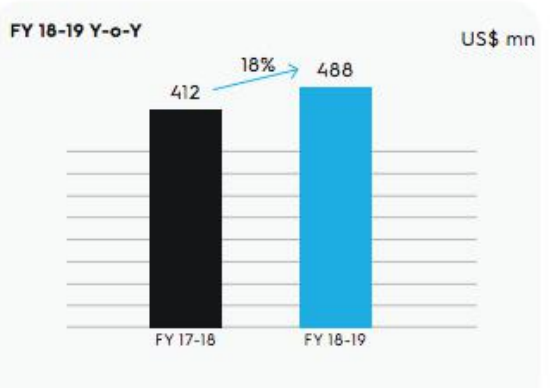


Source: IBEF (2019)

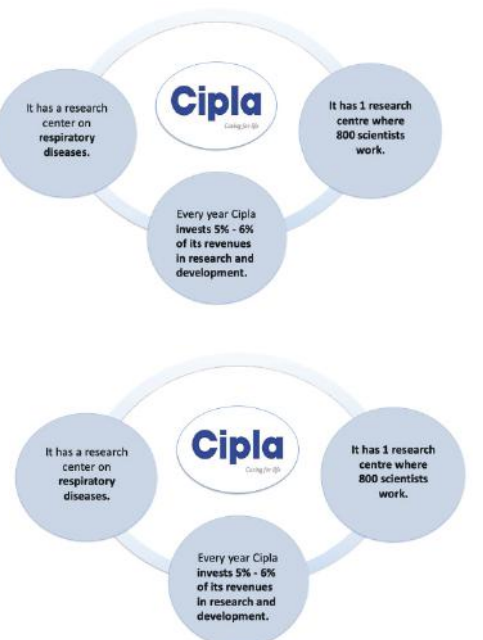
In the financial year 2018, Sun Pharma was the Indian company that invested the most in research and development (R&D). The investment of the company in the mentioned item was USD 341 million.

Cipla: Leader in highly regulated markets

Cipla is one of the main suppliers of generic medicines for the North American market. In the 2018-19 financial year, sales to the mentioned market reached USD 488 million. North America contributes to 21% of the company's total revenue.



*Sou*rce: Cipla Limited. Annual Report 2018-19



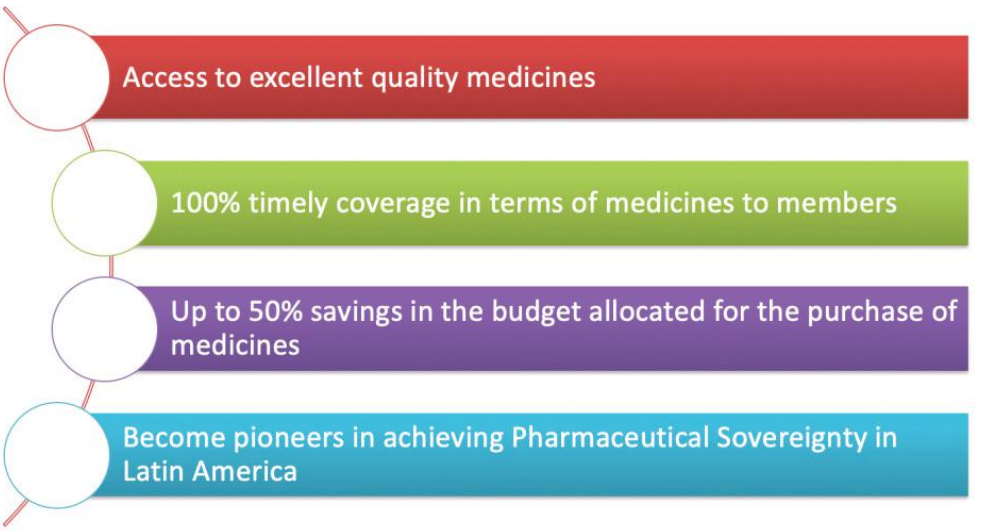
*Sourc*e: India Brand Equity Foundation

Ecuador – India Business Proposal

"The Agreement for Pharmaceutical Sovereignty of Ecuador" will be a government-to-government agreement, which means, a PUBLIC-PUBLIC alliance.

India proposes that the public sector company STC be the representative in negotiations with Ecuador. STC will only invite companies that have highly regulated market certifications to participate in the Project: "Ecuador in Search of Pharmaceutical Sovereignty" Ecuador, Chile and Bolivia are the

Potential Benefits of Strategic Alliance with India



- Access to excellent quality medicines.
- 100 per cent timely coverage in terms of medicines to members.
- Up to 50 per cent savings in the budget allocated for the purchase of medicines.
- Become pioneers in achieving Pharmaceutical Sovereignty in Latin America.

first 3 countries in Latin America which have been invited to participate in Pharmaceutical Sovereignty programs by India

India / STC will ensure that the quality of medicines are in accordance with the requirements stipulated by Ecuador / IESS.

Remarks

The strengths of the Indian pharmaceutical industry, and this huge experience in the production of high-quality and low-cost generic drugs, have allowed him to have a valuable presence of Indian medicines in highly regulated markets. (40 per cent of the demand for generic drugs in the United States and 25 per cent in the United Kingdom).

Indian pharmaceutical companies have developed the capabilities to compete in the international market, having the largest number of production plants outside the United States approved by the USFDA. In 2017, Indian pharmaceutical companies received 304 (ANDA-Abbreviated New Drug Application) approvals from the USFDA (US Food and Drug Administration). Year in wich the USFDA tested more than 323 generic drugs produced in several countries (100 of them in India) to assess their quality. According to the tests performed, the 323 medications met the USFDA standards.

Conclusion

Developing countries like Ecuador are often a few steps behind the one known as the first world countries. Thats why in the frame of Science Diplomcy the countries, like India and Ecuador can save lives strengthening trade and cooperation mechanisms about transfer and exchange of scientific knowledge and technological development. If India provides 40% of generic medicines to the United States. Ecuador could access a similar or preeminent figure. There are approx. 3000 laboratories in India that produce medicines. It is important to shortlist the companies that have Certificates in Highly Regulated Markets.

India can provide 60,000 generic drugs in more than 60 therapeutic specialties. An effective supplier of medicines can be generated by a strategic alliance with the Indian Government. STC is the Public Sector Trading Company of India authorized to negotiate with Ecuador.It is important to get benefits of this PUBLIC to PUBLIC alliance to make effective and support the Pharmaceutical Sovereignty for Ecuador.

To get benefit of the costs and quality of Indian medicines to adopt itself as a government focused on the welfare and recovery of members. Generating 100 per cent coverage in high quality medications. Science and technology unite us today, but cooperation and solidarity lead us towards a good living for the humanity.

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Science Diplomacy to Enhance Scientific Outputs in Ecuador

Jorge Andrés Pinto Landeta*

Introduction

Ecuador is a small country with an annual GDP of US$103 billion (National Institute of Statistics and Census, 2010). According to the National Population and Housing Census 2010, Ecuador's population amounts to about 16.5 million people. Ecuador is one of the most environmentally diverse countries in the world and it has contributed notably to the environmental sciences. The first scientific expedition to measure the circumference of the Earth, led by Charles-Marie de La Condamine of France, was based in Ecuador; and research in Ecuador by the renowned naturalists Alexander von Humboldt of Prussia and Charles Darwin of England helped establish basic theories of modern geography, ecology, and evolutionary biology. Even though Ecuador is been a place of interest for scientists around the world since the seventeenth century, it is well known that internally it has poor academic research and scientific outputs.

Science, Technology, and Innovation: Legal Framework

According to the "Organic Code of Social Economic Knowledge, Creativity and Innovation", known as the Code of Knowledge or "Código Ingenios" in Spanish, the Secretariat for Higher Education, Science, Technology and Innovation of Ecuador (Senescyt) is the Government Institution in charge of establishing the national policy in the matters of science, technology, innovation and ancestral knowledge.

This Code intends to modify the way in which knowledge is generated, used and distributed in Ecuador, by changing the ways in which universities and other institutes invest and manage their research and development departments, as well as their budgets.

* *Secretariat for Higher Education, Science, Technology and Innovation of Ecuador - Senescyt*

In Ecuador, scientific research is mostly carried out by universities but also in public research institutes; both of them, working under Senescyt's regulations. Although some public universities were created in the 19th and 20th centuries, they lack scientific tradition. Universities have focused mainly on teaching, leaving scientific production and quality behind. Few professors in universities hold PhD degrees in science, therefore research and publishing is reduced. These university staff has a high load of administrative work, their salaries are relatively low compared with other countries, and they are usually hired under contract rather than as full-time (Van Hoof, Eljuri, Estrella, & Torres, 2013).

As these staffs are a key component of quality research, the lack of adequately trained staff in Ecuador has negatively impacted outputs (Austin, 2002). However, problems are not only a function of the staff but also reflect the public system as a whole.

The public purchasing system (which controls all financial needs of research via the central government) is excessively bureaucratic and seriously inhibits research progress due to following reasons: people responsible for allocating funds are not familiar with science/research needs, the purchase system is very complex, designed to buy regular goods and not scientific supplies, and there is an annual gap in funding allocations, which occur because of the country's overall financial distribution regulations. This makes the purchase of materials and equipment very difficult and reduces the active time for research throughout the year (Castillo & Powell, 2018).

Although the legal conditions in Ecuador related to the matters of science, technology, and innovation are very complicated, due to specific programs and projects implemented by Senescyt, some of them involving international cooperation, several scientific outputs have increased.

Science Diplomacy in Ecuador

According to Ayala-Mora (2015), modern science in Ecuador started in the sixties, when "scientific knowledge was fundamentally foreign in Ecuador", since then, most of the Ecuadorian scientific publications were produced as a result of international collaboration, which played a crucial role in the advancement of science and technology.

According to the Research and Information System for Developing Countries of India - RIS, "Science Diplomacy aims at promoting scientific collaborations among different countries for addressing common challenges for mutual gains. Its role in shaping foreign policy of the nation has become prominent over a period of time…"

For small countries like Ecuador, or countries with low scientific productivity, collaboration with more experienced countries can generate research that would otherwise be impossible (Harris, 2004).

Since 2006, the Ecuadorian government has been working to improve scientific performance. Several new policies have been enacted to improve the standards of higher education, science, technology and innovation in the universities and technical institutions. For example, in recent years, Senescyt has encouraged scientific networking among national and international partners by funding multilateral projects under an arrangement known as "Virtual Common Pot", where each funding partner funded its national scientific teams. Ecuador has been participating in funding programs such as the Research Foundation Flanders (FWO; a Belgian organisation, whose main purpose is to support fundamental and strategic research) and with STIC & MATH AmSud Regional Program (French cooperation and counterparts in Latin America oriented to promote and strengthen collaboration and the creation of research-development networks in the fields of information, communication, science, technology, and mathematics, through the realisation of joint projects).

Although very few projects have been funded to Ecuadorian teams in these programs in recent years, every year more and more projects are presented during the annual calls and Senescyt has increased its budget for funding these projects (Medina et al., 2016).

Another case that is necessary to highlight is that Senescyt signed a protocol to the Technical Cooperation Framework Agreement (signed in 1999), between Ecuador and the European Center for Nuclear Research (CERN), focused to train Ecuadorian researchers in the areas of physics, materials science and ICT. As a result of this agreement, various stays have been made and some Ecuadorian scientists and students have participated

in the different experiments of CERN (Medina et al., 2016).

Other recent strategies promoted by the Ecuadorian government that directly increased international collaboration were the Prometheus Programme and the creation of four emblematic universities where almost all the PI (professor in-charge) are distinguished Professors from prestigious universities around the world.

The Prometheus programme succeeded in bringing international experts to Ecuador to conduct research at universities and public research institutes, to train Ecuadorian scientists in a variety of fields, and to transfer their knowledge to Ecuadorian professionals and students (SENESCYT, 2015; Van Hoof, 2015). From 2010 to 2015, Prometheus sponsored around 1000 visiting researchers in Ecuador, most contributing to the publication output of the country (SENESCYT, 2015). The new universities (known as "emblematic") brought international professors to work on newly built university campuses in different areas. One of them, Yachay Tech University, has more than 100 foreign professors as faculty staff (74 percent of professors from 23 nationalities). These professors are actively publishing using data obtained mainly in their institutions of origin, which has increased both the number and impact of publications.

Another important aspect to consider is the fields of knowledge that international collaboration emphasizes. In general, agricultural/biological sciences and medicine account for 56.6 per cent of all publications in Ecuador (Castillo & Powell, 2018). At the country level, the United States xx | and Spain are the largest collaborators in almost all fields of knowledge; this agrees with the results shown by Lemarchand (2015), and agricultural/biological sciences and medicine are in the top of the list of these countries (Castillo & Powell, 2018). This indicates the importance of collaboration with these countries in those particular fields.

Senescyt intends to improve scientific outputs to bring Ecuador to a knowledge economy and even though the number of scientific outputs has substantially increased in the last years due to the previously mentioned actions, for example, the number of publications, there are still many problems to face to achieve the objectives established in the National Plan of Science, Technology, and Innovation and to fulfil the norms the Organic Code of Social Economic Knowledge, Creativity and Innovation demands.

The extreme bureaucracy and administrative hurdles that Ecuadorian researchers face have limited the achievement of better scientific outputs. Government and university administrations do not understand the demands of "research," and faculty spend 70 to 90 per cent of their days teaching or doing administrative work; central government requirements for domestic and foreign researcher registration are daunting; permits and funding application approvals are delayed due to a lack of research-oriented administrators; and funding is slow and arrives late in the year (in some cases, resulting in the research stopping). University administrators must show experience in the scientific endeavour to understand the researchers' needs to help solve these problems.

Conclusion

The future of Ecuadorian S&T should include an adequate policy on international collaboration to promote research in conjunction with at least two other regions while prioritizing North America and Europe. Government policies on research funding should continue for the top fields based on past work, but the government should also consider increasing funds in areas for which outputs impact is low if those areas are important to the future country framework. Higher education authorities should facilitate the exchange of faculty members and students with foreign institutions, provide easy travel, and allocate funds for shared research projects.

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STI Cooperation in Arab Countries: Challenges and Opportunities

Mai Sayed Mohamed Hassan*

Introduction

Arab Countries are the countries which are extended from the Arabic Gulf in the east to the Atlantic Ocean in the west, with an area of about 14 million square kilometers. It consists of twenty two countries; which are Egypt-Jordan- Palestine- Syria – Lebanon – Morocco- Mauritania- Tunisia – Algeria- Libya- Sudan- Somalia - Saudi Arabia – Yemen- Oman- Iraq- Kuwait-Qatar- Bahrain- the Comoros Islands- Djibouti –and the United Arab Emirates.

All of these Arab countries have a common history, culture and language. They are all members in the League of Arab countries which is established in 1945 to reflect these common ties between its members and to provide a mechanism for coordinating between each other toward common challenges.

On the other hand, Scientific Diplomacy is the concept that indicates for using of scientific cooperation among countries to solve their common problems and to build constructive partnership.

In this regard, and as one of the most important tools of the foreign policy since scientific and technological developments, science diplomacy can play a vital role toward facing common political, economic, social and security challenges among Arab Countries.

Thus, we can talk about three dimensions of science diplomacy which are:

- **Science in diplomacy**: this means that scientists present their scientific advices to serve the foreign politics goals.
- **Diplomacy for Science**: this means facilitating of international scientific cooperation using diplomatic tools.
- **Science for Diplomacy**: this means sciences in promoting relations between nations.

* *Executive Secretary, Ministry of Higher Education, Egypt.*

The importance of science diplomacy appears in many dimensions, the most important ones are:

- Contributing in finding solutions for urgent challenges for globalization such as climate changes, epidemics, natural disasters and cyber security.
- Achieving sustainable development for countries on the long run in addition to developing solutions for improving food security, water purification, lack of energy and etc.
- Promoting cooperation in the international relations which allowing opportunities for solidarity actions.
- Science diplomacy represents common and non-political language which can gather both allies and enemies to deal with certain cross-borders challenges.

STI Cooperation in Arab Countries

In the light of historical and cultural similarities and common challenges, science diplomacy and cooperation between Arab countries in the field of scientific research is very important to promote diplomatic relations among these countries from one side and between them and others of international actors from the other one by the way that allow for these countries to build a base of experience and common scientific resources to integrate science in the regional decision making for solving crisis. We can differentiate between two levels of this international cooperation in the field of scientific research on the level of Arab Countries in the frame work of science diplomacy as follows:

First Level: Arab-Arab Cooperation (between Arab countries and each other) in the field of scientific research:

- **Inter Academy Partnership (IAP):** a global network of national science academies that includes "Egypt, Morocco, Sudan, and Jordan" aims to build capacity in the sciences and to provide scientific evidence to inform national and international policymaking
- **Eastern Mediterranean Public Health Network**: this connects public health workers in seven Arab countries and provides epidemiological training. [1]
- **Researching Center of Water Desalination in the Middle East:** this supports researches and training about water desalination and other issues related to water.
- **Sezamy Project**: which launched in 2002 under the auspices UNESCO and produced to use in different applications that serving the fields of medicine, energy and environment. [2]

There some regional events that organized by some Arab countries such as:

- **The regional forum for Science diplomacy and technology:** that holds in Jordan on December 2015 under the title of "Toward Comprehensive Transformative Partnership for Sustainable Future" and hosted by the Royal Jordanian Scientific Society in coordination with Economic Social United Nations Committee for West Asia.
- **Quatrain Sciences Stars Program:** aims to encourage Arab scientists from Arab youth and business men which will lead them to be interested in unlimited abilities of sciences and technology.

Second Level: Arabic Cooperation with World in the field of STI:

International universities promote the cooperation in the field of scientific research:

- **Egyptian –Japanese University for Sciences and Technology (E-JUST):** which established in Egypt in 2009 according to an agreement between Egypt and Japan. It is an Egyptian university that based on the partnership between Egypt and Japan and it follows the Japanese innovative education system based on the scientific research, it is a researching university including a number of Centers of Excellence that have the ingredients of creation and innovation.
- **The French University in Egypt**: it established in 2002 according to an initiative between the two presidents of Egypt and France, and in January 2019 an agreement was signed between the two ministers of foreign affairs of Egypt and France during the Visit of French president to Egypt in order to "refoundation of the French university in Egypt". Regarding this agreement the French university of Egypt will play a vital role in enhancing scientific cooperation between Egypt and France. It states establishment of joint researching labs and scholarships for

Egyptian students to study in France, sending French faculty member staff to teach in the university and transfer their experiences and knowledge, training for Egyptian students in French searching labs.

The German Jordanian University in Jordan.

Joint scientific and searching programs:

- **German Egyptian Research Long-term Scholarships "GERLS" and German Egyptian Research Short-term Scholarships "GERSS":** Egyptian German programs allow for the Egyptians students to study in German and these programs are jointly funded by the two countries.
- **Egyptian- Japanese Education Partnership (EJEP)**: it is an initiative which announced in a joint statement between the Egyptian and Japanese Government during the visit of the Egyptian president to Japan in 2016. According to this initiative there are scholarships from Japan to Egyptians students to complete their post graduates studies in Japan in addition to training programs for the undergraduate students in the Japanese university. The fields of these scholarships are the fields that have priority in the Egyptian government such as (renewable energy, water resources, nano- technology, medicine industry, education, nutrition and agriculture, engineering) [3]
- **International Fellowship Program (IFP)**: it is the program of the international scholarships in cooperation between the Egyptian Ministry of Higher Education and Scientific Research and the Ministry of Sciences and Technology in China.
- **The Joint National Egyptian-Chinese Renewable Energy laboratory in Sohag:** which established on September 2019 according to the agreement between both countries during the visit of the Egyptian president in December 2014.
- **Joint initiative of Prema:** between Egypt and the EU in the field of higher education and scientific research through activation of the projects of Science and Technology Fund and Scientific Research Academy. This initiative aims to achieve the objectives of sustainable development plan of Egypt – Vision of Egypt 2030.
- **Gulf Scholarships for Scientific Innovative and Knowledge Economy (GSIKE):** through these scholarships the British government funded Forum of Scientific Cooperation for Promoting Scientific Relations between Researchers in Bahrain and the United British Kingdom in cooperation between the British Council and University of Bahrain. That program includes workshops of capacity building for researchers, scientific seminars and funding of joint researches. [4]

Challenges and Opportunities

The previous presentation for the reality of science diplomacy in the Arab countries showed that despite of the attempts of building science diplomacy bridges between Arab countries and each other and between them and world, it is still not the typical ones. In my point of view of Arab countries managed to cooperate regionally effectively, they will manage to do the same internationally. I think the Arab countries similarities, resources and ties must make them cooperate in the frame work of science diplomacy in the most perfect way.

So, it is interesting to think about what are barriers that prevent these countries to act perfectly. To know why they do not use their scientific tools to perfectly face their common problem. Then, here are some of the challenges that face Arab countries in its way to cooperate scientifically in the frame work of science diplomacy effectively:

- Political systems variables and factors: since the year of 2010, there are a lot of political, economical and social variables that happened in the Arab countries and led -in a number of cases- to political instability. For instance, EU launched an initiative for promoting the assistances for Egypt in 2012 but because of the events of 2013 and its dependencies of institutional and political transformation led for the program to stop affected the execution of the program.
- Some of Arab countries are still having a gap between its scientists and its decision makers.
- The absence of scientific societies for promoting the regional and international cooperation. [5]
- Laws and organizational barriers which are breaking down the scientific progress inside the Arab countries, for example the education

systems in these countries does not depend on the creation and innovation, labs are not equipped enough, there is no academic freedom regarding the independent thinking, and the absence of the stimulation of creation and innovation.

- The absence of high quality scientific journals on both national and regional level.
- The UNESCO report for science shows the scientific progress in each country as follow:
- In 2012 Tunisia has 1394 scholars for every one million of the people; this was the highest number in the Arab countries however in 2006 it was 1588 for every one million of the people. Also in Egypt, the number was 581 scholars for every one million of the people, while in 2006 it was 617. On the contrary, in Morocco it was 647 scholars for every one million of the people, and 864 scholars for every one million of the people in 2012. [6]
- Therefore, some actions need to be done … new opportunities had to be created, such as:
- Preparing a suitable environment for interaction between sciences and politics including the awareness of scientists and politicians and employment of scientists to work with decision makers.
- Promoting the culture of joint science by connecting the existing scientists networks and benefit from the existing networks and the new ones. Also, establishing scientific platforms for sharing knowledge and as data base for scientists and researches for exchange information and knowledge between Arab countries.
- Display the vision of the science diplomacy inside Arab countries to include a clear definition for the commitment of the measures.
- Determining channels for science diplomacy between Arab countries and support cooperation through them.
- Develop of certain science diplomacy projects connect between the issues of water, nutrition and energy.
- Preparing programs for promotion of exchange Arabic brains and the mobility of young scholarships across the Arab countries.
- Preparing a full program that benefit from the advantages of each country. For example, Saudi Arabia has the huge wealth to fund and build equipped laboratories, while Egypt and Lebanon have smart researching brains.
- Spreading the Arabic culture concerning supporting of science diplomacy through preparation of infrastructure and improving capabilities of students of sciences, scientists and experts of public diplomacy in the fields of science technology and others.
- Governments should be commitment to providing suitable climate for cooperation.

Conclusion

Arab countries have to reorganize their home from inside politically, culturally and scientifically to manage to cooperate in an effective way. It should be a long term clear plan through which they can act together to cooperate scientifically in all their common problems ,on the top of these are energy, water, and security, and not to be just a separate attempts. There is a need for clear mechanisms and objectives. My suggestion is to organize an event such a scientific forum with the active participation of the most important scientists of these fields in the different Arabic countries aiming at define objectives, determine mechanisms and set a road map in the frame work of science diplomacy. This forum should discuss the previous mentioned challenges and opportunities.

Endnotes

1 Nart Dohjoka, Cathleen A. Campbell, and Brenna Hill, **Science Diplomacy in Arab Countries: the Need for a paradigm Shift**, 17/3/2017, www.sciencediplomacy.org.

2 Ibid.

3 The website of Egyptian Ministry of Higher Education and Research, www.mohesr.gov.eg

4 Ibid.

5 Ibid.

6 UNESCO science report, http://unesdoc.unesco.org,

Science Diplomacy to Enhance Higher Education Collaboration between Ethiopia and India

Mulugeta Tsegaye*

Introduction

From ancient trade routes cooperation to higher education, Ethiopia and India have long-standing relations. Ethiopia, where the Indian teachers pragmatically had been playing a significant role in secondary schools the 1950s and 60s is endeavouring to intensify exchanges and collaboration with the government of India in different fields including Science and technology exchanges and collaborations.

Ethiopia–India relations have existed for almost two millennia although the two countries established their diplomatic relations formally at the level of legations in July 1948, after the independence of India. The relationship was raised to the ambassadorial level in 1952. India maintained an Embassy in Addis Ababa and Ethiopia in New Delhi. Since then both countries are enjoying their friendly relations (Thubauville, 2006).

India is among the few and its contribution to Ethiopia's education sector is an example of south-south cooperation. This cooperation and bilateral relations would have not been realized if the successive Ethiopian regimes had not been appreciative of the fact that India was never been hostile to Ethiopia's interests. However, the relations have passed through various phases largely in response to the change in regimes in Ethiopia.

Relations during Emperor Haile Selassie's regime (1941-74) were close. The emperor encouraged a large number of Indian teachers to come to Ethiopia and who worked in the remotest parts of Ethiopia which brought tremendous goodwill that both countries enjoyed. However the subsequent Communist Derg Regime (1974-91) favoured the Soviet bloc and many resident Indian businessmen and teachers left Ethiopia, India and Ethiopia never hesitate to enjoy back again

* *Demissie, Sr. Foreign Relations Expert, MoSHE*

their close and friendly relations with the current federal democratic republic of Ethiopia that came to power in 1991. Despite the change in regimes, Ethiopia had been consistent in her support for India in international issues (MEA, 2014)

Overview of Ethiopian Higher Education and its Challenges

Ethiopia is embarked on a higher education expansion reform program of impressive dimension. It has enriched the number of its universities from two to fifty in the past two decades. More than 90 private colleges universities and more than 30 teachers training program are under regional administration. This massive expansion of higher education has had a positive impact on increasing the intake capacity higher education institutions, and currently, more than one million students are pursuing their higher education. Despite the massive expansion of higher education, the higher education sector of the country has been facing the following challenges.

For the nation which has dramatically boosted its university expansion shortly, the insufficient number of lecturers cannot be explained not only by the very fast expansion of higher education but also the brain drain which is still challenging the higher education sector of the nation (Saint, 2004).

In addition to that gaps of well-skilled manpower in the fields of research, innovation, curriculum development, policymakers and administrating staff is hindering the higher education sector not step forward ahead.

Ethiopia-India Higher Education Cooperation

As the Indian Secondary school teachers rescue the expansion of Secondary schools in Ethiopia in the 19 40^{s} and 50^{s,} Indian lectures likewise are rescuing the Ethiopian higher education sector in various fields. Based on the bilateral agreement made by the two countries hundreds of Indian Lecturers are serving in Ethiopian higher educations. This has enabled the universities to get out of peer teaching, start new programmes as well as full fill a minimum requirement needed to include expatriate lecturers in the respective universities (Alemayehu et al., 2017).

Hence the Migration of Indian lecturers is playing a significant role in filling the gaps of brain drain as well as encouraging the higher education Sector in the positive dimensions mentioned in the above.

Furthermore, the government of India is contributing a significant role in capacitating Ethiopian nationals' trough its south-south cooperation programs called the Indian Technical and Economic Cooperation which is supported by the government of India under the commonwealth African assistance program and TCS Colombo Plan programme.

In the past years, Ethiopia has benefited from the cooperation for its development programs. For example, more than one thousand Ethiopian nationals are pursuing their masters and doctoral programs through different cooperation schemes.

As part of the educational cooperation programme with Africa, the government of India is giving fifty-five scholarships annually through Indian Council for Cultural Relations (ICCR) and hundreds of short term training trough the Indian Technical Economic cooperation program (ITEC). In addition to that close one thousand students are pursuing their graduate and post-graduate educational programs in various fields of study under the Ethiopian government sponsorship program on the basis of the two countries bilateral relations.

In the meantime, the bilateral cooperation is believed to have created a platform for Indian academics to explorer the academic markets and increase the people to people relations of the two countries apart from their academic role.

The institutional linkage between their respective countries is also among the main forms of collaboration which the two friendly countries are endeavouring to achieve more successes in their cooperation areas.

To this end, the government of India via various respective Institutions has donated to Ethiopia a 64-Slice CT Scan Machine to Black Lion Hospital in Addis Ababa as part of our Grant Assistance. Tele-Education and Telemedicine services were being offered till recently at nodes set up in Black

Lion Hospital in Addis Ababa and in Addis Ababa University and were well-received. The Tele-Education project has been replicated by the Ethiopian side and linkages established between the Addis Ababa University and the Indian Institutes of Technology at Delhi and Kanpur. Their cooperation has extended in four areas suggested by the Ethiopian side viz. traditional knowledge, textiles and garments, leather and leather products, ICT and microelectronics.

The Cooperation envisages the establishment of a Joint Committee on Scientific & Technological Cooperation. A space cooperation program has since been initiated. Ethiopian side has requested for India's assistance in their flagship program of establishing 16 Centers of Excellence in Adama Science and Technology University (ASTU) and Addis Ababa Science & Technology University (AASTU).

The proposal was considered in the framework of India-Ethiopia S&T cooperation during the Joint committee meeting which was held in February 2017 in New Delhi, India. An MoU on enhancing cooperation in S&T Sector between the two countries was signed and a draft implementation plan based on the issues discussed during JCM meeting and mentioned in the MoU, particularly, on PhD programmes, visiting fellowships, faculty visits, GIS training, Joint R&D projects and, technology transfer is under consideration to move further. 28. During IAFS-III, PM had announced doubling of the scholarships/fellowships for Africa. It is proposed to offer 1000 C.V. Raman Scientific Fellowships over the period of 5 years. This is to be implemented by the Department of Science & Technology/Federation of Indian Chambers of Commerce & Industry (FICCI). Since the beginning of this fellowship in 2010, 23 candidates from Ethiopia have been sent so far. Further, to replicate the success of Indian plant tissue culture in African countries, a total of 270 slots [over the period of 5 years] have been allocated to impart Plant Tissue Culture Training through Department of Biotechnology, Ministry of Science & Technology.

According to Katti, et al. (2009), India has been a provider of development assistance since its independence, but its role and contribution has gained momentum more recently as a result of its growing economic and political influence in the global community. In contrast to OECD/DAC countries until today India does not have any publicly declared policy paper or standards. The guiding principles for its foreign policy and its development cooperation are founded in the Panchsheel/ Bandung Principles. According to this approach, India's development cooperation is implemented by various ministries and institutions with the Ministry of External Affairs (MEA) as the leading ministry. As India does not have a single agency for Indian Development Cooperation (IDC), estimates about the magnitude of India's development assistance have to be culled out of the budget outlays of the relevant Ministries/Departments and other sources. According to available data, India's aid focuses first on neighbouring countries, followed by African countries. In recent years India became an important factor in promoting regional integration.

Conclusion

In conclusion, this paper has proven that the bilateral and South-South cooperation of Ethiopia-India has shown progress in terms of Scholarship, lecturers and capacity building program exchanges in the past decade. Therefore, both the bilateral and south-south cooperation on between the government of Ethiopia and India is found useful to fill the gaps Ethiopia has faced due to the massive expansion of higher education as well as the continuing brain drain. Moreover, this paper has also proved that the bilateral cooperation of the two countries has also created a platform for Indian academics to share the market in the sector.

Recommendations and way forward

Currently, the bilateral cooperation of Ethiopia and India is mainly confined to Scholarship and training exchange programs. However, It is advised that the two countries should extend their collaboration in various exchanging programs in the fields of research and innovation to give solutions to their respective social problems.

So far, there is no joint technical team that leads and evaluates the successes and gaps to

be observed through the implementation of their bilateral collaboration. This helps to unveil synthesized regarding the implementation of their bilateral collaboration. It also helps to give clear and tangible information to the national decision and policymakers.

Finally, it is recommended that the collaboration should give priority to bring institutionalised knowledge from the respective countries. They should also ease the challenges faced in scholarship exchange programmes.

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Need for Promoting Science Diplomacy in African Union Member States

Haregwa Sahile Sege*

Introduction

Science diplomacy is the use of scientific collaborations among nations to address common problems facing 21st century humanity and in building constructive international partnership. Yet the current reality is that many African countries are not utilizing science diplomacy in order to address many challenges prevailing in these countries.

The continental fragmentation and small domestic markets translate into a lack of economic scale in the production and distribution of goods and services endangering millions Africans. With a few notable exceptions, African states have not yet developed the robust, efficient, and lasting scientific and technological capability and culture required for economic and social progress.

As a result, only 2.3 per cent of the world research community comes from Africa, and the continent contributes only up to 2 per cent of the global scientific publications. This situation is unlikely to improve unless the uneven support to science and technology is comprehensively and systematically addressed. Transnational cooperation constitutes the most rational way to develop adequate solutions to the increasingly acute and complex challenges facing the continent.

The interface between science and diplomacy, which goes well beyond the building of bilateral or multilateral scientific relationships, and speaks to broader foreign policy objectives, has not yet been fully explored in Africa.

The continent needs effective application of science *in* and science *for* diplomacy because of its political and economic fragmentation, its conflict-prone status, and its vulnerability to negative geopolitical trends.

* *Ministry of Foreign Affairs of Ethiopia.*

Additionally, the African continent *needs to develop endogenous science-led diplomacy, supported by sound and fair international cooperation, which not only will* help African countries build their STI capacity through stronger regional partnerships, but also can be used to identify, address, defuse, and ultimately solve cross-border or trans-boundary problems facing the continent.

Practices of Science diplomacy among the African Union Member States

Africa's patchwork of nation-states is uniquely positioned to take advantage of the world's abundant scientific and engineering expertise in order to address its myriad economic, environmental, and social challenges. A recent World Bank report illustrated the opportunities ahead: "Vertiginous changes brought about by the digital revolution in the past 20 years make leapfrogging (skipping steps, charting new paths) in Africa not only a possibility but a necessity.

African political leaders have recognized, albeit only recently, that *science and technology should be* a top development priority and have endorsed a funding target of 1 per cent of each country's GDP on research and development. Today, almost every national, regional, and continental policy document and strategic development plan has science, technology, and innovation (STI) as a high priority. The most emblematic of these include:

- "Science, Technology and Innovation Strategy for Africa 2024" (AU, 2014))
- "Support to Higher Education, Science and Technology" (AfDB, 2009)

Yet, with a few notable exceptions, African states have not yet developed the robust, efficient, and lasting scientific and technological capability and culture required for economic and social progress. As a result, only 2.3 per cent of the world research community comes from Africa, and the continent contributes only up to 2 per cent of the global scientific publications. This situation is unlikely to improve unless the uneven support to science and technology is comprehensively and systematically addressed. Transnational cooperation constitutes the most rational way to develop adequate solutions to the increasingly acute and complex challenges facing the continent.

Even as few successes in science diplomacy have been recorded, and the documented successes are mostly in the health sector—namely, control of infectious diseases such as river blindness and leprosy, and vaccine-preventable diseases such as polio—a host of obstacles stands in the way of broader applications of the field. Various deficits associated with fluid and conflicting political and economic agendas, cultural sensitivities, and endemic mistrust often hamper science diplomacy processes. The situation is exacerbated by a lack of qualified practitioners, weak research-to-policy interfaces, and the marginal role played by research institutions, universities, and civil society.

Despite the absence of a well-defined Africa-wide science diplomacy approach and strategy, the core principles of science diplomacy (attraction, cooperation, and influence) have already been folded into the African Union's Agenda 2063 strategic framework for the socioeconomic transformation of the continent.

The most promising issues to consider for applying science diplomacy in Africa include: **management of trans-boundary water resources,** including to enhance international water laws and regional cooperation. Africa has approximately one-third of the world's major international water basins, with about eighty International River and lake basins and fifty trans-boundary aquifers. Virtually all countries share at least one international water basin, and certain countries serve as the cradles of several international rivers (e.g., Guinea, an extreme case, has twelve such rivers).

The continent likewise has huge potential for energy production through hydropower, for food production, and for environmental rehabilitation, with the link between water and energy increasingly important to recognize.

Despite this relative abundance, water scarcity is a rising concern in many parts of the continent and the cause of political tensions that can sometimes escalate toward war. Water-related conflicts have occurred throughout the continent, from its dry to its fertile regions.

These have revolved mainly around equitable access, benefits sharing, and governance issues. The recurrent heated tensions between Nile River

riparian countries drawing from Lake Edward (Uganda, Democratic Republic of the Congo) and Lake Victoria (Kenya, Uganda) best exemplify the acuteness of the problem. In such cases, science diplomacy can help in:

- Developing a mutually agreed understanding of the spatial and temporal scales of the conflicts
- Crafting integrated and inclusive management plans for sustainable and equitable use of water resources on national, regional, or continental scales
- Drawing up a wide array of coping strategies and tools (including effective communication mechanisms and efficient institutional and legislative frameworks); and
- Deriving workable protocols for mitigating and preventing water-based conflicts.

Two related areas that call for judicious science diplomacy–led collaboration are:

Cross-boundary water-transfer projects, from abundant reservoirs to those in less-endowed regions, that distribute water more efficiently and cost-effectively (Congo basin–Lake Chad water transfer project; Lesotho Highlands water-transfer project).Science can and should play a critical role in providing informed decision making and options that ensure the associated diplomatic process is objective and inclusive.

Challenges of Ineffective Practice of Science Diplomacy in the African Union Member States

Due to the ineffective practices of Science diplomacy, the member state countries are not benefiting from their natural resources. For this and other reasons the member state countries are facing the following challenges:

- Managing shared natural resources, protecting the environment, and addressing climate change;
- Coping with adverse impacts of climate change while promoting climate-compatible development and achieving the UN Sustainable Development Goals, known as Agenda 2030;
- Resisting and repelling international terrorism and addressing its cohort of humanitarian issues;
- Preventing, controlling, and eradicating human and animal pandemics;
- Promoting democratic principles and institutions, popular participation, and good governance;
- Establishing and fostering sound academic and scientific foundations;
- Achieving economic, trade, social, and political collaboration, coordination, and convergence.

Conclusion

Science diplomacy in Africa is in its infancy and has a long way to go. Even though the continent has made significant progress toward meeting some of its ambitious objectives for development and political integration, the need remains for further progress achievable through a smart, systematic application of science interacting with diplomacy. Science diplomacy should, therefore, be recognized as a priority in shaping continental as well as national policy and development agendas. Many challenges, of course, wait. The primary one is how to build up the needed science diplomacy capabilities through educational curricula, training, and experiences that reflect norms and values directly relevant to Africa's development aspirations. The second challenge is how Africa can devise a "code of conduct" for science diplomacy that takes into account its legal, cultural, and political specificities as well as the ambiguities, tradeoffs, and competing interests at play in conflicts. The third main challenge is how to facilitate cooperation and trust among scientists and diplomats, supported by the communication and empathy essential to conducting broad negotiations.

To harvest the many potential benefits that science diplomacy could produce, African governments must collaborate with credible international partners to strengthen local research capacity, establish an appropriate regulatory environment and policies, and support the current drive toward regional integration. Cross-border cooperation can then favor the advent of an integrated African scientific community. The recent successes in cross-border initiatives in pandemic control, peacekeeping, and information and communication technology have created rich soil in which science diplomacy can take firm root and grow.

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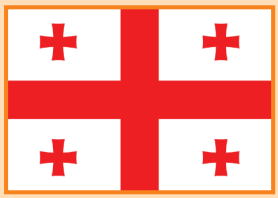

The Role of Science Diplomacy in Russian-Georgian Relations

Anna Rusieshvili*

Introduction

Diplomacy is the management of international relations by means of negotiations, dialogues, compromises, the methods by which these relations are adjusted and managed non-violently, whereas science Diplomacy is the process when the international relations are managed by means of knowledge acquisition in terms of science and technology. The states use the acquired knowledge to build the scientific collaborations and constructive, knowledge based international partnerships among them. Science, technology and international affairs affect one another, and these mutual influences can be used as one of the most powerful tool to ease tensions between countries (2019).

There are three dimensions of Science Diplomacy: diplomacy in Science, Science in diplomacy and Science for diplomacy. Science for diplomacy draws primarily on the "soft power" of science, its soft power implies in its ability to develop stronger links between countries where political environment is tense and official relationships are strained and constricted (The Royal Society. 2010)

This paper aims to define the role of "soft power" of science diplomacy between two countries Russia and Georgia, countries that have rather strained political relations, as a result of the full scale military aggression exercised by Russia against Georgia, occupation of the integral parts of Georgia, and ethnic cleansing provided on these territories and declaration of this region as an "independent Republic". Georgia break off diplomatic relations with the Russian Federation On September 2, 2008 (MEA, Georgia, 2019). Explain the challenges of using the science diplomacy and if the possibilities of using the "soft power" of science diplomacy as the tool to regulate the existing relations.

In today's Georgia, perhaps there is no such urgent and problematic issue as the Russian-Georgian relationship. All the problems Georgia faces regard the politics, economics, culture, science, to some extent is related to Russia-Georgia relations. Being for a long time in the Soviet Union,

Senior Specialist, Ministry of Finance, Georgia.

struggle for independence, then establishment as an independent state, the reassessment of national interests, has left a peculiar mark on the country from which we are still struggling to come out. Also, As Georgia is an independent country, it is difficult to maintain the normal relations with Russia. However, considering the geographical and economic dependencies of the countries, ways are to be paved for peaceful coexistence. Taking into consideration all the above mentioned, it is essential to find some kind of tool that helps us to regulate current tense relations, considering the armed conflict between them, that caused existence of two occupied territories in Georgia. The given paper analyses the possibility to collaborate through the science diplomacy and foster peace between Georgia and Russia.

Overview of Russian-Georgian Relations

Since the August 2008 War and the consequent recognition of independence of Abkhazia and South Ossetia by Russia, the relations between Georgia and Russia have deteriorated significantly. In the absence of diplomatic relations, the consultations and peace-building talks in Geneva (mainly Abkhazia and South Ossetia related) remain the only format involving international actors and mediators. Indeed, more than 40 rounds of negotiations have produced no tangible progress on converging the visions between parties. Even bilateral talks, since 2012 have failed to contribute in the normalization of relations, particularly some progress in economic relations and humanitarian issues. With this lack of interaction between official structures, dialogue between Russia-Georgia experts and policy makers remains one of the most important instruments for solving the problems between Georgia and Russia (Georgian Foundation for Strategic and International Studies. 2018).

Nearly 25 years ago, the Soviet Union was dissolved and 15 independent states rose out of the post-Soviet realm. The disintegration of the USSR resulted not only in the self-determination of its former parts, but also caused a split in the values, ideologies and foreign policy priorities as well as led to newly established actors. The motivation for Georgia to leave the Soviet Union and distance itself from Russia, among other factors, happened because of deeply rooted differences in the attitudes and opinions for the reasons of almost 200 years of cohabitation (Georgian Foundation for Strategic and International Studies. 2015).

The most significant issue between these two countries is the understanding of national interests. The nature of the relationships between different states is determined by the policies they pursue. Domestic and foreign policy are main factors for determining the national interests, particularly when there is mismatch between Georgia and Russia. The main national interest of Russia is the restoration of old glory and the return of the Prestige of the superpower. A clear example of this idea is of Eurasian Union, an alternative of the EU and that already functions as a Eurasian Customs Union (Georgian Foundation for Strategic and International Studies. 2018).

After the collapse of the Soviet Union, as well as the Russian Empire under which Georgia was, it faced the political orientation issue. There are three alternatives of foreign policy orientation towards modern Georgia: the north, the west, and neutrality (Georgian Foundation for Strategic and International Studies. 2018). Georgia has Euro-Atlantic orientation; It was stated by the Georgian Prime Minister, Georgi Kvirikashvili, in July 2016, at the meeting with US Secretary of State John Kerry, in Tbilisi that Georgia's European orientation is irreversible. A National Democratic Institute survey conducted found strong support for Georgian government's Euro-Atlantic aspirations—68 per cent in support of NATO and 71 per cent for the European Union (NDI survey, 2016).This policy was also reflected in effective steps. Georgia has signed the Association Agreement (AA) with the European Union. The Association Agreement aims to deepen political and economic relations between the EU and Georgia, also through the creation of a Deep and Comprehensive Free Trade Area (DCFTA). However, Georgia's European aspirations led to a military conflict with Russia and eventually it's territories were occupied by Russian Government.

Scope of Cooperation

Agriculture

Georgia has two occupied territories Abkhazia and

the Tskhinvali region. It can be stated that in this occupied territory, there should be use of science diplomacy, to normalise the relations between the two countries. There are problems in these areas that require the involvement of both parties to deploy science and technology related applications, for ensuring the well being of the population in occupied and cross-border territories.

Zugdidi, the main town of Samegrelo region (Western Georgia) remains badly affected by the socio-economic consequences of the break-up of the Soviet Union and the 1992-93 conflict with Abkhazia (1992-93) which displaced 250'000 people. Today, Zugdidi is home to more than 90'000 IDPs, 35 per cent of whom still live in collective centres. Up to 40 per cent are unemployed and suffer from extreme poverty (ICRC.2007). In order to limit dependency on humanitarian assistance and promote economic self-sufficiency, the International Committee of the Red Cross (ICRC) launched a Micro-Economic Initiative (MEI) Programme for existing resident and IDP food beneficiaries. The aim was to enable them to start or resume a productive activity. From 2004 to 2006, 8'600 households (33'000 persons) received agricultural and productive items or cash grants. This was supported with training and technical advice to ensure they could generate a regular household income (ICRC. 2007). A lesson learnt from the MEIs implemented in Georgia is that to distribute inputs alone is not enough to reach economic security, nor does it restore the dignity of the victims. ICRC developed a "coaching" programme to further support the beneficiaries. During both training and the programme itself, interaction between beneficiaries was encouraged so best practices could be shared. (ICRC. 2007).

There are support of USAID through some projects particularly to create a stronger business environment in cross-border villages of one of occupied territory of Tskhinvali (USAID. 2019). Georgia Hazelnut Improvement Project (G-HIP) (USAID, 2019) will be implemented as a public-private Alliance between USAID, Ferrero and Cultivating New Frontiers in Agriculture (CNFA), to leverage the technical and financial resources of each partner for sector development of the hazelnut. G-HIP will be co-created, co-developed and co-implemented by the Alliance. The G-HIP Alliance will utilise market-based approaches and solutions to advance USAID's development priorities by increasing the quality and quantity of Georgian hazelnut production, improving processing capabilities and establishing market linkages that will allow smallholder growers to reach lucrative end markets (USAID 2019).

Also, the USAID Agriculture Program would accelerate growth of agricultural sub-sectors that show strong potential to create jobs and increase enterprises' revenues, including the production and processing of fruits, vegetables, herbs, and other high-value horticultural products. The program will achieve these goals by increasing productivity and productive capacity; building capacity to add value through processing, storage, and other techniques to meet international standards and certifications; strengthening linkages within agricultural value chains as well as to new markets; strengthening the capacity of cooperatives, extension and other service providers, associations, and other relevant organizations (USAID, 2019).

The population actually needs this kind of technological and scientific support in producing and processing of fruits, vegetables, herbs, and other high-value horticultural products. With these projects, it can be highlighted that it is possible that representatives of the scientific community will cooperate in the agricultural sector to introduce new technologies, which will promote the development of the occupied territories. But the point of departure, this paper intends to make is there are similar kind of technologies developed in Russia, which can be transferred to the annexed regions, for their economic and social development, particularly in Agriculture.

Architectural Restoration

The Russian aggression of 2008 and the subsequent occupation of Georgian regions (Abkhazia and Tskhinvali region/South Ossetia) have endangered historic monuments located therein. It should be noted that the state of the monuments of Georgian cultural, historical and religious heritage located in the occupied regions needs to be restored. Some monuments are in urgent need of rehabilitation (OHCHR. 2016).

The Russian aggression of August 2008 caused an extensive damage to monuments located in

Tskhinvali region/South Ossetia. All these historical monuments occupy a special place in the history of Georgian Christian architecture. Most of them require an immediate intervention and restoration. The painting of the XIV century is particularly affected because of the humidity. The roof and walls must be repaired as well. In 2012 a virtual map of cultural monuments was created by the occupation regime, in which 42 entries were marked. Apart from that, the so called "Parliament of South Ossetia" adopted three "laws" on preservation of cultural heritage of SouthOssetia: the "Law on Import and Export of Units of Cultural Value"; the "Law on Cultural Heritage Units"; the "Law on Works of Art", but without involvement of the representatives from Georgia (OHCHR. 2016). Representatives of the occupying regime presented a list of 10 monuments in urgent need of restoration. Among them are: Tsandripshi, Drandy, Mokvi, Bedia and Lashkindari temples, Bichvinta Cathedral, architectural compounds of Otkhara and Tsabelda, Sokhumi Fortress. It must be mentioned that the plan to carry out "restoration" works without the involvement of Georgian specialists (OHCHR. 2016). This is vitally an important issue which can be addressed through technological cooperation for restoration of existing architectural monuments. Technical expertise is to be deployed in borrowing examples from countries which are using advance technologies to restore their monuments. Such technologies include Reflectance Transformation Imaging; Photogrammetry and LiDAR (Light Detection and Ranging, to name a few.

Conclusion

Science Diplomacy can help to mobilize scientific networks and as the tool to solve problems faced by Russia and Georgia. Taking into account all above mentioned, science diplomacy remains the only way to normalize the situation. There is a need for dialogue between the scientists of the two countries, in order to share the latest technological advances in the aforementioned agriculture sector and establish these advances into the occupied and cross-border villages. Also it is important for the preservation of cultural heritage, the collaboration of restorers, archaeologists, and historians, by the use of advanced technologies in the restoration industry.

To conclude, scientific diplomacy can play a very important role in Russian-Georgian relations, even in the absence of any political, economic or diplomatic relations. It can be used as one of the means, to foster peace and mutual welfare. Through decisions made at the level of scientists and with the involvement of the international community, particularly the developing South, will be a turning point in Russian-Georgian relations with the background of confrontations undergone.

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Diplomatic Challenges in Climate Change Negotiations: A Case of Caribbean Community (CARICOM) Region

Dianna Rajcumar*

Introduction

Climate change mitigation and adaption are the two measures agreed to at the COP 21 UN Climate Change negotiations to cap carbon emissions for limiting temperatures at 2 degrees celsius. The negotiations by developing countries for climate change with regard to adaptation under the financing clause with developed countries presents a diplomatic challenge to achieve political consensus under the United Nations Framework Convention on Climate Change (UNFCCC). This along with investment in greener technologies are the two outcomes of the Paris Agreement. This paper extrapolate this argument that the diplomatic challenge of climate change negotiations are fractured owin to the global dimensions of developed countries support for mitigation financing and developing countries negotiating for adaptation financing given that they are the net emitters in climate change, which transcends political borders. Secondly, the Paris Agreement has no enforceable mechanism under the UNFCCC nor COP 21 for developed countries to comply with the financing clause. Further, negotiations for climate financing is not formalised under the UNFCCC institutional framework for developing countries to fast track their *Nationally Determined Contributions* (NDCs) for implementing the 2015 Paris Agreement.

The paper structures the argument along the fractured climate financing negotiations between the developed and developing counties using a case study of the Caribbean Community (CARICOM) region as vulnerable Small Island Developing Sates (SIDSs); and their negotiating challenge to implement the NDCs in climate change adaptation, and their comparative advantage as against developed countries mitigation measures in achieving a collective outcome of 2 degrees celsius, in implementing the Paris Agreement.

* *Personal Assistant to the Minister Public Security, Guyana*

In the context of our argument for implementing the financing mechanism, Article 59 of the Paris Agreement, we will define mitigation policies, from a political point of view, "as addressing the causes of climate change" and "greenhouse gas emissions are indeed the primary cause of the acceleration of global warming in recent decades." In contrast adaptation practices aim to soften the consequences of climate change (Field et al, 2015: 9). The former is a preferred policy option of developed countries to deal with lowering carbon emissions and the latter is the policy alternative for developing countries to deal with the consequences of climate change, in particular vulnerable SIDSs (ibid). There are already difficulties in reaching the 2 degrees temperature target even with the Paris Agreement (2015).

Negotiations between developed and developing countries

The UNFCCC negotiations have evolved to reflect the changes in the national and economic circumstances of countries resulting in the Paris Agreement. But this shift is not parallel to the mobilisation of "climate finance which remained too mired in an increasingly antiquated North-South, developed-developing countries dichotomy." This fractured dimension affects countries diplomatic ability to negotiate finances for the mitigation and adaption process in implementing the Paris Agreement (Ha et al, 2016: 1). Mitigation is a global public good which affects the global populace. The largest five developed countries account for more than 60 per cent of global emissions which transcends political borders. Hence developed countries reduction in greenhouse gas emissions, should be shared by both developed and developing countries. But herein lies the dilemma because "developed countries are better prepared to cope with climate change and have stressed the importance of mitigation" to limit temperature to 2 degrees celsius (Field 2015). The preferred diplomatic practice is that "developed countries could receive credits towards their domestic targets by investing in lower cost emissions in developing countries" (Ha et al, 2016: 2). In this context the diplomatic challenge is that the cost effectiveness of mitigation measures exist but policies on adaptation are virtually new to the climate change agenda. The Paris Agreement created the Green Climate Fund (GCF), an institutional body to mobilise US 100 billion annually until 2020 for climate financing flow to developing countries, mostly for adaptation measures. However, it must be pointed out though that developing countries have historically contributed little to carbon emissions but are at the receiving end of the trans-border impact of climate change manifested in their economies by, inter alia flooding, hurricanes, droughts and landslides. In the context of this case study, CARICOM Small Islands Developing States (SIDSs) as a region has contributed less than 1 per cent of global carbon emissions. The diplomatic negotiating challenge for the region now is to secure adaptation financing from developed counties to invest in greener technologies such as afforestation to contribute to mitigate developed countries emissions by forests carbon absorption capacity, across political borders (Field 2016).

From an economic policy analysis, "greenhouses gas emissions are a negative externality. Gases expands through the atmosphere across political borders." Hence, developed countries emissions affect developing countries with no cost imposed on developed countries (Field, 2015: 9). The Paris Agreement has factored in this cost in the GCF for disbursement to developing countries who are historically net emitters. With reference to CARICOM SIDSs, they have been recognised by the UNFCCC as amongst "the most vulnerable countries in the face of the effects of climate change" given their vulnerability to the immediate impact of extreme weather and rising sea levels. But while they face serious diplomatic challenges in negotiating with developed counties, SIDSs have "been enthusiastic and contentious contributors" (Hoad, 2015: 2) to the COP 21 and predecessor climate negotiations.

The question is then, can CARICOM SIDSs implement the modalities of *Nationally Determined Contributions* (NDCs) given their resource constraints? CARICOM diplomatic agenda for adaptation to climate change includes reaffirmation of the contribution to Reducing Emissions from Deforestation and Degradation (REDD Plus) for mitigation efforts along with adequate incentives and institutional and financial support for implementation of REDD plus. The implementation

of climate funding requires government monitoring capacity and efforts made to maintain that forest be verifiable for financing of mitigation projects under international assistance and compensation. Poor infrastructure, market imperfections, and institutional barriers are impediments in financial transfers from the North to the South (Eyckmans 2016). CARICOM embryonic Caribbean Community Climate Change Centre (CCCCC) has managed to secure technical assistance from the UNFCCC for its climate change Strategic Plan. Financing through aid should lead to development growth and the outcome is ultimately dependent on the institutions and policies in developing countries. CARICOM institutional strength in negotiating for securing funding from the GCF for climate adaptation will require the diplomatic commitment made at COP 21 by developed countries (CARICOM Report 2016).

The Paris Agreement has no enforcing mechanism under the UNFCCC nor COP 21 for complying with the financing clause

The UNFCCC multilateral programme facilitates both developed and developing countries under the same forum for negotiating climate change mitigation and adaptation measures in COP 21 and its predecessor – Copenhagen Accord (2009) and COP 16 (2010). But climate financing is not enforceable in this institutional framework (Hannam et. al, 2015: 1). The resultant likelihood is that structured negotiations for climate financing, which is critical to developing countries NDCs to cut back on the trend of global warming, will be ad hoc; in addition to lacking an enforcement mechanism (ibid) for developed countries to comply with the financing commitment of GCF under the Paris Agreement.

The Paris Agreement (2015) Article 59 states that "the Green Climate Fund and the Global Environment Facility, the entities entrusted with the operation of the Financial Mechanism of the Convention, as well as the Least Developed Countries Fund and the Special Climate Change Fund, administered by the Global Environment Facility, shall serve the Agreement." There is consensus in principle but there is no obligation under the UNFCCC for developed nor developing countries to engage in climate financing (Ha, et. al, 2016: 1). While the UNFCCC has the institutional mechanism for climate financing, negotiations and capacity building for developing countries (Hannam, et. al, 2015, p: 3), the mobilisation of US $ 100 billion per annum was agreed to at in Copenhagen Accord (2009) and COP 16 (2010). Given this precedent and with no enforcement mechanism for climate financing in the Paris Agreement, the question remains as to what is the likelihood of developed countries honouring this commitment now (Eyckmans 2016).

The implication of this is the looming disaster if developing countries are not afforded aid to enhance adaptation policies in particular CARICOM SIDSs. Research hypothesis on the externalities of climate change consensus is clear: "The potential damage of climate change is most heavily concentrated in low tropical regions and low coastal states such as Latin America and the Caribbean" (Field, et al 2015, p.2). CARICOM, recognises this as an impediment for the region whose livelihood is under threat from the consequences of climate change and is now focusing its diplomatic engagement to secure adaptation financing from the GCF. From a cost-benefit analysis for project funding, CARICOM has a comparative advantage in conservation and management of forest which are large carbon sink. It has articulated its diplomatic challenge to secure aid assistance and compensation from the GCF in it mitigation contribution to the absorption of greenhouse gases globally, from developed countries. But its immediate need is to implement NDCs for adaptation to the vagaries of climate change even in the stark reality that its contribution to global warming is less than 1 per cent (CARICOM Report, 2016). The GCF aims to use public investment to stimulate private finance for climate friendly investment for low emission and climate resilient development. The GCF seeks to multiply the effect of its initial financing by opening markets to new investments. The GCF investments are in the form of grants, loans, equity or guarantees. **The first GCF Caribbean country project was launched in Barbados in June 2019** (Caribbean Community Climate Change Center, 2019).

An application was submitted to the Project Preparation Facility (PPF) of the ***Green Climate Fund*** *in order to enable Belize to develop and implement a bio-mass*

energy project, utilising an indigenous fast growing C3 perennial rhizomatous grass – **Arundo donax.**

This project aims to initially introduce a new high energy crop as a supplementary fuel for generation of electricity in Belize. Based on the outcome of the preliminary exercises, large-scale cultivation on a commercial basis for ongoing use and for expanded use elsewhere could be pursued.

A successful fossil fuel displacement project, albeit partial in scope, will represent significant progress towards Belize realizing its goals of becoming energy self-sufficient. Developing a commercial renewable enterprise based on the use of Arundo donax *could bring significant benefits to Belize and the Caribbean. The immediate benefits would be to stabilise power production from BELCOGEN, provide clean sustainable power throughout the year, create new jobs in the cultivation of* Arundo donax*, save foreign exchange by displacing imported Mexican power, increase energy security, reduce Belize's greenhouse gas emissions and reduce BEL's cost of power. The project will be implemented during a 15-month period, and total cost is estimated at US $739,700.00, with the GCF providing US $ 694,000.00* (Caribbean Community Climate Change Center, 2019).

Climate financing negotiations: A developing countries perspective

Climate finance is probably the most contentious issue in the UNFCCC negotiations. Its diplomatic discussions are fractured along a North-South distributional conflict, a zero-sum political game (Ha, et al, 2016: 2). One of the UNFCCC core objectives is to marshal resources for climate resilient economies. The mobilisation by developed countries of US $100 billion annually to finance mitigation and adaptation measures in developing countries has long been on the diplomatic agenda. This is in tandem with the new multilateral institution established by the Paris Agreement – the GCF for financing flows to developing counties. But herein lies the diplomatic negotiating challenge that "even if the money is mobilised and if the GCF and other institutions can effectively channel it, a wide gap remain between what is available and what is needed (Ha et. al, 2016: 1).

To close this gap, China opted not to participate in the GCF but to go via the route of South-South Climate Fund (SSCF), outside of the UNFCCC framework. China's policy move "represents further fragmentation in the institutions affecting the climate finance regime" (Hannam et. al, 2015, p. 2). This lack of coordination between developed and developing countries financing rules can adversely affect countries mitigation and adaptation measures to lower carbon emission and investment in greener technologies. Hannam, et al (2015) assert that for climate finance to best achieve its goals, diplomatic negotiations should be carried out under the UNFCCC framework for negotiating the rules on climate finance. The SSCF should be tracked within the UNFCCC framework to coordinate with "existing institutions to progressively green all financial flows" (Ha, et. al, 2016: 2). All countries engaged in climate finance should begin reporting their activities to the UNFCCC Standing Committee on Finance (Ha, et. al, 2016: 5).

It must be recognised that though, South-South cooperation is legitimised under the UNFCCC Framework, the UNFCCC should multilateralise its task and leverage its role as international coordinator for climate financing (Hannam et. al, 2015: 3). South-South cooperation for climate financing should be complementary to developed countries' commitment to mobilise US$100 billion in climate finance annually. The Paris Agreement (2015) Art. 65 states that "the institutions serving the agreement to enhance the coordination and delivery of resources to support country-driven strategies through simplified and efficient application and approval procedures and through continued readiness support developing country Parties, including the least developed countries and Small Island Developing States, as appropriate." For Latin America and the Caribbean region as a whole, the South-South Climate Finance Flow in 2013 amounted to US$ 3 billion (Ha, et. al, 2016: 3), but this cannot suffice the mobilisation of finances needed for adaptation measures given these countries increasing and immediate vulnerability.

The literature has underscored the ethical dimension of climate financing flows to developing counties from a procedural and distributional justice lens: "how climate finance may support an optimal

outcome, arguing that international adaptation transfers could help address the perceived unfairness with historical emission" (Eyckmans, 2016: 3). It is well established that SIDSs have contributed little or nothing to the climate change problem and while developed countries have "included absolute or economy-wide emission reduction" in their NDCs, SIDSs NDCs are in a "direct proportion to the precariousness of their plight" to the challenges of financial constraint and lack of technical capacity. Nonetheless, the issue of fairness is enshrined in countries NDCs and the GCF has provisions for the SIDSs climate conditional financing support for adaptation (Hoad, 2015: 2).

Synthesis

Are mitigation and adaption measures complements or substitutes? Can the reduction in the cost of one (adaptation) reduce the demand for mitigation? And or a reduction in the cost one measure will increase the demand for both (Eyckmans 2016, p.3). Given the existing literature and the negotiation outcomes of the Paris Agreement, it can be assumed that adaption measures in developing countries will reduce the demand for mitigation measures, since adaption as a tool to deal with the consequences of climate change is new to the climate agenda. This is because developed countries have been dealing with the causes of climate change through mitigation policies and adaption measures have only occupied the climate change diplomatic agenda in the last decade because of the recognition of the consequences on developing countries.

There is a school of thought which posits that the financing of adaptation and mitigation measures in developing countries (SIDSs) can encourage negligence on the part of developed countries to violate their NDCs. This is because if SIDSs are complying with afforestation and mitigation, which aid in the global absorption of greenhouse gases and there is no enforcement mechanism for countries such as China and the United States (US) if they violate their INDC (Eyckmans, 2016), this will present a challenge for implementing the outcomes of the Paris Agreement.

The polarised climate discussions between the North and the South has been abated by the South–South Climate Finance which emerged to fill this gap but there are diplomatic challenges on how the UNFCCC will coordinate the financing flow in the traditional climate fund from developed to developing countries. The diplomatic challenge is how to incorporate "China as the most active developing country providing active climate finance on a bilateral basis" within the UNFCCC framework (Ha, et. al, 2016: 4).

Conclusion

This paper has argued that climate change mitigation and adaptation are two measures emanating from the Paris Agreement (2015) but the diplomatic challenge in implementing the financing clause for policy action is inherent in the fractured climate financing negotiations between developed and developing countries.

Negotiations on climate financing are fractured along developed countries established policy practice of mitigation whereas developing countries policy advocacy is on the effects of climate change and conservation of forests to mitigate developed countries carbon emissions. Climate change adaptation policies are relatively new to the agenda and this has implications for developing countries institutional strength and negotiating ability to marshal climate finance from the GCF under the UNFCCC. Climate financing for developing countries including SIDSs adaptation measures is critical for ensuring limiting of temperatures at 2 degrees celsius because it has an absorptive capacity to abate greenhouse gas emission across countries borders.

The UNFCCC framework has facilitated developed and developing counties to negotiate mitigation and adaptation measures but there is no enforcing mechanism for compliance with the financing clause in the Paris Agreement. The mobilisation of US$ 100 billion climate change fund was agreed to in predecessor negotiations-Copenhagen Accord (2009) and COP 16 (2010) but has not materialised in substantial financial flows to developing countries. The implementation of this is questionable, given the set precedent. Vulnerable SIDSs are affected the most by rising temperatures from climate change and has a

comparative advantage for climate funding in adaptation measures to soften the consequences felt in their economies and for the conservation and management of forest.

Climate finance has emerged as the most contentious issue in the UNFCCC climate change negotiations fractured along the distribution of developed and developing countries but the GCF has emerged to aid climate financing to developing countries. China has spearheaded the SSCF to close the financing gap with climate financing flows to developing counties but this funding regulation is outside of the UNFCCC and is not coordinated with the GCF. The lack of coordination in the climate funding can adversely affect SIDSs in implementing their NDCs contribution to the climate change phenomenon.

Studies are is needed to explicate policy formation and analysis in climate financing, especially in adaptation policy measures since they are new to the policy agenda; and the implications of distributional justice for vulnerable SIDSs who have historically contributed little to global warming but yet face challenges in accessing the GCF. In fact, climate financing in adaption measures is probably the most immediate policy action to realise the 2 degrees celsius temperature limit given that forests have an absorptive capacity to mitigate carbon emissions.

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Science Diplomacy and Development in Honduras: Policies and Practices

Karina Elizabeth Aquino Valle*

Introduction

It is a fact that Science Diplomacy (SD) has increasingly acquired more relevance today, even though, *Science Diplomacy is not new – it has a long history, since the end of the Cold War* (Amb. Saurabh Kumar, 2011). *Science Diplomacy is the use of scientific collaboration among nations to address the common problems facing the 21st century and to build constructive international partnership. There are many ways that scientists can contributes to this process*. (Fedoroff, 2009, p. 15).

The relationship between science and diplomacy can be articulated as three concepts– diplomacy for science; science in diplomacy; and science for diplomacy (or simply "science diplomacy"). Within this framework, science is considered in its broadest sense to encompass not only scientific research but also the whole range of international scientific cooperation activities including education and capacity building, as well as the people involved in the enterprise, who care involved in these activities. There is an association between science and international cooperation, in fact, one of the areas is Science in diplomacy, that provide enough knowledge and understanding regarding Science and Technology, required to equip international decision-makers. In looking at current challenges, such as those related to global health, climate change, weapons proliferation and economic growth as well as innovation, it must be acknowledged that science, technology and knowledge have a central role to play in providing possible solutions.

Since 2010, Honduras has been making efforts regarding the promotion of innovation in the country and increase Science in Diplomacy, in support with International Cooperation and the research community. As a first step, the National Planning System of Honduras established a regulatory framework which includes a Country Vision (2010-2038) and

* *Coordinator/ Second Secretary, Ministry of Foreign Affairs and International Cooperation, Honduras*

the National Plan (2010-2022), under the Legislative Decree No.286-2009, which constitutes one of the most notable efforts of public management, model based on a planning system with long-term vision and based on the commitment of various sectors of the country (Government of Honduras. 2009).

The 'Country Vision' integrates four (4) national objectives for 'a Honduras, without extreme poverty, educated and healthy, with consolidated social welfare systems; that develops in democracy, with security and without violence; a productive country, generating opportunities and jobs, that sustainably uses its resources and reduces its environmental vulnerability; and a modern, transparent, responsible, efficient and competitive country' (National Planning System 2009).

The consolidation of these objectives includes transversal topics talking about cooperation programmes and projects. In this matter, Honduras is also highly committed with the implementation of the Agenda 2030 for Sustainable Development. As a result of this process, it presented the first Voluntary National Report (VNR) on the High-Level Political Forum in 2016, and will present the second VNR in 2020. In this endeavour, international organisations, NGOs and private sector have been working together with the government of Honduras, in order to align the SDGs with the National Planning process. The United Nations System, through programmes and projects, coordinated by government of Honduras have worked together to operationalise the United Nations Development Assistance Framework (UNDAF). The framework facilitates in integrated actions to design a road map, based on a country analysis and important international aspects, like the Paris Declaration to make Development Co-operation More Effective (United Nations 2017)

Honduras, as a signatory of the Paris Declaration and member of the Global Alliance for Effective Development Cooperation (AGCED), has participated in the different monitoring rounds that seek to measure progress in effective implementation of the agreed cooperation. The fulfillment of these commitments depends on the country as well as the cooperating partners and other development actors. The two previous rounds of assessments, have reported some progress of the country related to alignment with the principles of the agreement (United Nations 2017). Honduras is strengthening the international scientific cooperation to build national capacities; some of them include bilateral cooperation with Canada, and multilateral cooperation, facilitated by the United Nations and European Commission, for creating the first National Cooperation Management Platform (PGC).

The use of country systems allows development programmes to be integrated better with expenditure plan, reducing duplication of effort and increasing positive effects of development cooperation, in terms of resources and the sustainability of activities as well as outcomes. At the same time, it must facilitate new relations with different actors, to increase national capacities, with the support of bilateral and multilateral alliances as well as development banking (Finance for Development Forum. 2019).

Science and Innovation in Honduras

The President of Honduras, Juan Orlando Hernandez launched the National Vision in 2009; He asserted: '*That we need a modern, transparent, responsible, efficient and competitive country….'* (National Planning System, 2009). *As quoted by Fedoroff (2009, P.5):*

"International scientific cooperation motivated by advancing science and is typically a win-win proposition, with private sector or civil society partners collaborating to produce, for example, better medications, cleaner water, improved hygiene or more disease-resistant crops"

The government recognises the need to promote, guide and encourage scientific, technological and innovation advancement, to formulate medium and long-term plans that boost the economic and social development of the country. For this reason, There were establishment of the National System of Science, Technology and Innovation - SENACIT, and consequently, the Honduran Institute of Science, Technology and Innovation – IHICIETI, (La Gaceta. 2014).

As rightly stated, the central purpose of science diplomacy is often to use science to promote a state's foreign policy goals or inter-state interests (Fedoroff., 2009). The institution, IHCIETI drives the efforts

of promoting, developing and strengthening the structure of Science, Technology and Innovation Systems of the country, through steering the regulatory framework. The vision of the institute reflects and encourages the grow and foment science and Technology, by financing studies and research; incentives such as awards, scholarships, grants, or any other recognition are given that boost scientific production, technology and innovation.

The institute is also committed to promote the culture of scientific research and technological development in the country, and support the applied research with the aim to find out optimal solutions to general problems that are facing society (HICIETI 2019), with this in mind, it foments interest of young Honduran students and scientists, and they are encouraged to participate in the promotion of the science in the country.

In the light of all this, some successful case studies can be enlisted that have been under development since 2014. For example, the Photonic cranial-spinal neuronal regeneration system (2014), the Implementation of an automated center based on CAD design and 3D printing (2014), study of the photonic band of neuronal regeneration and construction of a new prototype (2014), Construction of water harvesting prototypes in the semi-desert area of the El Paraíso department, municipalities of Texiguat and Liure (2015), Creation of Virtual and Mixed Reality Laboratory (2016), "Robotic Vehicle Recognition and Support for Firefighters and Bomb Squad" (2016), Use of Bacteriophora Heterhorabditis for the Biological Control of Pine Bark Weevil Dendroctonus Frontalis (2016), Design and Construction of Devices for Disabled Mobilization (2017), Platform for Administration and Control of Hospital Processes in Honduras (2017), among others (General Coordination Secretariat of Honduras. 2019).

Financing research projects with the purpose to foster the promotion of national talents is a task that the institute gives year by year, through the organisation of an important general Call for applied to Research Projects that generate knowledge to enrich the country's scientific area, according national policies and it brings real solutions to the country problems. With the purpose of focusing the efforts of the government, the institute has developed prospective studies and it has determined five important areas necessaries to foster the technological and innovation development in the country: Materials Science, Energy and Environment, Electronic, Information Technologies and telecommunications and Biotechnology.

On the other hand, the institute works with international cooperation in order to establish portfolios of projects given by private and public sector for development scientific and technological area and mobilise national and international resources for financing science and technology actions. Throughout this time, the government of Honduras has invested around US$ 230,000.00 in six launched Calls for scientific projects proposals.

Technological Progress and Governance

In accordance to the SDG 16 for peace, justice and strong institutions, Honduras' commitment to implement the principles of Transparency and Accountability of International Cooperation and its participation in the International Aid Transparency Initiative (IATI). The country has strengthened the Cooperation Management Platform (PGC), which allows the management of cooperation to be made visible through the registration, monitoring and referencing of projects. Since 2011, the government of Honduras has been making efforts in this field. It initiated the investigation in the development of instruments for external transparency.

To begin, Honduras hired the company Development Gateway (DG), in order to map the technological challenge of the country, based in the Declaration of Paris of 2005 on Aid Effectiveness. It started a communication with the representatives of the United Nations Development Programme (UNDP), who had already financed the implementation of the Platform in other countries, which consists of three stages: Diagnosis, Implementation and Institutional Support. The project was successful, with the support of, the government of Canada, European Commission (EC) and the United Nation Development Programme (UNDP). The National Cooperation Management Platform promotes effective management of

development cooperation through the strengthening of dialogue and coordination among the actors involved in the management, administration, monitoring and evaluation of international cooperation funds.

Honduras as a member of the Global Alliance for effective cooperation for development, is the impeller of the principles that emanate from this alliance, ensuring that through the PGC, the principle of Transparency and Accountability is transferred to the National Plenary, including Official development assistance, as well as other cooperation modalities such as the Private Sector, South and Triangular. The PGC is beneficial for the country by providing transparency, efficiency, coordination, easy of analysis and decision making. The PGC also seeks to strengthen the capacity of the government, to align international assistance with country priorities and improve coordination and harmonisation among cooperators.

Honduras has accumulated and developed a set of lessons, experiences and knowledge in different sectoral areas, achieving willingness to share with other countries which have similar development conditions, geographical location, challenges and expectations. The thematic priorities of the projects reflected on the PGC are: Health, Education, Environmental Protection, Drought, Disaster Prevention, Security, Human Rights, Infrastructure, Science and Technology, Agro Development. All of these projects are developed by the private sector, whether based on their corporate social responsibility or as foundations, churches, Academies and / or Civil Society Organisations' in the country's development through the strengthening of communication channels and coordination with the public sector. The international cooperation in Honduras is moving forward with the active participation of different actors. It is achieving transparency and innovation, applying the IATI standards for Programmes and Projects at various stage of development cooperation (financing, implementation Etc.). There are currently 1,491 projects entered into the PGC, related to science and technology and allied areas.

Conclusion

Despite the progress we have made in recent years, much remains to be done. This includes challenges such as security, human rights, migration, gender equality, elimination of discrimination, and environmental sustainability, which are not unique to our country. However, our challenges are a part of the global agenda and have been identified and included in the Global Alliance. It is important to mention in this context that the qualification of Honduras as a low-middle income country is a recognition of our progress towards international and national priorities. It also places us in a narrower category of access to traditional cooperation.

To move ahead in this direction, the Addis Ababa Agenda for Action on financing for cooperation was adopted and the possibility of partnerships are being explored as per the Agenda. The country will develop financially, improve the national fiscal framework, expand the territorial vision of development, generate greater internal capacity in the public-private sectors, and incorporate ODS, among other benefits, which would boost science, technology and innovation in the country. With the implementation of The National Cooperation Management Platform, alternatives are being drawn to fulfill the aforementioned objectives.

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German-Indonesian Cooperation for Protection of Environment Ecosystem in Indonesia

Hardi Alunaza*

Introduction

Cooperation in the fields of science and technology that Germany has fostered with Indonesia is a long history in the course of history. This collaboration began when the German government established the Federal Ministry of nuclear which later changed its name to the Federal Ministry of Education and Science in 2005 (Alunaza, 2015). This cooperation can be realized because of the bilateral relations that are well established between the two countries and the role played by B.J Habibie who at that time served as Minister of Research and Technology and Head of the Agency for the Assessment and Application of Technology. In addition, personally Habibie also has a personal closeness with Germany as he studied at the Technische Hochschule Aachen universities in Germany in 1960. The cooperation in science and technology between Indonesia and Germany is based on national development value that was declared by the President of Indonesia in 2011.

Cooperation in the nuclear field is what later developed and became the basis for the first of cooperation in the field of science and technology in which the scope covered is broader. Henceforth, nuclear development cooperation is incorporated into the framework of science and technology cooperation. The cooperation agreement between Indonesia and Germany was signed on March 20, 1979 (Ministry of Research and Technology, 2014). This collaboration aims to conduct and develop research together. Both parties will equally contribute to scientific involvement as well as those related to budgetary needs. This collaboration is related to marine research and technology, energy research and technology, aerospace and space research and technology, earth science, social science and humanity, appropriate science and technology to provide basic needs for industrial development, information and scientific documentation.

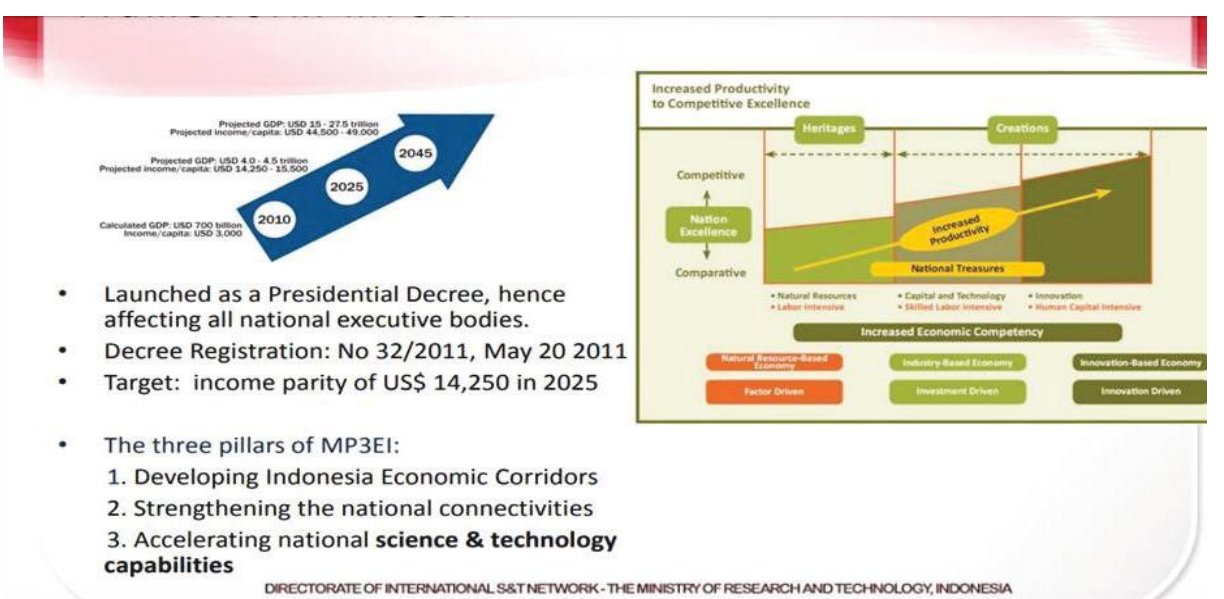
* *Lecturer, Department of International Relations Universitas Tanjungpura and currently work as International Relations Officer Universitas Muhammadiyah Pontianak, West Kalimantan Indonesia.*

From 2000 to 2009 there were several new programs developed by the two countries. The program includes SPICE (Science for the Protection of Indonesian Coastal Ecosystem) which is a preliminary study to design a master plan for Indonesian marine, tsunami early warning, geothermal research, and research evaluation of technological sciences for development. Germany's decision to develop scientific and technological cooperation was originally inseparable from the Asia Concept 2002 published by BMBF in June 2002. This concept was compiled because Germany saw Asia especially Indonesia as the most important region from a political, economic, and scientific and technological perspective (Ministry of Research and Science Germany, 2010).

Germany believes that cooperation with several countries in Asia, especially Indonesia, is becoming increasingly important. Germany has made the internationalisation of science and technology with four main objectives (Klode, 2011). First, strengthening collaboration in research and technology with global leaders. Second, the exploitation of the potential for international innovation. Third, intensification of long-term cooperation with developing countries in the fields of education, research and development. Fourth, assume international responsibility and to master global challenges.

Indonesia plays an important role in protecting of global environmental goods such as global climate and biodiversity, not least because of its huge forest areas. Since a large proportion of greenhouse gas emission is released as a result of the destruction of tropical forests, Germany provides assistance to the Indonesian government in implementing forestry reforms that facilitate sustainable forest management such as through the establishment of social forests. Within this priority area, Germany also provides advisory services to the Indonesian government on how to adjust its climate change mitigation policy and how to implement climate action plans. New projects aim to support national reform towards sustainable agriculture value chains and peat land management and rehabilitation of environment in Indonesia.

Bilateral contracts in the earth and ocean research have been in place since 1980s and 1990s, when joint marine geological and geophysical investigations were carried out on the German research vessel SONNE in Indonesian seas. Based on these contacts and the subsequent renewed interest in Indonesia and Germany to intensify and expand the cooperation, a bilateral workshop was held in Hamburg in 1998 to exchange ideas and explore themes for further cooperation. Following this workshop, a bilateral steering committee was established in 2000.



At its first meeting in Jakarta, the Steering Committee for Earth and Ocean Sciences decided to jointly develop a 10-year action plan for cooperation. The plan was developed by Indonesian and German scientists as well as Indonesian alumni of German universities active in the field of earth and ocean research through a series of meetings beginning with a scientific conference and DAAD alumni seminar held at Purwokerto in 2001. The action plan formed the basis of the SPICE (Science for the Protection of Indonesian Coastal Ecosystems) Program which was approved in 2003 and being implemented since then (Glaeser and Glaser, 2010).

SPICE I provided significant information on the structure and functioning of coastal ecosystems, covering mangroves, coral reefs, coastal pelagic systems and peat swamps and on their alterations due to human interventions. Based on the information and experience gained in the first phase, the focus on natural sciences was complemented by social science during the second phase (2007-2010), aiming to better understand the social dimension of coastal ecosystem changes and to improve the links between research and decision making.

Following two phases of successful bilateral cooperation the research program has been continued in 2012. For the third SPICE phase six interdisciplinary research topics were jointly agreed by the German and Indonesian research team. In some of the topics the research which formed the basis of the SPICE Program during the first two phases will be enhanced on a wider approach, some alignments like potentials for renewable energies and natural and anthropogenic induced environmental changes during the past 4,000 years have been newly affiliated according to their actual relevance in Indonesia. During its implementation, the SPICE-Program has created a bilateral team of scientists dedicated to coastal and marine research and contributing to implementing national marine research and development as well as higher education priorities in Germany and Indonesia. The program also makes substantial inputs towards fulfilling regional and international obligations of the two countries as entailed in international conventions and treaties.

Indonesia-Germany Bilateral Cooperation in Science and Technology

Science and technology cooperation is one form of cooperation that has been maintained by the two countries since the opening of bilateral relations between the two countries. This shows the relevance of the cooperation carried out in Indonesia to illustrate the need for assistance between one country and another. Diplomatic relations between Indonesia and Germany have also been opened since 1952. This relationship shows that both parties have a good and trustworthy relationship. At present there are less than 250 Germany companies doing business in Indonesia.

Indonesia is a priority country in German development cooperation. This development cooperation is an instrument of development policy compiled by the Federal Ministry for German cooperation and development. When viewed from

Table 1: cooperation project between Germany-Indonesia from 2000-2009

No	Project	Sum
1	SPICE	5.500.000,00 €
2	Biotechnology	3.280.000,00 €
3	STORMA	3.700.000,00 €
4	Tsunami early morning system	55.000.000,00 €
5	Geothermal	8.800.000,00 €
6	Geo-technology	1.300.000,00 €
7	Integrated water resources management	6.000.000,00 €
8	Periscope study	3.000.000,00 €
9	International cooperation	2.533.000,00 €
	Total in Euro	**87.113.000,00 €**

Source: Statistisches Bundesamt (2009) p. 19

an economic and political point of view, Germany has considerable interests in the Asian region, especially in Indonesia. These interests can be seen in the task of Germany foreign policy document issued at the Ministry of Foreign Affairs office in Berlin in May 2002. The document states that the Asia Pacific region with the number of countries in it, its economy and culture, achievements in the field of science and technology and its market potential. That was what later a prominent feature became in German foreign policy.

In cooperation with science and technology with Indonesia, Germany provides assistance in the form of grants in the form of goods and services in the context of project assistance where the source of funds in this scheme does not need to be returned by Indonesia (The European Union and Indonesia, 2006: 86-88). An example of this assistance scheme is the cooperation in the development of tsunami early detection equipment, in which Germany donated some tools and technical assistance for the development of these detection devices in Aceh and Nias after the 2004 tsunami. Another grant scheme provided by Germany is the provision of experts to implementing a cooperation project in Indonesia. The scope of the consultant's work is adjusted to the ongoing cooperation scheme. Other grants given by Germany to Indonesia are training exchanges of researchers both from Germany and those from Indonesia.

Germany has put development issues high on its agenda. Germany makes poverty reduction a top priority in the 2015 Program Action. The contribution of the German Government in halving extreme poverty in the world. This program defines global poverty reduction as an important element in all government political policies and (main) goals of development cooperation.

In 2005 Germany provided tools to improve the urban water supply system, thereby reducing health risks from illness in the Department of Settlement and Regional Infrastructure, PDAM Bengkulu. In 2002-2004, through accompanying measures for the operation of the water treatment installation and distribution network sector in order to contribute to adequate water supply in the Department of Settlement and Regional Infrastructure, PDAM Palembang. And 2001-2005 in NTT by ensuring a sustainable supply of clean water for residents in five districts in the province of East Nusa Tenggara

Bilateral cooperation between Germany and Indonesia in the fields of education and science and technology can be seen in the cooperation that took place between German and Indonesian universities. Like research and education cooperation. The German Academic Exchange Service and the German Embassy in Jakarta play an important role in the collaboration between the universities. Similarly, cooperation in the fields of science and technology is coordinated by the Federal Ministry of Education and Research in collaboration with the Indonesian Ministry of Research and Technology.

In the fields of science and technology there is a significant increase in the amount of cooperation assistance. If in the first 20 years the field of cooperation was carried out in eight fields, then in the period 2000 to 2009 there were 13 cooperation focuses. Such as cooperation in the field of biotechnology that aims to develop technology in the industry both in Germany and in Indonesia. Then a preliminary study to design a maritime master plan that aims to develop Indonesia's marine potential by mapping the current potential, both in terms of the potential of sea transportation, fish cultivation. Germany contributed by sending experts to design the master plan.

Principles of Germany and Indonesia Bilateral Cooperation

In the study of increasing scientific and technological cooperation assistance conducted by Germany and Indonesia can be carried out on four ethical principles. First, the principle of security. Germany is known by the world community with advanced and sophisticated technology. Sophisticated technology that can sustain the German economy. The German government made a policy strategy on the direction of national technology to be achieved. One such strategy is the Asia Concept 2002. This concept explains that Germany sees Asia as the most important region from a political, economic, and knowledge and technology perspective. Germany believes that cooperation with certain countries in Asia is becoming increasingly important.

Second is economics. Collaboration between research institutes and several countries is a prerequisite for the development of innovation to open new markets. Third, political interests. Germany accepts its international responsibilities in bilateral cooperation in education and research. The collaboration contributes to overcoming global problems and economic, social development for cooperation partners.

Through this cooperation, Germany will be appreciated by the cooperation partners from several countries, especially Indonesia. Because the technological advancements owned by Germany, enable Indonesia to continue to use these technological advances. This was done by Indonesia in order to save on expenses compared to buying technology products at lower prices but of lower quality. Thus, Germany sees the importance of increasing cooperation in the field of science and technology with Indonesia.

By increasing cooperation in the fields of science and technology with Indonesia, Germany gained the intensity of cooperation projects between the two countries and indirectly, cooperation between the two countries will increase. Thus, researchers from Germany will continue to have the opportunity to continue to develop research which in turn will give birth to new research results facilitated by the government and will give birth to new products according to market needs.

In the Indonesian-Germany Development Cooperation document issued by the German Embassy in Jakarta in 2002 it was stated: "*There are numerous motives for granting development assistance. Primarily, the moral obligation towards those who are disadvantaged in our One World. Furthermore, there are objectives in the common interest of Germany and its partners such as a long-term prospect for peace and stability based on prosperity of all nations. The latter is of crucial importance for Germany's export-oriented economy. The preservation of vital natural resources is another issue of global significance.*"

Conclusion

The collaboration between Germany and Indonesia aims to develop research together. The collaboration between Germany and Indonesia refers to the Asia Concept 2002 with four objectives. Namely, strengthening cooperation, exploiting potential and innovation, intensifying cooperation, and mastering global challenges. Germany's national interest in working with Indonesia is seen in the Task of Germany Foreign Policy. Germany sees that Indonesia has great potential to develop the country's technological progress. The cooperation program can be seen from the assistance provided by Germany to Indonesia in the form of an early detection tool for the tsunami disaster after the 2004 Aceh and Nias tsunami tragedies. In addition, assistance was also provided to improve water systems in the urban PDAMs in Bengkulu, Palembang and East Nusa Tenggara. Indonesia was also given assistance in the form of an Expert Assistant to develop cases in the field of technology research. This can be seen from the experts provided by Germany for the development of marine potential in Indonesia.

In the Indonesian-Germany development cooperation document, it is stated that Germany has a moral obligation by helping disadvantaged developing countries. That's because Germany has a mission to maintain peace and stability in the country's economy. Furthermore, cooperation with Indonesia has its own advantages for Germany. The profit is divided into three motives, environmental security, economy values, and politics.

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Hydropower of Kyrgyzstan: Opportunities for Cooperation

Zhumagul Beketaeva*

Introduction

It is impossible to imagine a modern world without electricity. It is the basis for the development of industries, characterises the progress of people, social production. Electric energy is present in all spheres of life: science, technology, industry and agriculture, in transport, in everyday life. Without electricity, work in various fields stops. The work of modern communications, various gadgets is based on the use of electricity. Electricity provides a comfortable life for a person. In general, we can say that the electric power industry is the basis of the economy.

The structure of the electric power industry consists of coal, oil, gas, nuclear power plants, hydroelectric power stations (alternative energy sources). Kyrgyzstan does not have sufficient oil, gas and coal resources, and the available resources are located in remote climatic and mountainous areas. At the same time, Kyrgyzstan has sufficient water resources, as located in the headwaters of the Syr Darya River, the largest river in Central Asia. Hydropower in Kyrgyzstan is predominant, it produces more than 90 per cent of electricity (UNDP, 2015). This is due to the existing energy potential of the country. Of the 18 power plants operated in Kyrgyzstan, 16 are hydropower plants, 2 Thermo-Power plants are located in Bishkek and Osh.

Based on the fact that the power industry is the basis of the economy, and water resources are an important natural wealth of Kyrgyzstan, the prospects for the development of the country's economy and cooperation at the regional level depend on the effective use of this resource. For over 20 years at various sites and levels, it has been stated that hydropower is a strategic industry in Kyrgyzstan and has export potential. The urgent question remains about what opportunities for the development of cooperation at the present stage are available in the hydropower industry of Kyrgyzstan.

* *Research Officer, National Institute for Strategic studies of Kyrgyz Republic, Kyrgyzstan.*

Hydropower Resources

"El bash bolboy, suu bash bol" translation "Do not be at the head of the people, but be chief at the source of water / at the head of water". (Kyrgyz proverb)

One of the cheapest and environmentally friendly sources of electricity is water energy. One of the features of hydropower resources is their renewability, therefore, the electricity generated at hydroelectric power plants is cheaper than the electricity received at thermal power plants. Another positive point is that hydroelectric power plants are characterized by a faster payback than thermal power plants and create an energy base for the development of other sectors of the national economy.

Kyrgyzstan is a country with significant water resources. A feature and advantage of Kyrgyzstan in Central Asia is that the water resources of Kyrgyzstan are fully formed on its territory. The country has significant hydropower resources, which is one of its main wealth.

There are more than 2000 rivers in the country, the length of which exceeds 10 km, their total length is almost 35 thousand km. A significant amount of water is concentrated in the country's water bodies (lakes, shallow ponds, reservoirs). The total area of water resources is 6836 square meters. km Lakes are mainly located in the highlands - 3-4 thousand meters above sea level.[1]

The State Agency for Water Resources under the Government of the Kyrgyz Republic regarding the hydropower potential provides the following data: "The hydropower potential of rivers is about 174 billion kW. hour, and power - 19.8 million kW. Huge volumes of water resources are concentrated in 6580 glaciers, whose reserves are about 760 billion cubic meters." (Government of Kyrgyzstan, 2020).

The expert on water resources in Kyrgyzstan V. Kasymova provides the following data on water resources: "In Kyrgyzstan, the total river flow is 47.2 km3. Explored and approved fresh underground water reserves of 34 deposits are equal to 3.5 km3 per year, but their potential reserves are 13 km3. The country uses 20 per cent of the surface water resources formed on its territory. More than 80 per cent of the flow is transit and flows to the underlying basin areas in Uzbekistan, Kazakhstan, China and Tajikistan. At the same time, Uzbekistan uses about 50 per cent of transit flow. To regulate the flow of transboundary rivers Chu, Talas, Naryn, Ak-Bura, Karadarya, 18 large reservoirs were built. The regulated river flow is 23.5 km3, or 47 per cent of the surface water resources."[2] These data indicate the availability of sufficient water resources for the development of hydropower in Kyrgyzstan and the possibility for further development.

The main hydropower resource of Kyrgyzstan is the flow of rivers that begin on the territory of Kyrgyzstan. As noted, water resources formed on

Table 1: Hydrolectric Power stations in Kyrgyzstan

Name	Installed capacity, MWt	Available capacity, MWt
Toktogul hydroelectric station	1200	1200
Kurpsay hydroelectric station	800	800
Tash-Kumyr hydroelectric station	450	450
Shamaldy-Say hydroelectric station	240	240
Uch-Kurgan hydroelectric station	180	175
At-Bashy hydroelectric station	40	37
Kambaraty hydroelectric station-2	120	100
Small hydroelectric stations – 12 шт.	42	30
Thermo-Power Plant (TEPP) of Bishkek	666	520
Thermo-Power Plant (TEPP) of Osh	50	35
Total	3788	3587

Source: Author's own compilation.

the territory of Kyrgyzstan exceed the amount of own consumption. If you look at the structure of water use, it looks like this: about 90% is spent on the needs of irrigated agriculture, about 6 per cent - on the needs of industry, less than 3% on the water supply of the population. Forestry and fisheries, energy and the service sector together use up to 1% of total domestic water consumption.

The total capacity of Kyrgyzstan's power plants is 3,788 MWt, including 19 hydroelectric power stations with a total capacity of 3,071 MWt and 2 thermal power plants with a total capacity of 716 MWt[3]. (Table 1)

This tables show that the available technical capabilities fully satisfy the needs of the country. There also remains some excess of generated electricity, which in different years has been exported to neighboring countries (Kazakhstan, China, Uzbekistan).

Challenges and Opportunities

Despite the existing hydropotential of the country, which could have a positive effect on the development of the country's economy, Kyrgyzstan did not fully feel the effect of its natural resource. The situation in the hydropower industry requires a serious decision. Actual issues in the hydropower sector include the following areas:

1. Natural. One of the problems is the dependence of this industry on one source and the water level in the river. Naryn (Syrdarya river), water accumulation in the Toktogul reservoir.

2. Technical and technological. There are high losses and depreciation of equipment in the industry, as well as a lag in the use of innovative technologies.

3. Economic. Energy tariffs do not cover the costs of energy companies and the lack of own funds for modernization.

4. Management. One of the significant problems is the issues of state regulation of the energy sector.

5. Threats to energy security.

6. Political. The annual change of government, the events of 2005 and 2010, when there was a change in the top political leadership, all this negatively affects the investment climate of the country and does not contribute to attracting investment in the country's hydropower.

It is also worth noting that there are opportunities for its development in the hydropower industry of Kyrgyzstan. So one of the areas often mentioned by experts is the prospects for the development of small hydropower plants, renewable energy sources.

In order to increase exports and increase the level of energy security of the country, it is advisable to encourage the construction of small and medium-sized hydroelectric power stations with sufficient hydropower potential. For this, investors may be involved. For example, the Kirov hydroelectric station in the Talas region, the Papan hydroelectric station in the Osh region, the Tortkul hydroelectric station in the Batken region. Such hydropower plants can be attractive because reduced costs required for the construction of hydropower plants, which requires less investment.

In addition, it is possible to use micro-hydroelectric stations. In Kyrgyzstan, micro-hydro power plants of various capacities were used to generate electricity; Envod JSC. The data were used not only in Kyrgyzstan, but also in other countries (Georgia, Kazakhstan, Tajikistan, Cuba, Mongolia). Energy experts make calculations that, when using the energy of small streams throughout the country, can provide an additional estimate of 5-8 billion kWh of electricity.

Those the completion of the existing hydropower plants and the commissioning of small hydropower plants, with appropriate investment, will help expand the country's hydropower capabilities.

Areas of Cooperation in Projects

At the present stage, the hydropower industry of Kyrgyzstan is implementing projects in the following areas: to increase generating capacities (Rehabilitation of the Toktogul HPP –2023, commissioning of the second unit of the Kambaratinskaya HPP – 2 –2021, etc.) and projects to ensure reliable power supply and reduce losses (CASA 1000 - 2022, etc.).[4]

Along with the implementation of large projects, the conditions for the development of small and medium-sized hydroelectric power stations on

small rivers are also increasing. The resources of small rivers in Kyrgyzstan are mastered only by 3 per cent, and this is an attractive niche for realizing investment opportunities. There are some concessions for investors who have invested in the electricity sector of Kyrgyzstan, since since 2017 a simplified procedure for obtaining an investment visa has been in force. Also, a relatively liberal legislative framework has been created in the country regarding the protection of the rights of foreign investors; privileges may be provided in accordance with state programs and development projects.

In Kyrgyzstan, 7 regions and two industrially developed cities (Bishkek and Osh) are connected by heating and electric networks, which form the country's electric power system. The Kyrgyz energy system has the ability to produce, transport, distribute electricity both domestically and export, import to neighboring countries, participate in covering the power shortage and cover peak loads in the energy systems of Central Asian countries.

Experts note that Kyrgyzstan occupies a strategic location between the CIS and the Asia-Pacific Economic Community, representing one of the main transit routes through the Central Asian corridor. Since independence, Kyrgyzstan has managed to build mutual relations not only with the countries of the region, but also with non-CIS countries.[5]

One example of cooperation is the CASA-1000 project. This is one of the priority projects aimed at exporting clean energy from Central Asia to South Asia in the summer. The project provides for the construction of a high-voltage power line connecting the energy systems of Kyrgyzstan and Tajikistan with Afghanistan and Pakistan. Upon completion of the project, electricity will go from the Kyrgyz Republic to Tajikistan (477 km), and from Tajikistan to Afghanistan and Pakistan (another 750 km).[6]

Indo- Kyrgyz Cooperation in Hydel Projects

In 2019, Mr. Chingiz Azamatovich Aidarbekov, Foreign Minister of the Kyrgyz Republic, on his first ever official visit to India, met Indian External Affairs Minister. The two Ministers held wide-ranging discussions on bilateral, regional and multilateral issues of mutual interest. During the meeting, Kyrgyzstan sought India's assistance to build hydel projects besides other sectors (The Economic Times, 2019).

Conclusion

Kyrgyzstan has sufficient reserves for the production and provision of water resources for its needs. However, the country is currently experiencing certain technological and financial difficulties and is not fully utilizing its potential. Moreover, when implementing projects to modernize existing and develop small hydropower plants, some of the generated energy can be exported to neighboring countries (Kazakhstan, China, Tajikistan and Uzbekistan). The cooperation with India on the development of hydel projects in Kyrgyzstan will help in utilizing the huge hydropower potential of the country.

Endnotes

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2 http://rudmet.net/media/articles/Article_MJ_08_16_pp.37-41.pdf

3 https://www.unece.org/fileadmin/DAM/project-monitoring/unda/16_17X/E2_A2.3/NSEAP_Kyrgyzstan_RUS.pdf

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Case Studies of Science Diplomacy in Indo-Mauritian Collaboration

Ruvina Seebun*

Introduction

Mauritius, officially the Republic of Mauritius, is an island nation in the Indian Ocean about 2,000 kilometres off the southeast coast of the African continent (Wikipedia, 2020). Mauritius has an upper middle income economy which is ranked 13th worldwide out of 190 economies in terms of ease of doing business in the World Bank's 2019 Ease of Doing Business Index (World Bank, 2019). The country has built its success on a free market economy. According to the 2019 Economic Freedom of the World report, Mauritius is ranked as having the 9th most free economy in the world (Fraser Institute, 2019).

Mauritius has very strong and friendly relations with India for both historical and commercial reasons and it is worthy to note that the connection between the two states dates back to 1730. Diplomatic relations between India and Mauritius were established in 1948, well before Mauritius was declared Independent in 1968. Mauritius maintained contacts with India through successive Dutch, French and British occupation. Around half a million of Indian indentured labourers were brought into Mauritius between 1834 and early decades of the 20th century, and out of them about two thirds settled permanently in Mauritius (High Commission of India, 2018). At present, around seventy percent of the Mauritian population is of Indian origin.

Starting from the time of the accession of Mauritius to the status of an independent nation to the present day, the contours of the special relationship between the two sovereign states have been defined by the changing socio-economic and political developments in the two countries as well as in the global politico-diplomatic arena. This is not to say that there have been any significant changes every time an alternative political regime has been elected to power in the two democracies. Indeed, it is quite remarkable how changes in governments in India have had very

* *Second Secretary, Ministry Of Foreign Affairs Regional Integration And International Trade.*

little impact on the relationship between the two countries.

While the two countries have maintained their special relationship through thick and thin, it is the content of this relationship which has really been conditioned by the evolving nature of their internal socio-political progress as well as the fundamental and epoch-marking changes in the global environment.

The latter part of the 20th century has witnessed huge evolution from the bipolar world of the Cold War era and the unleashing of globalization and its neo-liberal agenda which has completely transformed the global geo-political setting. These have necessarily impacted on the way the two nations have re-defined their respective roles in the global economy.

While Mauritius as a Small Island Developing State (SIDS) has forcibly agreed to adapt to the new rules of the game, India has to a large extent chosen to integrate further into the new global configuration, often on its own terms and at its own pace. It is true that liberalization and opening up of the economy in the early 1990s under the impulse of Prime Minister Narasimha Rao and Finance Minister Manmohan Singh was undertaken under excruciating conditions when the foreign exchange reserves of the country had reached unacceptably low levels.

This first "economic shock therapy" though has proven to be hugely positive as it unlocked the entrepreneurship drive and allowed the country to maximize on its comparative advantage – an army of young literate engineers and computer geeks contributed to the first wave of the Information and Communications Technology revolution. This in turn provided an open platform for international business networking and communication which served as a platform for the economic take-off of India and its integration into the global economy (Servansingh, 2017). Thus, in a span of only about two decades India had moved from the status of a developing nation into a world player, even if it remains a fast emerging country with tremendous challenges especially with regard to the distribution of wealth and the eradication of poverty.

During that same lapse of time and after years of living in its economic cocoon of protection and preferential trade agreements, Mauritius also had to wake up to confront the test of a more competitive and challenging global economic landscape. The prevailing social and economic nature of the collaborations between the two countries, which had been perfected into an art form by both international trade negotiators and the local capitalist class, has recently evolved into a more scientific and technical nature. The focus of this paper is to give an insight of the scientific and industrial nature of the diplomatic relations and collaborations between Mauritius and India.

Education and Training

India and Mauritius have been celebrating a very close collaboration since many years. India having a strong science and technology expertise has been helping Mauritius in areas as diverse as information and communication technologies, biotechnology, environment, hydrography, legal meteorology, telemetry, agriculture and ocean economy amongst others. As far as Tertiary Education is concerned, India is one of the most preferred destinations every year for Mauritian students for higher studies (undergraduate and postgraduate); around 100 ICCR scholarships are extended annually to Mauritian students for higher education in India and about two hundred Mauritian students enroll themselves in Indian Universities every year on a self-financing basis.

Indian Technical and Economic Cooperation (ITEC) has been India's flagship capacity building programme since its inception in 1964 and has acquired a strong brand name in India's development partnership with Mauritius which is one of the largest beneficiary countries of the ITEC programme. Mauritian nationals have taken advantage of a large number of scholarships offered by India on civilian and defence related training courses at Indian institutions.

Rajiv Gandhi Science Centre

The Rajiv Gandhi Science Centre (RGSC) has been set up with the objective of kindling scientific curiosity among young Mauritians, through innovative and interactive exhibits, displays and models;

the organisation of activities and programmes, scientific lectures, seminars and fairs, and other outreach efforts. In this way, the Centre is meant to supplement school education in a non-formal way, and thus popularise scientific temper among the youth and the masses. In brief, the strategy of the Centre consists of the following:

- Develop new exhibits on emerging areas in Science and Technology.
- Encourage students to undertake science projects that will enhance their creativity, reasoning ability and skills.
- Organize lectures, seminars and workshops for various target groups.
- Develop interactive educational programmes in Science and Technology.
- Acquire and disseminate latest information in Science and Technology.
- Create awareness on impact of Science and Technology in society.
- Collaborate with other institutions for the promotion of Science and Technology.

A proposal for setting up a science centre in Mauritius for the above purposes was first proposed in 1992. The Government of India readily agreed to provide assistance for the project and identified the National Council of Science Museums (NCSM), Kolkata, as the nodal agency in India for rendering such assistance to Mauritius, in the form of technical expertise, training of local staff in India, supply of exhibits and equipment and their installation.

After the completion of the Centre, the Prime Minister of Mauritius extended a personal invitation to Smt. Sonia Gandhi to visit Mauritius and inaugurate the facility. The Rajiv Gandhi Science Centre was inaugurated by Smt. Sonia Gandhi on November 30, 2004 whereby she also unveiled a bust of late Shri Rajiv Gandhi, installed at the entrance of the building (High Commission of India, 2019).

Visitors to the RGSC can benefit from enlightening displays covering diverse subjects, such as the geological origin of Mauritius, Resources and Demography of Mauritius, an introduction to the world of modern Science & Technology, and an area reserved for hands-on science called "Fun Science". Apart from these permanent exhibition areas inside the science centre, the sprawling garden outside hosts a "Science Park". Young visitors have access to about forty exhibits in the Science Park to explore concepts of science through 'play based activities'.

The RGSC contains five permanent galleries of interactive exhibits and one temporary exhibition gallery. In addition, the Children Activity Corner, Adult Activity Area and conference room are meant to host activities like Science Demonstration Lectures, Vacation Hobby Camps, Sky Observation, Science Quiz, Science Seminars, Science Rally, etc. Other facilities available for the public in the RGSC include a cafeteria, a souvenir shop, a library, a car park and a state-of-the-art auditorium.

Mauritius Metro Express Project

Mauritius Metro Express is a 26 km light rail transit system being developed in Mauritius. Estimated to cost MUR18.8 billion (USD 565 million), the project was officially launched in March 2017 and is being undertaken by Metro Express Limited, a wholly owned company of the Government of Mauritius. It marks a major milestone in the country's endeavour to modernise its public transport system and propel the country towards a safer, smarter and sustainable Mauritius.

The Metro Express will be a harbinger of the new way of socio-economic transformation along with other major infrastructure projects that will upgrade the country to a high income economy. The project will bestow the country with the most modern and efficient alternative mode of transport that will enrich the transport landscape.

The project is being developed with the support of a USD 353 million grant awarded by the Government of India to Mauritius in March 2017. The grant was awarded as a special economic package for assisting five high-priority projects, which include the Metro Express project, new Supreme Court building, e-tablets for primary school children, social housing units and a new ENT hospital.

The Indian Government has granted MUR 9.9 billion (USD 275 million) for the Metro Express project as part of the grant, while the remaining

is being financed by the State Bank of Mauritius Infrastructure Development through a line of credit. An advance of MUR 1.8 billion (USD 52.95 million) was transferred to the Government of Mauritius in November 2016, followed by a MUR 900 million (USD 27.5 million) cheque issued in September 2017.

The light rail project is being undertaken to decrease traffic congestion in Mauritius, which is costing the nation around MUR 4 billion (USD 119.6 million) a year. The project design includes the creation of a multimodal urban transit solution, connecting three major bus interchanges to give commuters to access bus services. A future north-south expansion of the metro express is planned, which will create a direct connection to the airport (Railway Technology, 2019).

A Joint Project Monitoring Committee, under the chairmanship of the Minister of Public Infrastructure and Land Transport and the High Commissioner of India to Mauritius, was created to oversee the light rail project.

The Metro Express project includes the construction of stations, viaducts and bridges in addition to the installation of electric traction systems, ticketing and passenger information systems, and other maintenance equipment. The metro line will have 19 stations, which include two sophisticated state-of-the-art elevations with five interchanges at urban terminals and will also provide user-friendly ticket machines.

The project will feature 18 bi-directional, low-floor, air-conditioned trams with seven modules each. The trains will be equipped with an advanced signaling system, automatic vehicle location system (AVLS), transit signal priority system (TSPS), and a driving simulator. The trains will be capable of accommodating 300 to 400 passengers and will have Wi-Fi facility.

The Prime Minister of India, Shri Narendra Modi and the Prime Minister of Mauritius, Pravind Jugnauth jointly inaugurated the Metro Express in Mauritius through a video conference in October 2019. Speaking on the occasion, Prime Minister Narendra Modi noted the significance of the Metro rail system in further enhancing the quality of life of the people of Mauritius, as well as in deepening the close ties between the two countries. The much anticipated Metro Express Project will transform the mobility landscape in Mauritius as an efficient, faster and cleaner mode of public transport. Prime Minister Modi also said that the event was the first such occasion bringing Indian and Mauritian leaders together through a vide link across the Indian Ocean (Railpage, 2019).

The Prime Minister of Mauritius expressed his deep appreciation for the Indian support for this project as well as other development cooperation projects in Mauritius. He also conveyed his appreciation to all stakeholders for the timely execution of these two people-oriented projects. The two leaders also lauded the growth of India-Mauritius cooperation for the well-being of both the people and for peace and prosperity in the Indian Ocean region and in the world.

New ENT Hospital

The project consisted of demolishing the old ENT hospital to establish a new state-of-the–art hospital providing world-class healthcare facility. The new ENT hospital, consisting of a hospital and administrative building, has an overall surface area of 12,000 square metre and funded to the tune of MUR 900 million.

The Government of Mauritius is determined to provide quality services to all citizens by placing healthcare at the core of its agenda with the priority of making the latest medical technology accessible to all. The hospital is a major project aiming to spearhead development in the country. The state-of-the-art energy-efficient ENT Hospital will significantly expand access to quality health-care and benefit the people in addition to being the first paperless E-Hospital in Mauritius.

The conversion of the old stone wooden structure of the ENT Hospital into a new modern hospital is in line with the strategy of the Ministry of Health and Quality of Life to improve the quality of hospital services through the provision of upgraded, renovated and completely new infrastructure, modern equipment, technologically-based and evidenced based specialised medical services.

In a statement to the press, the then Minister of Health and Quality of Life lauded the Government of

India for its unflinching support to the Government of Mauritius for the provision of financial assistance for the construction of the new ENT hospital. The Minister also recalled that the unveiling of the foundation stone of the new hospital was effected by the President of the Republic of India, Shri Ram Nath Kovind. In fact, the latter was on a State Visit on the occasion of celebrations marking the 50th anniversary of the Independence of Mauritius. The Minister highlighted that both countries share strong bilateral relations that will usher a new era of cooperation in the future.

The Prime Minister of Mauritius, Pravind Jugnauth, and the Prime Minister of India, Shri Narendra Modi, proceeded on Thursday 3rd October 2019 with the E-Launching of the new ENT Hospital. In his address, through a videoconferencing, Shri Narendra Modi said that the new ENT Hospital will provide quality health care services to the population adding that all these projects reiterate the commitment of the Indian Government to support the development of the Mauritius (Le Journal, 2019).

Prime Minister Jugnauth expressed gratitude to the Prime Minister of India for accepting to grace the function through a videoconferencing adding that this gesture is another demonstration of India's affection and consideration for Mauritius. He underlined that Mauritius would have never been able to implement the new ENT Hospital in such a short time without the support and assistance of the Government of India.

E-Health Project

The E-Health project will be implemented in a phased manner to enable the creation of standards compliant Electronics Health Records (EHRs) of the citizens on a pan-Mauritius basis along with the integration and interoperability of the EHRs through a comprehensive healthcare system. The main objective of the project is to have a single integrated source of information and a focal point of reference on all matters related to health with improved resource planning, allocation, monitoring and evaluation through the use of appropriate information technology.

E-Health project is envisaged to enable better continuity of care, secure and confidential health data and records management, better diagnosis of the diseases, reduction in patient re-visits and even prevention of medical errors, better affordability, optimal information exchange to support better health outcome, better decision support system and thus eventually facilitating improvement in the reforms of treatment and care of public health at National level. The e-Health project would cover all the hospitals, Area Health Centres (AHCs) and Community Health Centres (CHCs).

The project will be financed under the Government of India and Exim Bank's supported Line of Credit extended to the State Bank of Mauritius Infrastructure Development Co. Ltd, a nominated agency of the Government of Mauritius (Phoolchund, 2019).

Pan African E-Network Project

The Pan African e-Network Project was inaugurated on February 26, 2009 in Mauritius, which connected it to other African countries and India through a satellite and fiber-optic network. It has largely benefited Mauritius through the sharing of India's vast expertise in education and health care. All three modes namely VVIP, telemedicine and tele-education are currently operational (High Commission of India, 2018).

Other Projects

Mauritius intends to seek further assistance to the tune of USD 200 million from the Government of India in order to further develop the port and related activities. Projects include an Oil Jetty at Albion; an Aviation Fuel Pipeline from the port to the airport; a joint petroleum storage project at Albion between Indian Oil, Mangalore Refineries and Petrochemical Ltd and State Trading Corporation of Mauritius and a breakwater in the port to house a marina. India will also provide a grant of USD 4 million and a line of credit of USD 52.3 million to finance the 'Trident Project', which aims to considerably upgrade facilities for maritime operations and surveillance by the National Coast Guard, the more so in the fight against drug trafficking in the Indian Ocean.

In a demonstration of India's commitment to further strengthen its ties with Mauritius and to

promote maritime security in the Indian Ocean Region, Indian Naval Ship Shardul recently arrived at Port Louis, Mauritius on a three-day visit. INS Shardul, an amphibious ship of the Indian Navy, is currently on a month long deployment in the Southern Indian Ocean in keeping with the vision of SAGAR - Security and Growth for all in the Region. INS Shardul has also escorted MCGS Victory, a ship built at Goa Shipyard Limited, India and handed over to the National Coast Guard. The ship will also assist local authorities in providing logistics and medical support to the outer islands of Agalega and St Brandon. Since 2009, the Indian Navy has been deploying ships to Mauritius bi-annually to assist in patrolling the vast Exclusive Economic Zone of the country based on requests by the Government of Mauritius.

Both countries also want to work towards a Triangular Cooperation (India-Mauritius-Africa) that can leverage on Mauritius wide network of bilateral and multilateral cooperation arrangements in the region. This will enable both countries to tap new markets and promote greater cross border investments in Africa, particularly in the fields of science and technology. By doing so, India will be able to emerge as a key partner in the government's New Africa Strategy. Other areas of collaboration will be in the field of film making, with the emergence of a Mauritian Film Industry high on the agenda; a further boost to the ICT sector with new value-addition investment; a Pharmaceutical Village is also in the pipeline, with the objective to cater for local needs and that of the region (Hamuth, 2017).

Conclusion

The Indo-Mauritian ties are beyond the 'mind connect' and there is a lot of 'heart connect' between the two nations whether it is festivals or Bollywood or languages. The two Countries go a long way together and share a unique bonding, respect and love. When our government representatives meet and the collaborative treaties are signed, the overarching tendency to support each other is clearly evident at all levels.

Traditionally, India has been an important economic partner for Mauritius. Home to a host of Indian firms and a vast Indian-origin population, Mauritius is a preferred destination for Indian companies to set up businesses on the island as well as in other African countries. The India-Mauritius Global Partnership Forum has served as a great tool to further strengthen the relationship between the two countries in the forthcoming future. It's important to mention that this relationship extends beyond trade business exchange.

There are several areas in which both countries are working together and there are many more avenues in which they can further increase collaboration such as skills development, particularly in the fields of science and technology.

Mauritius is already looking at increasing its economic base by actively promoting emerging sectors. Working closely with the bodies/forums already in place, Mauritius and India can identify priority sectors together not only in the offshore sector which has always been seen as the pillar of business exchange between the two nations but also in other key sectors such as Information Technology and Renewable energy whereby Mauritius could capitalize on the vast expertise of India.

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Realities of Science and Technology Policy Development in Mongolia

Amangul Shugatai*

Introduction

The science, technology, and innovation's development uses to strengthen and improve cooperation among countries (Bridget M. Dolan, 2012) in investigating key roles to the economic development of a country as well as its fostering competitiveness of the science, technology developments in the world. Recently, common features of international development is to build an economy which is based on creating, promoting and using a science and technology. Over the last 30 years, scientific and technological development has been experiencing low growth rates in Mongolia. This is due to the lack of policy and organisational co-operation in the science and technology sector and the lack of initiative in introducing the results of research and practice to cognitive. (Science Technology Foundation 2019).

The present era is talking about the fourth industrial revolution in the age in which we live. Science and technology innovation achievements are measured in minutes and seconds. Therefore, science and technology policy needs to aim at establishing a system with constant monitoring and evaluation to improve Government investment efficiency in science and technology sector. (Duger 2019). Science and technology is not just a knowledge producer and riches of the society. It is also one of the basic foundations of development of a State (Duger 2019). With the knowledge gained and the introduction of innovation in life, the competitiveness of Mongolia will be enhanced by creating new ones. So, we must pay attention in this direction.

Mongolia has founded the system basics to develop industrial scientific knowledge, transform acquired knowledge into new technology, products and services. The Government of Mongolia is putting great emphasis in the scientific policy making by highlighting and storing National innovation system. Science policy focuses primarily on promotion of "knowledge-generation" centers, creating an efficient national innovation system (MECSS 2007).

* *Research fellow, Regional Studies & International, Organization Department, Institute of International Affairs of the Mongolian Academy of Sciences, Mongolia.*

The Science, technology and innovation policy is directed to develop national science system to promote Science" *mission of the Master plan is to enhance the Science and technology capacity, increase the innovation system effectiveness, promote the Industry-Academia collaboration, contribute to the economic growth by establishing an enabling social, economic and legal environment, establish a basis for national technology development, promote the growth of high technology based industries, and establish foundation for knowledge-based economy"* (MECSS 2007).

Today, one of the biggest problems in science, technology and innovation development of Mongolia is financing or funding problems. Last two decades, Mongolia's national scientific capacity has not grown and hence it could not contribute to the development of the country. This situation stems from the neglected policy of the state in the field of science for more than 20 years (Duger 2019). According to the government statistics the science, technology and innovation sector only 0.35 per cent or MNT 4605.7 million of general government budget an annual (Science Technology Foundation 2019). The National Science Technology Foundation of Mongolia spend it 90 per cent and which of 30 per cent spend to Mongolian Academy of Sciences and agricultural sector 20 per cent, technology sector 17 per cent, medical field about 12 per cent and the rest are in other branches and organizations. Thus above mentioned statistics shows sector funding is too low in Mongolia. It shows state budget is too low for academic institute and research universities which means our country's science, technology and innovation finance is much lower than other countries. For instance, Budget and investment for research development in Mongolia 10 times lower than in other developing countries. For example: Japan spends 3.14 per cent or $ 165 billion, Austria with 3.1 per cent or $ 12.1 billion, and China with 2.1 per cent and $ 451.9 billion, Mongolia spends 0.12 per cent or $ 15 million, South Korea 4.29 per cent, $ 92 billion, Sweden 3.26 per cent, $ 16.7 billion, Finland 2.74 per cent, $ 7.0 billion share of the GDP from the national budget to science technology sector (Science Technology Foundation 2019). Therefore, insufficient budget or funding for this science, technology and innovation also weakens the development of Mongolia's foreign science diplomacy cooperation.

Therefore, the Government of Mongolia is seeking to increase government support for science and technology from 2020. If state budget funding increases for science, technology and innovation branches in 2020, Mongolian academic institutions and scholars in this field will begin to work more effectively and improve science technology and innovation collaboration will deepen our future cooperation. There is an urgent need to expand scientific co-operation for science technology development. As part of Mongolia's foreign science cooperation, it has been cooperating with the Government of Japan, the Asian Development Bank and the World Bank, international donor organisations, like International Foundation for Science, International council of Science, The World Academy of Sciences, United Academy of Innovation, Centre for Science and Technology of Non-Aligned and other Developing Countries, NAM S&T Center (Mongolian Academy of Sciences 2019), the Russian Intergovernmental Foundation for Science, the Chinese Science Foundation, South Korea and Japan's Funds. With the help of the above organisations, researchers from partner countries are implementing joint projects. This is a project from developed countries where our scientists are working hard to introduce new innovation in Mongolia and joint innovation. Although, Mongolia is a small nation with a population of 3.18 million (National Statistic Database 2019). Unfortunately, science diplomacy and collaborations are not being implemented effectively in Mongolia. Today, Mongolian science technology collaboration is actively cooperating with Russia, China, Japan and Korea. However, Mongolia's cooperation with developed countries in the West and other Asian countries in which science and technology are well developed is inactive. For example: the Mongolian Academy of Sciences cooperates with India in the framework of scientific and technological cooperation with the following four organizations: Council of Scientific and Industrial Research, Indian National Science Academy, Avinashilingam, University, Uka Tarsadia University (MAS 2019). However, above mentioned four organizations made a collaborative agreements inactive following two organizations. Council of Scientific and

Industrial Research, Indian National Science Academy. The agreement and memorandum are discussed to expand cooperation between the two countries in the following areas: studies of medicinal and aromatic plants of Mongolia, microbial resource inventorisation, genomics, patent informatics, R&D planning, prioritisation, and project formulation, leather bioprocessing. Through its ITEC courses, it has partnered with the Indian Academy of Sciences to improve the English language skills of young researchers (Mongolian Academy of Sciences 2019).

Mongolia, therefore, will be able to achieve sustainable development in the field of science and technology as it adapts to its specifics, develops policy in the field of science and expands its cooperation with foreign countries. In this article, we will try to cover the situation in the field of science policy implementation in Mongolia.

Current Situation of Science Technology Sector of Mongolia

According to Asian Development Bank report: Chronic underinvestment has impeded the growth of Mongolia's Science, Technology and Innovation, since the early 1990s, after the country transitioned from a centrally planned to a market-based economy (ADB 2017). In 2015, gross domestic expenditure (GDP) on Research and Development expressed as a percentage of the gross domestic product was 0.16 per cent lower than in 1990 (1.0 per cent). This compares unfavorably with the Organisation for Economic Co-operation and Development countries (1.0 per cent – 4.2 per cent of GDP). The number of research development personnel (2,515 in 2015) has also been in gradual decline since the mid-1990s (3,102 in 1995). The main cause of stagnation is that Science, Technology and Innovation in Mongolia has not been well integrated with other related sectors (ADB 2017:1). Its contribution to the economy, in particular the diversification of the economy, and standards of living, through knowledge and technology transfer and commercialization of research and development has been insignificant, which has led to years of neglect (ADB 2017).

The national innovation system in Mongolia is characterised by weak knowledge dissemination, limited technology transfer, and infrequent commercialisation of researcher and development that stem from following main factors are influencing (Paavola 2019). Institutional arrangements for science technology and innovation are fragmented. Although the Ministry of Education, Culture, Science and Sports (MECSS) is responsible for formulating and implementing science, technology and innovation policies and directly supervising some of the 59 research institutions and 21 research-based universities (MECSS 2019) , about one-third of public and private research institutions are supervised by other ministries (Science Technology Foundation 2019)

There are about 4300 people (MECSS 2019) in the Science sector of Mongolia and , while 10 are under the Mongolian Academy of Sciences and working staff number is 2283 people working on STI sector (Science Technology Foundation 2019). Currently, there are 65 public and private research organizations. In Mongolia, the number of researchers per million is about 549, which is three times less than the world average. Last year, MNT 36 billion was spent on this sector, which is 10 times lower than the Asian average and 14 times lower than the world average (Mongolian Academy of Sciences 2019).

Most STI organizations are located in (90 percent) capital city of Ulaanbaatar.The young researchers are studying at 32 research institutions and universities in our country. There are 171 scholars and researchers are studying 25 foreign countries. It is getting better at preparing young researchers in 2016-2018, MNT 2.4 billion were spent on the training of scientists.

Foreign loans are the main source of assistance. The proportion of academic staff with a degree researcher number is increased almost twice between 1996 to 2000. Since 2016, the rates have also been increasing. The number of employees in the science and technology sector 9576 person in 2010 and increased to 14609 persons in 2018 (National Statistic Database 2019). This is because of the increased requirements for degree programs and the change of many boards of higher education institutions to interdisciplinary. One third of academic staff are in natural sciences, one fifth in social sciences and one fifth in the technical sciences.

Recently, one of the internationally recognized indicators used to evaluate scientific potential is the tendency to increase the number of researchers per million population. There is a sharp decline in the number of university recruiters in science, technology and engineering, which in the near future may lead to a lack of quality professionals, researchers and scientists in the field of technology. The above statistics indicate that the role of science and technology in the development of national economy is still insufficient for the national and regional innovation process in Mongolia. As that continues, the lag in science deepens (Science Technology Foundation 2019)

There is a shortage of details on science and technology and innovation research, joint projects and programs. This is due to the fact that the costs of the sector are not detailed and are not reflected in the statistics. It is necessary to reflect in the statistics that private enterprises and production companies of our country spend a considerable amount on technological innovation.

From the outset, the ability to properly grasp, wisely anticipate, and coexist with the changes that take place during the 4th Industrial Revolution, is clearly dependent on how well the Mongolian government can formulate and implement sound policies and programs (Science Technology Foundation 2019). For this, the human resources and technology development of the science and technology field and cooperation with foreign research organizations are also important. Success will be achieved through rapid investment in science and technology.

Science Technology Policy Implementation in Mongolia

In recent years, important policies have been set to expand and develop knowledge-based economy sectors in Mongolia's development policy and planning. It is important to increase the scientific role of Mongolia in ensuring its sustainable development and security, enhancing its national competitiveness and competitiveness, and to ensure its creative and comprehensive activities (Mongolian Academy of Sciences 2019).

To support the knowledge based innovation activities of the national development strategies. To establish the science system as the basis of research and technology development and improve international collaboration (Paavola 2019). To improve the technology growth and innovation capacity of private enterprises.

The Government of Mongolia has adopted the new policy the Law on Science and Technology (2007-2020) in 2006 (MECSS 2007). Within the this plan, the following statements are to be forced in order for Mongolia to follow through the path which the world is inclining towards in this field (MECSS 2007). Increasing funding sources to support the collaboration and partnership between government private- research organizations.

Next new policy launched on 2019, (MECSS 2019) this policy is implementing as the tool to develop Mongolia's science and technology division. Measures within the policy will be reflected in the annual General Guidelines for Development and will be implemented with financing of the state and local budgets, loans, donations and aid from international organizations. The policy sets goals to fully use intellectual and material resources in the scientific and technological sectors and to ensure creative and complex activities. Objectives are included in the policy to ensure the sustainable development and security, to increase the competitiveness and to boost knowledge-based economic sectors as well. The policy will be realized in two phases: first phase of implement plan have 2017-2020 and second phase implement 2021-2025 (MECSS 2019). In the first phase, works will be done to refine upon the scientific and technological policy, its legal landscape and management. Other measures will be taken to improve the infrastructure, to augment the financing and to construct infrastructure for a scientific park. The second phase focuses on increasing the GDP percentage for scientific and technological spheres, boosting the sectors' capacity and competiveness and developing it as one of the fundamentals of economic development.

To focus on the improvement of technological capacity of priority industry sectors. Linking national science and technology capacity with the regional and global network. The following

principles were pursued in the development of the policy: encouraging private sectors to participate in the development of science and technology sector and utilizing the results; ensuring information transparency; developing a plan that reflects socio-economic interests and objectives; supporting the transfer and adoption of advanced foreign and domestic technologies; ensuring the transparency and accuracy of performance indicators of investments (Duger 2019).

As the state has adopted a science and technology policy, it will economically and socially advance the science and technology sector to a new stage of development, competitively meeting the market demands, in line with economic and social demand and development orders. There is a legal opportunity to update some of the applicable legal documents in line with the policy. As a result, a science park will be established and the share of high technology and innovation products in the GDP will increase (Mongolian Academy of Sciences 2019).

It will also accelerate the process of wealth creation through the economic circulation of intellectual property and develop it into a comprehensive research-training-production system, increasing the competitiveness of the country, improving the standard of living of the population, ensuring sustainable economic and social development, and national security.

Conclusion

For Mongolia, the contribution of science and technology to the development of the national economy is still insufficient for global and regional scientific relations and regional innovation processes. Therefore, the Mongolian Government is vital to work towards the part of the development of science and technology and innovation to enhance the sector's foreign relations.

There is not enough data compiled in accordance with international standards and methodologies for policymakers, decision makers, researchers, and the general public statistics, information, monitoring and evaluation system, which covers the whole of science, technology and innovation sector of Mongolia. Therefore, it is necessary to address the above issues and develop cooperation in the field of science in your country and exchange experience.

Although agreements have been reached with research institutions in some countries for science and technology, so far the ongoing research has been slow and uncertain. A realistic look at the current situation and difficulties is increasingly demanding the right policy and the right model of development.Therefore, science and technology policy in Mongolia should be geared to fill the gap above mentioned the challenges in this science, technology and innovation sector. Over the past 30 years, there has been no significant change or improvement in investment or technology in the science. Although any government promises to "support science" and "implement science-based policies", it has been adopted today in the form of "support for funding."

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Science Diplomacy: A Driving Force of the Pro-active Nigerian Foreign Policy

Adeola Aminat Lawal*

Introduction

After World War II, the scientific world emerged in a fashion that made the world smaller with its impact visible across every aspect of human life. Science Technology Innovation (STI) has contributed largely to behavior of state in the international system where science policy legislations have implication far and wide not only within their own borders but also across different countries (Schweitzer,2018). Though advancements and applications of technology have achieved a number of success in furthering peace, security and prosperity. Such a development in STI in the field of world politics is acknowledged.

The birth or emergence of Science Diplomacy could be trace to 18th century, during cold war era between the East (USSR) and West (US) science interface with foreign policy and the diplomatic relation of state. States have long practiced but was coloured with today's vocabulary. The first effort of analysis and conceptualisation came to limelight in the 21st century (Ruffini,2017)

To start with, one has to give meaning each of the word, '**science'** which simply means a systematic study of the structure and behaviour of the physical and natural world through observation and experiment. It also means an acquisition of knowledge; while '**Diplomacy'** on the other hand is defined according to Ernest Satow, as the application of intelligence and tact in the conduct of official relations between governments of independent state. Its mean to achieve an end, a non-violent means characterized with negotiation, mediation, arbrititation, conciliation and adjudication (Ranjbar and Elyasi 2019).

Therefore,' Science Diplomacy', is the use of scientific collaborations among nations to address common problem facing humanity. It also means harnessing of science and scientists to the practice and art of Diplomacy. It was introduced as referring to new foreign policy activities that serve 'humanity' as well as 'build constructive international partnerships' (Fedoroff, 2009). Also, it is seen as 'fluid concept' that articulates the 'role of science, technology and innovation in three dimensions of policy':

* *Third Secretary, Training & Staff Welfare Division, Ministry of Foreign Affairs, Nigeria.*

- Informing foreign policy objectives with scientific advice (science in diplomacy);
- Facilitating international science cooperation (diplomacy for science); and
- Using science cooperation to improve international relations between countries (science for diplomacy).

Science in diplomacy

Some areas of foreign policy need to be enlightened by science, which leads diplomats to seek input from the research community. The most obvious examples are found in international negotiations on global issues: scientific expertise and advice are essential to diplomats and policy-makers to address issues such as climate change, food security or energy. Science and scientific expertise are an aid to decision-making in foreign policy: to achieve its purposes, diplomacy must make effective use of science.

Diplomacy for scienceEach country seeks to promote the national scientific community on the international stage and to facilitate cooperation with other countries: diplomatic and consular networks abroad are traditionally in charge of supporting the mobility of researchers (financial aid, visas) and assisting them in some negotiations (regarding intellectual property rights, for example). If it is decided to build major research infrastructures, this must be done by agreement of states through diplomatic dialogue, with shared costs and risks but also shared benefits through the participation of their researchers in multinational programs.

Science for diplomacyWhen political tensions between countries do not allow for traditional diplomacy to express itself, scientific relations can be used to maintain or restore links. The role of science as a substitute for and vanguard of diplomacy is probably, among the three stated areas connecting science and diplomacy, the most original one, even if during some periods of international relations more so than others. (Pierre-Bruno Ruffini, 2017)

Objectives

The focus of this paper is to understand the fact that STI is a sincere effort towards achieving national security of a state, region and International sphere which operationalises in form of collaboration, cooperation and partnership with states as well as design to meet up with rapid growth of Science and Technology of the global phenomenon. This paper is aimed at exploring the application of Scientific Technology Innovations (STI) to achieve a dynamic and a proactive foreign policy in Nigeria.

Nigeria Foreign Policy

Foreign policy is a country's response to the world outside or beyond its own frontiers or boundaries, it is an objective that guide the affairs of state with another state. It is influence by the domestic policy and considerations. Joseph Frankel defined Foreign policy as a dynamic process of interaction between the changing domestic demands and supports and the changing external circumstances.

Nigeria Foreign Policy from inception was coined by the ideas of her first Prime Minister, Sir Abubakar Tafawa Balewa (TFB), he set the standard for Nigeria's foreign policy in 1960 when she gained independence from the colonial master. The central focus of the Foreign policy was enshrined in the chapter II, Section of 19 of the 1999 constitution of the Federal Republic of Nigeria (as amended). The foreign policy is identified with the major components as summarised by the former permanent secretary of the Ministry of Foreign Affairs, Ambassador Enikanolaiye. They are (in no particular order): Respect for territorial integrity; Good neighborliness; Sovereign equality of states; Commitment to decolonization and eradication of racist minority rule from Africa; Promotion of the rights of the black man under colonial rule, Promotion of Pan-Africanism and African Unity; Respect for the principles of the United Nations Charter; and Non-alignment. (Ujara E.C and Ibietan, J. 2018)

However, this foreign policy orientation was criticised as being conservative and pro-West by academia. The policies were not consistent despite the laid down foundation of Sir Abubakar Tafawa Balewa which were based on the aforementioned principles. Changes were also caused by Military Incursion of democracy and policy maneuvers by different Government under various leadership (Ujara E.C and Ibietan, J. 2018).

The end result has been that Nigeria foreign policy has not been able to sustain the daunting change in global international system. It has not

been able to provide solution and respond to current domestic challenges, the neighboring countries, region, Africa at large as well as the International System.

Towards A Proactive Policy

It's important to note that technology evolves as a result of the need in the society. For instance, Nigeria like some other countries has been suffering from emerging neo threat in the world such as Terrorism, climate change, illegal Migration, Cyber security, etc. The need to mitigate and combat the neo- threat, there is need to introduce the Science, Technological Innovation (STI) to Foreign Policy formulation, implementation and articulation. This will be done with the aim to meet up with global standard, to achieve dynamic and proactive foreign policy. To achieve this pro-active and dynamic foreign policy, Nigeria needs to follow:

Firstly, there is need for policy makers, think tanks in Nigeria to involve scientists and technology experts to provide knowledge to guide policy formulation and signing of scientific/ technical agreements with other countries. This is with aim of this is to put the country in a collective advantage (win-win).

Secondly, scientists and experts use scientific method to gather information (data), observations of their day to day analysis, to develop and test hypothesis (Trekian and Kishi, 2017). The implication of this is that, policy makers will be able to predict an unseen occurrence and provide solution in the areas and come up with better strategies to achieve its goals that will have positive impact in the nation rather than reacting to it when it actually happens.

Furthermore, Science Diplomacy will serve as a veritable tool to achieve Sustainable Development Goal (SDG) in the next decade. Considering, the fact that most of the countries which belongs to United Nation Organization (UNO) are striving to achieve this by year 2030. It may interest you to know that Nigeria is one of the 189 countries in the world that adopted the Millennium Development Goals (MDGs) which was meant to be achieving in year 2015 and was able to record a success of MDGs in Nigeria, though at slow pace. Involving this Scientists and Technological Experts, inform of partners will help to gathering the required and necessary data which will facilitate the SDGs in 2030.

It is good that Nigeria, have a policy (UNDP 2015) to achieve the SDG by 2030, there is need for the country to interject Science Technology and Innovations to achieve this goals. Scientists and Technology experts together with policy makers can redesign this policy, align to the country challenges and structure, proitize the goals, as well as pattern with countries that have adopted STI to achieve their SDGs. For instance, India, Japan, Ethiopia, Serbia etc.

According to Magazine African report, published on 25th April 2019, where the former Commonwealth Secretary-General Emeka Anyaoku commented on Africa Check magazine revealed that the United Kingdom (UK) had 5,250 Nigerian-trained doctors on its books in April 2018, a rise of 10% on the previous year. That is an average of 12 doctors a week fleeing to the UK. A recent NOI poll showed that 88% of Nigerian doctors are considering working abroad and other countries such as the US, Canada, Australia is also attracting Nigerian doctors in droves, with Saudi Arabia aggressively recruiting in the country (Egbejule 2019).

It's about time that Nigeria foreign policy channeled towards attracting Nigeria scientists and technology experts into the country. The implication of this is that, they will contribute the knowledge into the society which bring about "Brain Circulation" as well as serve as advisory body to the policy makers such as the Ministry of Foreign Affairs. Aside from circulating knowledge, they will aid and facilitate the building of more scientific research centers and also connect with other the researchers from the global developing countries most especially the BRICS with the aim to make global effort in combating the global challenges.

of note, the rapid change in the world has brought the need of policy maker, diplomat of the world to be faced with different challenges. There is a great need of Nigeria policy makers rather Foreign Service Officers (FSO) to be properly trained on Science Diplomacy(imperative), this will help broaden their horizon as well as compete favourably with their counterpart across the world, also negotiate and deal from a well informed perspective since the new innovations are coming up daily, and there is a great new for diplomat to be equipped with knowledge.

There is need for Nigeria Foreign Ministry, to create a structure or cabinet for Science and technology advisor for Diplomacy. This ST advisor will work closely with the Honourable Minister of Foreign Affairs, which help to harness decision, promote foreign policy priority in areas where politics intersect science and technology as well as leveraging on international alliances which can add value to national interest, programs and missions. For instance, US has created and launched Science and Technology Advisor in 2015 and in Japan, an Advisory Panel on Science and Technology Diplomacy was established by the Minister for Foreign Affairs in July 2014 to consider ways to utilize science and technology in diplomacy (Trekian and Kishi 2017).

The accelerating pace of technological change, with its substantial impact on economic development, has underscored how countries must prioritize science and technology so as to strengthen their security and stay competitive in the twenty-first century global economy (Trekian and Kishi. 2017). No state can be in isolation, there is need for state to relate with each other to achieve their goal. Science Diplomacy via STI has provided a medium to facilitate international cooperation in area such as international partnership, synergy, development and acquisition. There is a great need for Nigeria to partner and work together with the country of the south such as India, China that technology inclined to acquire new technology, work with them closely (synergy), to know the one that will fulfill the needs of the nation.

Lastly, with the new spread of technology from IT revolution and the massive growth of mobile phones, people connect quickly and this has made the world borderless and seamless. Nigeria needs to leverage telecommunication market for national benefit and its shift its focus from the oil sector. There is need to have diversification in prioritizing sectors for STI advancements. Technologies experts need to work with policy makers to formulate policy for the regulation and work towards building internal STI capacity in the country. India can be a good model to replicate in Nigerian context. The 'Digital India' Policy can be adopted for giving boost to ICT development in Nigeria.

Conclusion

It is important to note that STI is imperative for Nigerian Foreign policy. It is used as soft power to promote geo-political relationship. This soft prowess does not only mean giving out money, but also giving intellectual resources form the donor and the recipient country. It's doesn't work in vacuum rather through collaboration, partnership and cooperation. Nigeria need to be more technological capable; adopt STI into foreign policy through Science Diplomacy and work with other countries of the world most especially (Global south-south), paving ways for Best practices of Science Diplomacy adoption.

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Advancement of Telecommunications Industry in Nigeria: Challenges and Prospects

Omowunmi Akande*

Introduction

Communication has formed the basis of all human interaction within and across societies; our evolutionary progression has depended heavily on the way and manner in which we communicate. Communication networks thus define modern society. It encourages cooperation through the sharing of ideas and information, assists in the management of conflict, facilitate production and promotes trade amongst many other things. Telecommunication technology has, therefore, revolutionized the world.

Telecommunication in Nigeria: An Overview

The development of Nigeria's telecommunication has been tedious. The first set of telecommunication facilities were established in 1886 by British colonial masters. By 1960, Nigeria's telecommunication infrastructure consisted of only 18,724 phone line for a population of 40million people."This translated to a teledensity of about 0.5 telephone lines per 100- people" (Akinyomi and Tasie, 2012). When Nigeria transitioned into a democracy in 1999, most of the country was connected by landlines. The telecommunication sector was managed by the government-owned Nigerian Telecommunications Company (NITEL), which was mandated to provide the country with efficient telecommunications services while connecting Nigeria with the rest of the world.

However, preference was given to the Economic Community of West African States (ECOWAS) and other countries with which it maintained strong economic and political ties. For Nigeria at the time, politics and communication were inextricably linked. NITEL was marred by problems of insufficient funding, improper coordination systems, inadequate technical expertise and organizational challenges.

* *Ministry of Foreign Affairs, Nigeria*

It was, therefore, unable to provide widespread, quality, affordable and efficient service to many Nigerians. According to Mould (2019), "prior to 1999, telecommunication services were expensive to acquire, difficult to obtain and expensive to use. Tele-density stood at 0.04 per cent (about 400,000 users) in a country with an estimated population of over 100 million people, which was one of the lowest in the world. Investment in the sector was below US$50 million". This has consequences for other sectors such as healthcare, which witnessed high rates of preventable deaths from accidents due to an inability to quickly communicate such situations and other life-threatening situations.

It is needless to say that democratic governance provided the right environment and necessary impetus for the telecommunications industry to thrive in Nigeria. The introduction of the Global System for Mobile Telecommunication (GSM) laid the foundation for outstanding successes made in the sector. This was furthered by the breakthrough in telephone infrastructure through liberalization of the sector in 2001 and the award of the Digital Mobile License (DML) to MTN and ECONET (now Airtel), both of whom "injected over a million lines into Nigeria within a year (Mould, 2019).

Indigenous Telecoms Company, Globacom was also created in the same year; together the three companies competitively dominated the Nigerian market. The emergence of Globacom was revolutionary as it was principally responsible for redirecting focus to economic opportunities in digitization and inclusiveness. Hitherto, users were billed on a per-minute basis and sim-cards were sold at exorbitant prices, thereby inadvertently excluding a large percentage of the population. The company introduced "per second billing system" and at a time when sim-cards were sold between N33,000 and N35,000, it drove the cost down to N100 (less than a dollar); this meant greater inclusion of citizens. "Today, there are over 150million active subscribers riding on GSM technology" for voice and data services (Akinyemi and Ramon, 2018).

The telecommunication industry in Nigeria has grown immensely in the last few years. The industry growth has been by and large in the voice segment. In the last five years, demand for data in Nigeria and the world generally by professionals and researchers has grown tremendously. In Nigeria, this is driven by the availability of online services i.e. Facebook, Twitter, Online newspapers, Blogs, YouTube, etc.), device availability as well as infrastructure provision especially by mobile operators in Nigeria. Platforms like Twitter are increasingly being used as a means for political expression. The rapid developments of information and communications technology and the advent of new services over telecommunication networks have given rise to convergence in how services are delivered to customers.

Impact of Telecommunications

Telecommunication advancements have had a transformative effect on Nigeria. First, the telecommunications industry has had a tremendous impact on the Nigerian economy, in 2003, it was responsible for 53 per cent of the country's GDP while in "2015 it contributed 1, 645, 82 billion nairas (8.8 per cent) to the GDP" (Nkoredeh et al, 2017).

Second, inadequate or ineffective dissemination and use of information are assumed to be responsible for the slow pace of industrial development in Nigeria. Telecommunications have created a link between government, business persons and the citizens, easing information dissemination and implementation of policies. For example, the e-wallet initiative that enables farmers to quickly access and purchase the best seeds and fertilizers by mobile phones, helped in eliminating middlemen, thereby addressing the stifling corruption in Nigeria's agriculture industry. The scheme has also facilitated a connection between agricultural development agencies (seeking to educate farmers) and small farmers in the most rural parts of the country that were hitherto inaccessible. Before this, rural farmers experienced difficulty in obtaining farming products especially government-subsidised fertilizer, thereby fuelling disinterest in farming and deepening poverty and unemployment especially in Northern Nigeria where terrorism occasioned by socio-economic factors is prevalent. This model is currently being recreated across African countries and beyond. Similarly, mobile phones and platforms like WhatsApp are the principal means employed by NGOs in communicating with persons in the most remote parts of the country.

Third, the telecoms industry has been a major driver of Foreign Direct Investment (FDI) and job creation in Nigeria. It has contributed over 5billion dollars in FDI and employs about 135, 000 workers. The telecommunications industry alongside the ICT sector created about 2.5 million jobs over the last decade (Nkoredeh et al, 2017). The industry has become so important that it sustains other service sectors such as banking, shipping, and insurance to mention a few. Furthermore, telecommunication is a major source of revenue for the government with companies in the industry remitting over "two hundred billion naira in taxes and levies" (Nkoredeh et al, 2017).

Overall, business transactions and project implementation have witnessed great improvement in efficiency as speedy access and diverse communication methods (voice calls, emailing, video-conferencing, etc.) have reduced execution time. Thus improving productivity and reducing risk. This complex communication system has greatly reduced the rural-urban divide. This apparent success of the telecom industry has been attributed to Nigeria's massive market and adaptable population, effective regulation and innovative CSR initiatives by service providers.

Yet, while impressive strides have been made, a lot more can be done. There is a need to create links with other countries in Africa and develop a competitive industry to support innovation, create jobs and enhance the export capabilities of the continent (a key role which African Regional Economic Communities can play. It is also imperative to leverage South-South cooperation as a means of building more robust partnerships and alliances to bridge existing technological and technical gaps.

Conclusion

Science and technology are critical factors for economic and social development. Through their application, it has become possible to harness the forces of nature and to transform the raw material resources abundant in nature, into goods and services for a better quality of life. Indeed, the extent to which a country is committed to this awareness and integrates science and technology practice into the socio-cultural activities of its people marks the difference between developed, developing and under-developed nations. The developed world has attained technological sophistry, by exploiting science and technology to create wealth, save human energy and provide technical services. A country like Japan which has very little natural resources but depends on importation of raw materials from other countries has, through the efficient application of science and technology transformed these materials into goods and services and now dominates world markets.

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Science and Cultural Diplomacy in BRICS: A Case of the Ural Region, Russia

Kurumchina Anna*

Introduction

The Ural region is one of the scientific centers of Russia. One of the biggest universities of Russia is the Ural Federal University, and the Ural Branch of the Russian Academy of Science is among the primer scientific institutions in the country. All these structures are working on different fundamental and applied aspects of science to develop the region and the country as well as contributing to solve the global challenges. The BRICS was officially established in 2009, when its first summit took place after several years of discussions and negotiations. Today it is a real economic power which influences global decision-making processes in many spheres. The name BRICS is an acronym of the union members: Brazil, Russia, India, China, and South Africa. These countries have developed their cooperation at global and regional levels, with greater attention being given on economic development, science and culture cooperation.

The Ural region has been playing an important role in developing BRICS cooperation. First of all, the first BRICS Summit took place in Ekaterinburg – the capital city of the Ural region, in 2009. So, we can say that the Ural gave official life to the BRICS. Since that time the cooperation among BRICS countries has developed strongly. Ural Federal District is one of the eight federal districts of Russia. Its population was 12,080,523 (79.9 per cent urban) according to the 2010 Census. The district was established on 13 May 2000 by a decree of the President of Russia. It is located at the border of the European and Asian parts of Russia. The administrative centre of the district is the city of Ekaterinburg. The district contributes 18% to Russia's Gross Regional Product (GRP), although its population is only 8.5 per cent of the Russian total (Ural Region, 2019).

This article is devoted to the analysis of the scientific cooperation and cultural diplomacy in the Ural region, which has a strong influence on the BRICS countries decision-making process in the sphere of the global

Ural Federal University, Yekaterinburg, Russia.

problems and sustainable economic development. The key objectives include: 1) to describe shortly what the BRICS project is; 2) to explore Ural Federal University and its international cooperation in the sphere of science; 3) to highlight the international projects of the Ural Branch of RAS with BRICS countries; and 4) to analyze some challenges which the Ural region facing with in its cooperation with the BRICS.

Ural Federal University

The university consists of two dimensions: classical, academic university and technical university. They were established in 1920. During the reforming of the Russian education system of 2009 they were renamed into Ural Federal University. Today there are 16 institutes covering practically all spheres of science and humanities. For its 100-year history the UrFU has developed rich networking with the foreign countries. Since 1950s till present students from China, India, Africa, South-East Asia and Near East came for studying here. Today it has 3500 students from more than 90 countries including the BRICS members (Ural Federal University. 2019). There are many possibilities for foreign students to choose the programme. If they know Russian, they can take any course they want; there is a year preparatory course of Russian language, which is useful for everybody from abroad. Also, there are Master programmes in English language. Moreover, every year there are more than 5 Summer schools for international students in the Ural Federal university in topics such as Russian Studies, Engineering, Economy, Human Resources Management, Sport etc. There are more than 30 student societies like

Table 1: Agreements with International Partners

Country	#	Institute
India	1	Alliance University Bangalore
	2	Indian Institute of Technology Madras
	3	Jamia Millia Islamia
	4	University of Delhi
China	1	Beijing Normal University
	2	Beihang University
	3	Beijing University of Technology
	4	Changchun University of Science and Technology
	5	China University of Petroleum
	6	Dalian Ocean University
	7	Dalian Polytechnic University
	8	Dalian University of Foreign Languages
	9	Fudan University
	10	Guangdong University of Technology
	11	Tsinghua University
	12	and some other 32 universities.
Argentina		Universidad Nacional del Sur
Brazil	1	Pontifical Catholic University of Minas Gerais
	2	Sao Paulo State University
Columbia	1	Del Rosario University
Mexico	1	Universidad de Monterrey
	2	Universidad Juárez del Estado de Durango
	3	Universidad Internacional Cuernavaca
	4	Universidad Madero
	5	Universidad Popular Autónoma del Estado de Puebla (UPAEP)
Chili	1	Universidad Finis Terrae
Ecuador	1	International University of Ecuador

Source: Author's compilation.

dance clubs, sport teams and others for full-time education students.

One of the important parts of the development of the BRICS science cooperation is that UrFU hosts the BRICS Network University and SCO University along with CIS Network University, University of the Arctic (UArctic), and Association of Technical Universities of Russia and China (ATURK).

Ural Federal University is ranked 58th among the universities of the BRICS countries. It is the largest regional venue for international events. In 2014, UrFU hosted the final of the ACM-ICPC world programming championship. The university makes a great contribution to the studying of various cultures and is the place of their meeting. In 2008, a unique center of the Chinese language and culture, the Confucius Institute, was established under the Institute of Social and Political Sciences (now the Ural Institute of Humanities). In 2013, the Thai Cultural Center was officially opened, in 2016, the Center for Iranian Studies (Ural Federal University. 2019). Annually, Ural Federal University is visited by more than 100 foreign delegations representing leading world universities, diplomatic agencies, large companies and enterprises. Ural Federal University has more than 150 agreements with foreign universities and associations, here there is a list of some universities, which present Asia and Latin America (Ural Federal University. 2019).

For instance, the training of highly qualified personnel within the framework of the SCO University is carried out in priority areas of cultural, scientific, educational and economic cooperation of the Organization's member countries (energy, ecology, engineering, metallurgy, materials science, construction, transport, fuel and energy sector, history, linguistics, IT technologies). Cooperation is carried out on the following types of educational programs: preparatory language courses, graduate programme (4 years); Master's programme (2 years); postgraduate school (3 years), provided for by bilateral agreements; doctoral studies (3 years); training programs, professional retraining, distance and part-time education. Universities participating in the SCO University are implementing educational programs in the areas of: "Information Technology", "Nanotechnology", "Pedagogy", "Regional Studies", "Ecology", "Economics", "Energy". The scheme of studies at the SCO University is that students studying under the SCO University program have the opportunity to continue their education at any foreign university from any semester, which is also a member of the SCO University and implements this educational program. Students must attend a foreign partner university for at least one semester. In accordance with the approved SCO University Concept, the students study in it on a paid and free basis (each SCO state allocates training quotas).

The official languages of instruction at the SCO University are Russian and Chinese. At the same time, many Chinese universities provide the opportunity to study in English. In addition, students have the opportunity to optionally study the state language of the host country (Ural Federal University. 2015).

According to the results of training, the students receive a university diploma in which they began his studies or studied for the longest time (at least 60 per cent of the time) and a certificate of the SCO University. Dual-degree diploma programmes are also being implemented. Upon completion of training at the SCO University, the students will receive two diplomas - from their own university and from a foreign university (if they spent at least 30 per cent of the time in it) (Ural Federal University. 2015).

The Center of the BRICS Studies is also based in Ural Federal University. The work of the centre is mainly focused upon: "analytics, consulting and advanced research in various spheres of BRICS countries collaboration. Some projects are also implemented in the interests of Russian governmental bodies, responsible for certain directions of foreign politics of Russian Federation; providing advanced (MA and PhD) education in BRICS studies and coordinating collaborative and exchange programmes with UrFU partners in different BRICS countries; organizing important scientific, cultural, educational etc. events of common interest for BRICS educational, research and cultural institutions.

In this way BRICS studies centre of the Institute of Social and Political Sciences of Ural Federal University tries to build widest possible

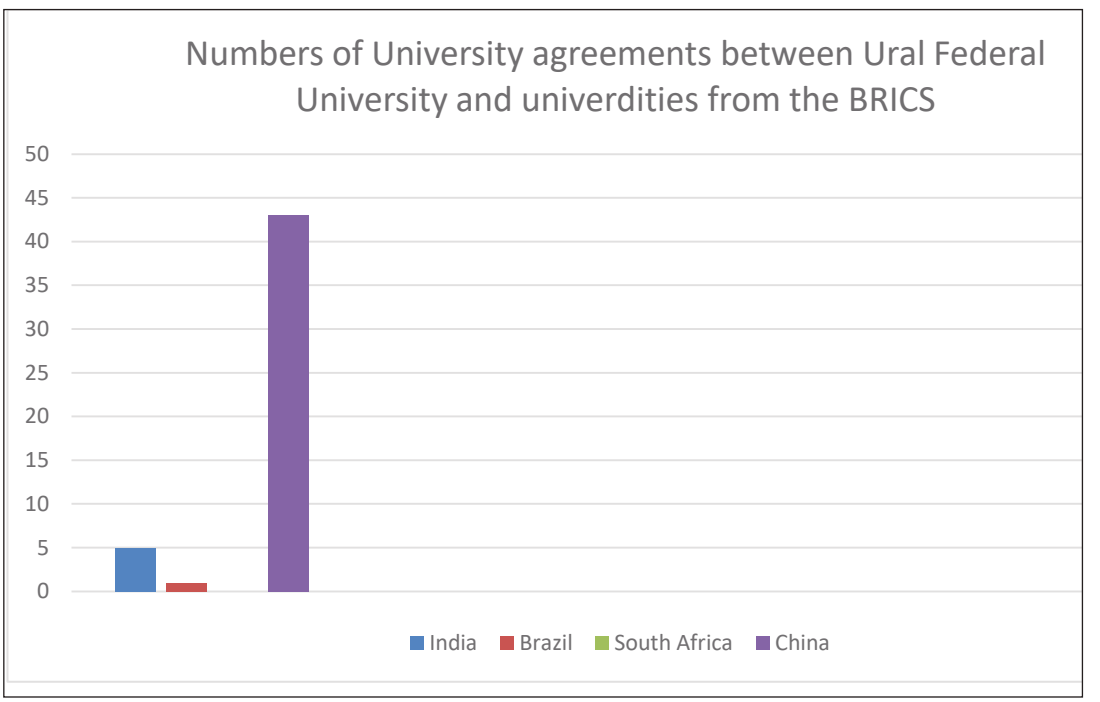
collaboration with other research and educational institutions of the BRICS countries. The main goals of such collaboration are: enhancement of visibility and competitiveness of the educational and research institutions of BRICS countries, especially in the context of world university rankings, including BRICS QS ranking, BRICS and Emerging Economies THE Ranking and other relevant international university rankings; formation of common educational space of the BRICS countries through academic exchanges, joint and network projects as well as via the activity of the relevant Associations and Leagues; creation of common research area through organizing joint studies in the fields of common interest, publishing joint articles, working out projects of joint scientific and scholarly journals as well as via creating wide network of joint post-doctoral fellowships; building shared innovation infrastructure, which would include joint-stock small and medium enterprises, start-up centres, business incubators etc. to influence the development of technologies of interest for BRICS economies; enhancement of understanding and intensification of the cultural contacts between the peoples of BRICS countries through organizing various events, short programmes and courses, including promotion of the languages of BRICS countries" (Ural Federal University 2020).

Russian Academy of Science

The Ural Branch of the Russian Academy of Sciences is a diversified research complex comprising 38 institutes, the largest scientific library in the Urals, design-and-technological and engineering centers, and a network of hospitals. Academic research centers are located in Yekaterinburg, Syktyvkar, Izhevsk, Perm, Chelyabinsk, Arkhangelsk and Orenburg. Over 3,300 scientists work in them, of which 673 are doctors and more than 1,800 candidates of science. Research in the most important scientific areas is led by 31 full members of the Russian Academy of Sciences and 52 corresponding members of the Russian Academy of Sciences. There is a doctoral program; postgraduate studies are underway in 83 specialties.

The main areas of research are related to theoretical and applied mathematics and mechanics,

Table 2: UrFU Agreements with BRICS Universities



Source: Author's compilation

control processes, solid state physics and chemistry, electrical and thermal physics, thermal energy, complex problems of mechanical engineering, the theory of metallurgical processes, high-temperature electrochemistry, synthetic organic chemistry, population ecology, immunology, genetics, a comprehensive study of plant, animal, water and soil resources, the creation of the basics of rational nature management, geological geophysical studying geological province and adjacent regions, a complex of humanities and social sciences. The formation of these areas is due to the features of the historical development of academic science in the Urals and the needs of one of the largest industrial regions.

The most active science cooperation among BRICS and Ural Brunch of RAS goes with China. For instance, in 2003, according to the director of the Institute of Solid State Chemistry of Ural Branch of RAS academic Yatsenko, they launched technology at Pin-Guo in China for the recovery of gallium from bauxite processing solutions on alumina. And thanks to that China came to the first place in the world to produce this metal. (Plotnikova 2019).

Every year there is a Russian-British scientific café which has place in the Institute Physics of Metals, Ural Branch of RAS together with the British council in Yekaterinburg (in 2019 there was 8th café). In this format, scientists from Great Britain, Germany, Japan and their Russian colleagues from various regions countries discussed the most important issue – behavior materials in extreme conditions. In 2019 there were 13 participants in this event. The first café took place in 2012 and was dedicated to problems of organic chemistry. The following events passed also in the capital of the Urals and in Perm. Their subject was diverse – space magnetic fields, problems of physiology, agricultural technologies, and economic issues. (Panizovkina, 2019). Foreign do their scientific reports at this café along with the Russian. It is a very informative and useful format of scientific diplomacy which allows specialists to communicate and exchange knowledge.

One of the problems which the Institute of Industrial Ecology, Ural Branch of RAS works on is increased radiation. It is important task to be solved because mankind can't live without this technology today. This the Institute of Industrial Ecology, Ural Branch of RAS, scientists developed the technology for a complete update of the radiation monitoring system which was implemented to every Russian atomic power plants. And as we know India is one of the partners of Russia where Russian specialists build atomic power plants. "Tamil Nadu State, Kudankulam NPP. Block No. 1 of the station began generating electricity in 2013, in the summer of 2016 it was finally transferred to the customer.

In August 2016, unit 2 of the station was first connected to the national energy system of India, and at the end of March 2017 it was put into warranty operation. On October 15, 2016, Russian President Vladimir Putin and Indian Prime Minister Narendra Modi took part in the laying of the second stage of the Kudankulam NPP via videoconference. In June and October 2017, the actual start of construction took place (pouring "first concrete"), respectively, of the third and fourth blocks of this nuclear power plant. Preparations are underway for the start of the construction of the third stage (blocks 5 and 6).

In October 2018, in New Delhi, the State Atomic Energy Corporation Rosatom and the Atomic Energy Commission of India signed a document on cooperation on new projects in the field of nuclear energy. According to the document, the parties intend to develop a project to build six nuclear power plants of Russian design with modern 3-generation WWER reactors at a new site in India. The site for the new NPP units was not called, but it was previously reported that it could be located in the Indian state of Andhra Pradesh" (Novosti. 2019). So, it means that the technologies developed by the Urals scientists will be used there too.

Challenges for international cooperation in the Ural region

In spite of the fact that Ural region has distinguished impact on the development of science and technology in Russia and the world, there are some challenges, which should be overcome in future. The first is in relation to concerns the BRICS. The statistic data show that the most active science and cultural cooperation Ural region has with China. For instance, *Table 2* demonstrates in numbers which the BRICS countries works with UrFU in the sphere of university education

There are two official schools of Chinese (Confucius Institute, UrFU and Confucius School, Russian State Professional Pedagogical University). There is one Cultural center of India, based in Yekaterinburg Academy of Contemporary Art. There is the same situation is witnessed in the case of the Ural Branch of RAS.

Conclusion

During 2020 Russia will preside the BRICS. The slogan is "BRICS Partnership for Global Stability, Common Security and Innovation Growth". According to President Putin, it is important that the BRICS states work closely together to solve global and regional problems, together they stand for strict observance of international law and uphold the central role of the United Nations in world affairs, these countries contribute to increasing the influence of developing states in the global governance system, creating a more equitable world order". He also noted that the "five" participants are consistently deepening mutually beneficial economic ties, increasing trade and investment approaches, jointly solving such important tasks as modernizing industry, introducing innovative technologies, and improving the welfare of citizens.

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India and CIS Countries: Cooperation in STI and Role of Science Diplomacy

Anait Tonian*

Introduction

Science and technologies are not only a source of economic growth of countries, but also the basis for the realization of the idea of universal prosperity. This explains the desire of many countries to develop science and technology in all possible ways, including international cooperation. The leaders of India recognized the importance of science at the very beginning of the emergence of a new independent power. India had quite productive relations with the USSR in the past, so it is not surprising that after the collapse of the USSR in 1991 the cooperation between India and the post-soviet countries was established and still tends to strengthen it.

Given the worsening international political situation and the narrowing of opportunities for deepening economic cooperation between Russia and the West, a quantitative assessment of the current state and the study of the growth potential of mutual investments of the "four" CIS countries (primarily members of the Customs Union) and South Asian countries are becoming particularly relevant.

India-CIS Countries Cooperation in STI

India and the CIS countries face similar problems in STI ecosystem: firstly, the training of qualified personnel for work in high-tech industries and, at the same time, the problem of brain drain, and secondly, the creation of a research infrastructure that meets all modern requirements.

Russia

As partners in many fields, in the sphere of science and technology India also maintains the closest cooperation with Russia. Cooperation between India and Russia intensified in recent years. Russia can help India not only to re-equip the army and navy, and begin to create their own effective military-industrial complex. It was noted, that over the past few years, India has concluded a number of agreements with Russia for the supply of high military technology, as well as the supply

* *Guide, Museum and Exhibition Complex, Russia My History.*

of oil and gas energy. The legal basis of Russian-Indian cooperation in science diplomacy is the intergovernmental Agreement on scientific and technical cooperation of June 30, 1994. In December 2002, the Joint Declaration on strengthening and building up economic, scientific and technical cooperation and the intergovernmental protocol on the protection and use of intellectual property rights, which is the legal basis for enhancing the process of commercialisation and transfer of high technologies[1]. There`s an Agreement between the Russian Academy of Sciences and the Indian National Academy of Sciences (2003). Many joint research centers have been established. So, in June 2010, the Russian-Indian Science and Technology Center was opened in Moscow as a structure for effective innovative interaction. Its main goal is the practical embodiment of the results of scientific research. In April 2012, the official opening of the branch of Russian-Indian Scientific & Technological Center in Delhi took place[2].

Russia and India have a long history of relations, but their potential is far from exhausted, especially in the field of science and technology. Thanks to the support of the governments of both countries, there are good prospects to bring scientific and educational cooperation to a new level, providing not only world leadership in modern industries, but also improving the quality of life of people both in India and in Russia.

Belarus

India and Belarus open a new stage of cooperation now. The focus is on scientific and technical cooperation, innovative and new technologies, where Belarus has gained considerable experience on a number of issues. The possibility of creating a demonstration technology center in India is being considered. Another side is the partnership between India and Belarus in the field of skills development, vocational education. Belarus is an active participant in the Indian program of technical and economic cooperation[3].

Central Asia

In June 2012, the Indian leadership announced the beginning of the implementation of a new political project aimed at strengthening the position of India in Central Asia and received the name "Connect Central Asia". The new course involves the development of political relations with Central Asian states; strengthening strategic and military-political interaction and consultations on Afghan issues; active cooperation in the energy sector; increased interaction in the field of medicine and pharmacology, tourism, construction, banking; expansion of cooperation in the field education, providing for the development of academic exchanges, distance education, opening Central Asian University in Bishkek; creation of a Central Asian electronic network; development transport links, including air traffic and the International Transport Corridor "North -South"[4].

On April 1, 2016, the Protocol on Scientific and Technical Cooperation was signed between the Department of Science and Technology of the Ministry of Science and Technology of the Republic of India and the State Committee for Science of the Ministry of Education and Science of the Republic of Armenia. The protocol is aimed at strengthening the cooperation established by the agreement on cooperation in the field of science and technology between the Government of the Republic of Armenia and the Government of the Republic of India, signed on March 25, 1994 in New Delhi. This protocol will help strengthen existing friendly relations between the two states, as well as deepen cooperation between scientific institutions, universities and research groups of the two states. In accordance with the protocol, the Parties welcome the implementation of joint projects of mutual interest and express their readiness to coordinate bilateral funding of joint research projects in such areas as disaster management, astrophysics, nuclear medicine, high-energy physics and pharmaceuticals.

Gradually moving towards establishing cooperation with Uzbekistan. President of Uzbekistan Shavkat Mirziyoyev and Narendra Modi agreed on cooperation in various fields, including the development of outer space for peaceful purposes. During this meeting 20 documents were signed. A decision was made to cooperate in the field of military education, agriculture, science and technology, health and medical science, and to jointly combat illicit drug trafficking[5].

Conclusion

The insufficient development of cooperation between India and the CIS countries is due to the fact that the CIS

countries gained their independence after the collapse of the USSR in 1991 and despite such a short period of independent self-government, many agreements have already been reached in various fields. That is why India and Russia have the most developed relations. Compilation of the categorical apparatus is an important and very difficult task, understand each other by scientists as well. The non-proliferation of English in the CIS countries also creates a number of obstacles to the development of scientific diplomacy between countries.

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Development of Science, Technologies and Innovation in Tajikistan

Aziza Razykova*

Introduction

Being the part of the former Soviet Union (USSR), the development of science in Tajikistan was at a relatively high level. The institutes of the Academy of Sciences of the Republic of Tajikistan, other research institutions and higher educational institutions have created the material and technical base for scientific research. In many areas of science, scientific personnel were trained, original scientific schools were formed. The studies were carried out in coordination with the institutes of the USSR Academy of Sciences and other scientific centers of the erstwhile USSR.

But faced with the consequences of the collapse of the USSR and gaining independence, for which Tajikistan was not prepared financially or morally, as well as the socio-political and socio-economic crisis caused by the events of the early 90s, science became stagnant.

After the proclamation of State independence of the Republic of Tajikistan, great efforts were aimed at preserving and maintaining scientific potential, reforming science and scientific technologies, reorienting science to solving urgent problems facing the country. The process of reforming science is currently ongoing. Research institutions are gradually adapting to activities in the new environment. The country has taken a strategic course to maintain and strengthen scientific potential, as well as the development of scientific technologies as the basis for the successful advancement of the country along the path of sustainable development (Sputnik, 2016).

Development of STI In The Different Spheres

According to UNECE, as of 2015, the Republic of Tajikistan is still at a very early stage in the formation of its national innovation system (UNECE, 2015).

* *Academy of Sciences of the Republic of Tajikistan*

Meanwhile, Tajikistan is located in a geographically important area where the interests of Central Asian countries intersect. Over the past ten years, the country has achieved impressive results in the development of the scientific and technological sectors. The priority areas of scientific research for Tajikistan are areas such as geophysical instrumentation, forecasting seismic phenomena and earthquakes, the creation of alternative energy sources, for example using solar energy, biotechnology, the use of laser and plasma technologies in medicine.

The results of recent studies conducted in Tajikistan in the joint cooperation of our and foreign scientists and researchers have shown a high demand for photovoltaic systems and solar water heaters in regions that are not connected to the grid, as well as in areas with tourism potential, such as Seven Lakes (Haftkul), Fan Mountains, Baljuvan, Shakhrinav, Shirkent, Darvaz, Vakhan corridor, and others. This direction can be developed by improving the legislative framework and financial opportunities. For information, in Tajikistan pilot (model) solar panels have already been used to accumulate solar energy and use them in the event of a power outage in such sensitive places. Tajikistan is a country located at a fairly high level above sea level, where warm sunny weather prevails most of the year. Therefore, the use of solar panels in the country seems affordable and real (Sputnik, 2019).

Regarding the HPS, the famous scientist in the area of physics and mathematics, academician, Dr. Mamadsho Ilolov cites that HPS is usually installed on large rivers. But he claims that it can be done on small rivers (Fergana International News Agency, 2018). In Tajikistan, there are 20 thousand rivers and streams on which small power plants can be built to provide electricity to small villages in remote regions.

Again, if we talk about heliostations, Tajikistan has many advantages here. Tajikistan is located in the so-called "sunbelt", where Italy, the countries of the Caucasus and Transcaucasia, as well as Central Asia are located. The use of solar energy also contributes to the relief of Tajikistan. The degree of insolation or, simply, illumination depends on the height: the higher, the more insolation. Solar panels and modules can be positioned higher, and then they will receive 20 percent more energy than in the lowland. We have territories that are located at an altitude of 1,500 to 3,500 meters above sea level. The air there is drier, which further enhances insolation. The topographny offers immense potenmtial to harness solar energy. It requires conducting a separate analysis of the territories in the republic, and trace how the parameters related to height change. This will help determine the best locations for installing solar panels.

STI Institutions & Regulations in Tajikistan

Regulatory Documents on STI

To date, the country itself has adopted a number of laws, strategies, directions and decrees of the Government that determine the national policy in the field of science, technology and innovation aimed at supporting the scientific potential and the development of scientific research:

The Law of the Republic of Tajikistan "On Science and State Scientific and Technical Policy" (1998);

Decree of the Government of the Republic of Tajikistan dated July 18, 1996 No. 331 "On the Council for the Coordination of Research in the Field of Natural, Technical, Medical, Humanitarian and Social Sciences in the Republic of Tajikistan";

Decree of the Government of the Republic of Tajikistan dated March 15, 1999 No. 87 "On the Concept of State Scientific and Technical Policy of the Republic of Tajikistan";

Decree of the Government of the Republic of Tajikistan of October 1, 2004 No. 385 "On the Activities of the Academy of Sciences of the Republic of Tajikistan".

National Development Strategy of the Republic of Tajikistan for the period until 2030

The Innovative Development Program of the Republic of Tajikistan for 2011-2020, approved in April 2011 with the aim of forming an effective innovation system that helps to increase the technological level and production competitiveness .

The Law on Innovation, adopted in 2012, creates the legal basis for the implementation of innovation policy in the country.

The Law "On the Technology Park", adopted in 2011, defines the legal conditions for the creation of technology parks on the territory of the Republic.

The Decree of the Government of the Republic of Tajikistan "On the definition of an authorised state body in the field of innovation", approved by the Government in 2013 and determines the Ministry of Economic Development and Trade as an authorised state body in the field of innovation.

National Strategy for the Development of Intellectual Property for 2014-2020, approved by the Government Decree in 2014. Improving the legislation, creating specialised infrastructure, improving work in the field of intellectual property management at the departmental (industry) level, developing the educational system in this area and the mechanisms of public access to world achievements in science are the main directions of the programme.

The program of state support for entrepreneurship in the Republic of Tajikistan for 2012 - 2020 was adopted by a Government Decree in 2012. The program describes a number of measures necessary for the development of entrepreneurship in the country.

The programme for the development of human potential and intellectual property for the period until 2020 (2012), the main purpose of which is the development of the country's intellectual potential and the protection of intellectual property.

The concept of innovative development of the agricultural sector of the Republic of Tajikistan.

Strategy of innovative development of the Republic of Tajikistan for the period until 2020

Decree of the Government of the Republic of Tajikistan "On the Procedure for State Registration, Organisation and Examination and Competitions of Innovation Projects" (2013).

The Strategy of the Republic of Tajikistan in the field of science and technology for 2007-2015 was developed on the basis of the above Laws of the Republic of Tajikistan and Decrees of the Government of the Republic of Tajikistan (Republic of Tajikistan (2015).

In Tajikistan, today there are many institutions, territories and zones of favor, contributing to the maintenance and development of innovations and technologies, including:

Technological Park of the Tajik Technical University named after academician M.S. Osimi, which was created in 2012 and is engaged in the implementation of scientific research and the manufacture of educational and laboratory equipment. The project's customers are various private and state-owned companies, such as Gazprom Neft-Tajikistan LLC, UGAI of the Ministry of Internal Affairs of the Republic of Tajikistan and other universities of the country.

The technology park at the Tajik National University was established in 2011 with the aim of implementing innovative programs and projects. The implemented projects include work in the field of energy-saving technologies.

The technological park of the Tajik Agrarian University named after Sh. Shokhtemur has been operating since 2014. A number of laboratories operate at its base: Ichthyology, Lemon Cultivation, Floriculture, as well as the Biotechnology Research Institute.

An innovative center of biology and medicine, established in 2011, whose goal is to develop and promote the scientific and applied aspects of biological and food (food) safety. A number of projects of the Center are devoted to the analysis of genetically modified plants and food products. Projects are implemented in collaboration with international partners.

Business IT incubator Dushanbe established in 2014. The mission of the Incubator is to develop an ecosystem for generating innovative ideas, implementing projects and commercialising technologies. It provides infrastructure for software development, consulting services and various forms of education and training.

The Presidential Foundation for Fundamental Research was established in 1996 and is engaged in targeted financing of fundamental research, which

is promising for the innovative development of the country's economy.

The Business Support Fund (Business Challenge Fund), which was launched in 2012 as a result of cooperation between the Government of Tajikistan and the UN Development Program, is actively working in the Sughd region, where it provides cheap loans to entrepreneurs. The conditions for issuing a loan are at least three years of experience, an innovative approach to production or ideas for the production of new products, the use of new technologies, the use of energy-saving technologies, etc., as well as the status of an exporter.

The Entrepreneurship Support Fund was created in 2013 as part of the implementation of the State Entrepreneurship Support Program in the Republic of Tajikistan for 2012-2020 and operates under the Tajik State Committee for Investments. The main function of the Fund is concessional financing. Currently, the organisation has already issued loans of more than $ 10 million.

Startup Weekend Tajikistan is a regularly organised initiative for entrepreneurs from Tajikistan, which serves as a platform for communication between young entrepreneurs and mentors. Events are sponsored by GoogleInc.

The role of the Chamber of Commerce and Industry of the Republic of Tajikistan in the innovation system is to attract foreign investment to the Republic to create new, technical re-equipment and modernisation of existing industries.

The Association of Innovative and Technological Entrepreneurship, the main purpose of which is to promote the implementation of innovative solutions and effective technologies in all sectors of the economy and areas of activity in which small, medium and large enterprises operate both within the Republic of Tajikistan and beyond.

Authorised state institutions, including the Ministry of Economic Development and Trade, the Ministry of Industry and New Technologies, the Ministry of Finance, the Ministry of Education and Science, are also responsible for the development and promotion of innovation, science and technology in Tajikistan.

Expert Coordinating Council for managing the implementation of the Innovative Development Program of the Republic of Tajikistan for 2011-2020 (2012)

The State Scientific Institution "Center for Innovative Development of Science and New Technologies" is a unit of the Academy of Sciences of the Republic of Tajikistan, established in 2011.

National Council for the Coordination and Development of Intellectual Property (2015).

The Center for Innovative Development of Science and New Technologies at the Academy of Sciences of the Republic of Tajikistan (2011), the main purpose of which is the organisation and conduct of scientific research, as well as applied work in the field of development and implementation of innovative projects and new technologies.

Among the research, educational institutions and projects the following can be distinguished:

Academy of Sciences of the Republic of Tajikistan

Center for the Study of Innovative Technologies at the Academy of Sciences of the Republic of Tajikistan (2017)

Industry research organisations, which include the Research Institute of Labor and Social Protection of the Population, the Research Laboratory of Environmental Protection, the Center for Strategic Studies under the President of the Republic of Tajikistan, the Research Center of the State Committee for Land Management and Geodesy, the Institute for Educational Development Academy of Education of Tajikistan and the Institute of Public Administration under the President of the Republic of Tajikistan.

Council for the Coordination of Research in the Field of Natural, Technical, Medical, Humanitarian and Social Sciences.

As well as information resources, which have gained great popularity among the population and are widely used in recent decades due to their availability. Among them:

The National Innovation Internet Portal of the Republic of Tajikistan, which contains information on innovation, new technologies, both domestic

and foreign research organisations, companies, and small and medium-sized businesses. The portal provides a mechanism for collecting and promoting innovative proposals and projects in various fields of activity (Innovation Cooperation Internet portal, 2020).

National State Institution "National Patent Information Center" (2012). The center was formed by a Government Decree in order to protect industrial property and further develop the system of scientific and technical information in the country.

Despite all this, Tajikistan still faces a number of problems, the timely progress of science, scientific technologies and their joint contribution to the country's socio-economic development depends on a timely solution.

Challenges

The difficulties science faces in Tajikistan today:

Inadequate material and technical support of science: The material and technical base for conducting scientific research is very outdated and partially destroyed during the years of the civil war and socio-political instability. Scientific equipment and instruments are physically and morally obsolete and do not meet the requirements of modern science and technology. Although Tajikistan has free aid in the form of innovative technologies from economically developed countries like Germany, China, etc., this is still not enough for full-fledged promotion, processing of products and work with natural resources at the international level.

The lag in the formation of a modern information base in the field of science is another reason why the development of science in Tajikistan is constrained. The institutes of the Academy of Sciences of the Republic of Tajikistan, sectoral scientific institutions, departments and laboratories of higher educational institutions are still not adequately equipped with computer equipment. World experience shows that without the use of modern information and communication technologies, science is doomed to lag, it is impossible to create competitive technologies and effectively put them into practice. This also includes a small edition of publications, including monographs, scientific journals, collections of articles and proceedings of scientific conferences on pressing problems of science. For this reason, the results of research become obsolete, the development of scientists of Tajikistan does not find timely access to the international scientific and information space, the priorities of scientific achievements are lost. Due to insufficient funding, research institutions are not able to receive foreign journals, books and other scientific information, which also negatively affects the quality and effectiveness of research.

The shortage of highly qualified personnel, like the previous one, today is associated with insufficient funding of science, as well as the fact that many scientists and specialists left the country during the years of the civil war and instability, and it is still not possible to fill the shortage of highly qualified scientific personnel, especially in the specialities of the exact, natural, and technical sciences.

One of the most important factors in increasing the efficiency of training scientific personnel, using the scientific and experimental base of academic institutions in the educational process and increasing the level of scientific research in higher education institutions is the integration of science and education. Lack of proper integration of academic science and educational structures reduces their development potential and contribution to the transformation of the economy and society.

The scientific potential of the institutes of the Academy of Sciences of the Republic of Tajikistan, sectoral scientific institutions and higher educational institutions has not yet been adequately combined in order to consolidate efforts and resources for the training of highly qualified personnel and specialists in the scientific and technological field and to jointly use the scientific and experimental base of the academic industry and university sectors of science, in research and educational processes.

6. Weak concentration of scientific potential in the priority areas of scientific research and socio-economic development of the country. In Tajikistan, scientific developments are carried out in many areas. But the scientific potential has not yet been adequately concentrated on solving the priority problems of science and the socio-economic development of the country. Many

scientific discoveries and scientific research are conducted in the humanitarian fields, less in the field of natural sciences. An insufficient number of scientific personnel is observed in the mentioned industry. Planning for research in this area needs further improvement and development of targeted integrated scientific and scientific-technical programs.

The lack of a proper connection between science and production is also an important problem, contributing to the lag of science from international standards. Scientific and technical developments and practical recommendations do not always meet the requirements of the level of development of modern technologies. The search for new forms of interaction between science and production is poorly conducted; moreover, the transition of the sphere of science and technology to the innovative development path is slowly taking place.

Lack of international scientific cooperation: In recent years, the international relations of Tajik scientists have expanded markedly, however, the level of international scientific cooperation should still be developed. Despite a large number of signed agreements and agreements on cooperation in the field of science and technology, the effectiveness of their implementation is not high enough. Over the past year 2019, there has been a noticeable intensification of scientific ties and the development of a common scientific potential with Russia, Germany and China.

Another problem today is the relationship between science and the economy in the Republic of Tajikistan. It is underdeveloped. Nevertheless, it is absolutely necessary to invest in science and develop the relationship between science and the economy for the future of the country in the long run, while emphasising the development of missing capacity elements such as technology transfer and commercialisation. Low demand for innovation is a persistent problem, as business interest in innovation is a key condition for the development of an active relationship between science and the economy. Innovation policy should aim at building capacity for adaptation-based innovation by stimulating the relationship between science and the economy and supporting the demand for innovation.

The current situation and existing problems in the field of science dictate the need to develop and adopt a set of measures for state support and development of science, the implementation of which should significantly strengthen the influence of scientific potential on the socio-economic development of the country, the rise of education and culture in the Republic in the coming years. For this reason, recommendations were developed to achieve a high level of intellectual potential of society and improve the quality of life of the population.

Recommendations

Recommendations are an important part of solving problems, developing and promoting the sphere in which they are involved. This is the most optimal way to choose a political course in the mentioned area, among which:

Invest more in education and training, including vocational education and training on the job. To support the aspirations of cadres for additional education. Develop the ability to adopt and adapt innovations. Reforms should be oriented towards international quality standards and support their implementation. For these purposes, it may be necessary to attract funding from international donors, since the need for resources will be significant, given the large percentage of young people among the growing population of the country.

Provide access to foreign knowledge and innovative products, services and solutions that have already proven their worth in foreign markets. In general, it is cheaper, faster and less risky in comparison with the formation of knowledge and the development of completely new products and services by the country itself. Import of machinery and equipment, transfer of knowledge from multinational companies to their subsidiaries located in Tajikistan, acquisition of rights to use foreign knowledge in the framework of licensing agreements of the direction that should be developed. It should be emphasised that related investments in the training of qualified personnel and the development of domestic R&D are necessary so that the Tajik economy can successfully accept and adapt foreign knowledge and innovations.

Mobilise remittances from abroad to finance domestic investment and attract foreign investment. This will not only provide a partial solution to the problem of limited domestic financial resources, but also bring new knowledge.

Reduce the burocratic paper - based prevention of the development of the business environment within the country, but in contrary improve it. Reforming the regulatory system, for example, by reducing the number of required permits for starting a business, as well as reducing the number of taxes taxed on startups. The implementation of such measures is feasible in a fairly short time, since experience and practice are publicly available and can be adopted from successful countries. It is also necessary to update the energy and transport infrastructure. This will require significant investments and, probably, assistance, including from multilateral financial institutions.

Streamline and coordinate existing innovative policy measures in order to reduce inefficient spending and increase their effectiveness.

To ensure the improvement of approaches and innovations in business processes that are aimed at improving the quality of products and services. This can be done at relatively low cost and relatively quickly while obtaining significant benefits by expanding the ability of Tajik enterprises to enter international markets.

Focus strategic support on existing sectors to support increased productivity in these sectors. One example is the transition from agriculture to the development of the food industry.

The dissemination of the results of scientific research is mandatory, as it is critical for the links between science and industry.

In the medium and long term, it is necessary to strengthen the awareness of the importance of intellectual property rights among researchers, teachers, students and scientific organisations in general. Special training should be organised for specialists in the field of intellectual property, paying particular attention to the training of patent attorneys. It is also necessary to provide support to domestic inventors in obtaining patents abroad.

Conclusion

The analysis of the regulatory framework proves that Tajikistan has almost no problems in the field of legislation, that is, the adoption of official documents, but in the field of implementation and timely fulfilment of our goals.

As well as the institutions mentioned in the article should function in a timely manner. This will all be feasible after the implementation of the recommendations implementation mechanism.

Naturally, the development of science, technology and innovation will lead to an improvement in the energy sector of the economy, which in turn will help to solve the most acute environmental management problems in the region.

The key areas are primarily energy, ranging from hydropower and ending with solar panels, on which, mainly, our economy is built. Another equally important area that should be paid attention to and the future of our generation depends on the decision of is the study of the effects of climate change, as well as the annual reduction in the supply of clean freshwater sources.

In addition, innovative technologies and science will have to help the development of the agricultural sector of the Tajik economy, one of the priority areas of which is agriculture, in particular, increasing the yield and quality of food in the country.

Also, for further growth of the economy with an income below the average, such as the economy of Tajikistan, it is not so much the engineering and construction potential that is important as the production and economic, vocational and technical or production potential.

Only by joint efforts can we solve the problems of science and innovative technologies by reviewing the financing of the field of science and rely on the younger generation of researchers, as well as the introduction of applied innovations in production.

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Can Science Diplomacy address Tanzania's Developmental Problems?

Mohammed Soud Juma*

Introduction

Science is the intellectual and practical activity encompassing the systematic study of the structure and behaviour of the physical and natural world through observation and experiment. According to encyclopaedia Britannica, science is any system of knowledge that is concerned with the physical world and its phenomena and that entails unbiased observations and systematic experimentation. In general, a science involves a pursuit of knowledge covering general truths or the operations of fundamental laws. Science is the systematic study of the nature and behaviour of the material and physical universe, based on observation, experiment, and measurement, and the formulation of laws to describe these facts in general terms. Also, we can say that Science is an accumulated body of knowledge and skills concerned with nature, learning and understanding.

Diplomacy is the profession, activity, or skill of managing international relations, typically by a country's representatives abroad. According to Siddhartha (2019:1), diplomacy as one is taught at entry into any training school for diplomats- is the primary means by which a state gives effect to its statecraft. In its relations with other states, a state's diplomats are the first in the chain of links designed to affect the non-military ends of the state.

Science diplomacy is the use of scientific collaborations among nations to address common problems and to build constructive international partnerships. Many experts and groups use a variety of definitions for science diplomacy. However, science diplomacy has become an umbrella term to describe a number of formal or informal technical, research-based, academic or engineering exchanges. Among the experts are Federoff (2009), Turekian *et al* (2014).

* *M.A Kiswahili, State University of Zanzibar, Tanzania*

ccording to Federoff (2009: 9-11) said that Science diplomacy is the use of scientific collaboration among nations to address common problems facing 21st-century humanity and in building constructive international partnerships. This is means that, countries explain their common problems in the wide world or to the members of their international partnership, in order to find the solution to the problems. It is increasingly critical in addressing many of the urgent challenges, such as management of global commons, faltering public health systems, and the threat of collapsing ecosystems (Turekian et al., 2014). This explanation shows that science diplomacy is the big pond that all problems are immersed in it for cleaning. These include internal problems and external problems.

The aims of this paper are to introduce the ability of science diplomacy to solve Tanzania's problems face science diplomacy in Tanzania and to find the solution to those problems. This is because, in 2011 Tanzania signed a bilateral agreement with South Africa for scientific cooperation in the following areas:- intellectual property, science, technology and innovation policy, biotechnology, information and communication technologies, and nanotechnology and materials science. But the achievement of those areas has not been successfully well.

Governments are well aware that science and technology cut-across national politics and can be engaged to tackle and hopefully solve global problems. However, the degree to which their international science and technology policy is guided by one or the other strand of reasoning, by offensive or defensive objectives or by a blend of all these vary considerably. Also, a great variety of approaches, in goals and in means, suggest it to be futile to look for a one-size-fits-all model to deal with international science and technology and science diplomacy. Instead, different institutional settings and political trajectories, interests and governance modes entail different approaches, which are still difficult to separate clearly (Flink and Schreiterer, 2010).

Contribution of Science Diplomacy in Developing Countries

Science diplomacy is the instrument used to build capacities in the countries of the global south through the framework of south-south cooperation to achieve development. The Indian government, since 1964 established the ITEC programme (The India Technical Economy Cooperation), in which delegates of various countries from Africa, Asia, Latin America learn and explore the role of Science Diplomacy (SD) in foreign policy and to benefit from such initiatives in engagement with other countries, regional and multilateral institutions and global organizations.

Why science diplomacy is important?

In a speech at the 2008 Davos World Economic Forum, Microsoft Chairman Bill Gates called for a new form of capitalism that goes beyond traditional philanthropy and government aid. Citing examples ranging from the development of software for people who cannot read to developing vaccines at a price that Africans can afford, Gates, noted that such projects "...provide a hint of what we can accomplish if people who are experts on needs in the developing world meet with scientists who understand what the breakthroughs are, whether it's in software or drugs". He suggested that we need to develop a new business model that would allow a combination of the motivation to help humanity and the profit motive to drive development. He called it "creative capitalism", driven by a pinch of idealism and altruistic desire to a better lot of others.

Scientists and engineers have an important role to play in creating what New York Times columnist Tom Friedman calls a "flat world," a world of economic opportunity made equal through electronic communication technologies.

At the 2010 Inter-Academy Panel of the British Royal Society, UK Foreign Secretary David Miliband said, "The scientific world is fast becoming interdisciplinary, but the biggest interdisciplinary leap needed is to connect the worlds of science and politics".

CEO of the American Association for the Advancement of Science Rush D. Holt, Jr. wrote, in his article entitled "Scientific Drivers for Diplomacy" published by *Science & Diplomacy* that "Beyond providing knowledge and applications to benefit human welfare, scientific cooperation is a useful

part of diplomacy - scientific cooperation to work on problems across borders and without boundaries, cooperation made possible by the international language and methodology of science, cooperation in examining evidence that allows scientists to get beyond ideologies and form relationships that allow diplomats to defuse politically explosive situations." Holt was the U.S. Representative for New Jersey's 12th congressional district from 1999 to 2015 and has a PhD in Physics from New York University.

Many of the global challenges related to health, economic growth, and climate change lay at the intersection of science, technology and international relations. Tanzania is among the developing countries of Africa and is expected to be in the countries benefiting from the science diplomacy.

Problems facing Tanzania's S&T Development

The problems that face the development of Tanzania's S&T development include weaker linkages between research and public policy, barriers to teaching and learning science, and over-dependence on donors.

Weak Research-Public Policy Linkage

In Tanzania, the main body in charge of science, technology and innovation policy is the Ministry of Communication, Science and Technology and its main co-ordinating agency, the Commission for Science and Technology (COSTECH). COSTECH co-ordinates a number of research institutes engaged with industry, health care, agriculture, natural resources, energy and the environment. A 2011 survey found that the public policymaking process was inadequately informed by research-based evidence in Tanzania, largely due to the limited interface between researchers and public policy-makers in the government. Among the challenges threatening the research-policy linkage, the study cited (Kraemer, *et al.* 2015). This has led to many scientific studies in Tanzania being ignored and living them in the library without working for them. Due to the ability of science diplomacy to handle the developmental problems of the country, this problem facing Tanzania is solved through science diplomacy for providing training and guidance. A good example of this is the operation of the RIS programme.

An over-dependence on donors

Four DAC members (Denmark, Finland, Ireland, and Japan) agree to participate in the Joint Country Assessment in Tanzania. The aim of the joint country assessment in 2003 was to understand how the implementation of donor's partnership strategies contributes to country ownership. Tanzania that relies on donations to a great extent, it will abjure its responsibility to seek their own development and it leads to not being involved in development activities; such as conducting scientific research mostly science diplomacy. Science diplomacy provides guidelines for developing countries to effectively use financial aid received from the donors. Tanzania will be better served by the financial aid from donors if the donors follow the guidance of RIS programme.

Barriers to Learning and Teaching Science

Tanzania implemented many science education projects. These include the Science Education in Secondary School Project (SESS), designed to improve classroom performance in secondary science and mathematics. Also, the Science Improvement Project, funded by the African Development Bank aims to develop teaching materials for and distribute textbooks to science teachers. In the country reports, it is indicated that little knowledge of the outcomes of these projects is forthcoming since conducting impact studies, systematic evaluations and analyses of both quality and 'needs-based assessment' were absent prior to project implementation (O-Saki, 2007:56). Without emphasising on these projects for achieving goal 4 of the Sustainable Development Goals, Tanzania will continue to face problems. Science diplomacy removes those barriers to developing countries for training member states of south-south Cooperation. The Ministry of External Affairs of India through ITEC offers this training every year to overcome the problem. Tanzania is one of the beneficiaries of this training.

Conclusion

In light of the above information, it can be concluded that science diplomacy is an important factor for the development of developing countries. However, Tanzania and many other developing countries face serious problems that hinder their potential to benefit from, science diplomacy. In a country like Tanzania, science diplomacy removes the problems of poor quality of research findings capable of informing policy and over-dependence on donors, and context of and barriers to learning and teaching science.

It is the responsibility of Tanzania leaders, stakeholders, and international donors to ensure that the development problems facing Tanzania are solved through science diplomacy. It is therefore recommended that effective measures be taken to eliminate problems. So, it is recommended that Tanzania leaders, stakeholders, and international donors ensure that they help in improving the quality of research findings, which are capable of informing policy decisions; oversee and direct scientific research conducted by internal and external researchers; and ensure that the findings and recommendations of the research are implemented. Apart from that, an over-dependence on donors, Tanzania should abandon donor dependencies by a large percentage of their budget and implement development strategies that will lead to the elimination of dependency. These strategies like investing in industrial economies, developing effective and stricter policies of science, technology, and innovation. And lastly, eliminating barriers for learning and teaching science as well as integrating science diplomacy into the education policy are some of the integral policy imperatives for achieving Tanzania's development.

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Role of Science Diplomacy in Addressing Monopolisation of Seeds' Market

Baraket Mokhtar*

Introduction

Science diplomacy is often conceived as the use of the "soft powers" of scientific collaboration to smoothen the political relations between two or more nations. It has become common to refer to this conceptualisation of science diplomacy as "science for diplomacy", which must be distinguished from "diplomacy for science", which refers to establishing scientific collaboration between two or more nations with the goal to address common problems (Gluckman *et al.,* 2017).

The concept of science diplomacy was given contemporary emphasis and currency by a meeting held in 2009 at Wilton House, United Kingdom. The most influential outcome of that meeting was the development of taxonomy for science diplomacy that has come to be widely used: (Gluckman *et al.,* 2017).

Science in diplomacy: Science providing advice to inform and support foreign policy objectives.

***Diplomacy for science*:** Diplomacy facilitating international scientific cooperation.

***Science for diplomacy*:** Scientific cooperation improving international relations.

Bilateral relationship

India - Tunisia Bilateral Relations

India has traditionally maintained cordial and friendly relations with Tunisia since establishment of diplomatic relations in 1958. The first resident Indian Mission at the level of Cd'A was established in Tunisia in 1963 and raised to the Ambassador level in 1976. The Tunisian Embassy in New Delhi was set up in 1981. Tunisian leaders have expressed admiration for India's democracy and its leaders such as Mahatma Gandhi and state that India's freedom struggle has served as an

* *Assistant Professor of agriculture research: climate change, Plant Physiology: National Institute of Research in Agricultural Engineering, Water and Forests (INRGREF), Tunisia.*

inspiration for Tunisia. India accounts for around 50 per cent of Tunisia's global phosphoric acid exports.

Under the two governments of President Bourguiba and President Ben Ali, the two countries also shared a respect for secularism, and moderation was a hallmark of the Tunisian foreign policy. In the early 2000s, a substantial progress was made in bilateral cooperation in phosphates with the establishment in 2006 of a joint venture in this sector. In international fora including the UN, cooperation between Indian and Tunisia continues to be good – the countries supported each other's candidatures at several International bodies and continues to be in similar positions (MFA, 2019).

Science & Technology Cooperation

India-Tunisia Cooperation in Science & Technology is guided by the Agreement on Scientific and Technological Cooperation signed between the two countries in October 1995 and the Programmes of Cooperation there under. The 4th session of the Joint Committee on S&T was held in New Delhi on 23-24 March 2017. Both sides agreed to support 19 new R&D projects in areas including material science, ICT, health science, agriculture, biotechnology, renewable energy and water technology (EI/TBR, 2019).

How Seeds Become a Serious problem

Seeds are the primary basis for human sustenance. They are the repository of the genetic potential of crop species and their varieties resulting from the continuous improvement and selection over time.

Crop improvement and the delivery of high quality seeds and planting materials of selected varieties to growers is necessary for ensuring improved crop production and meeting growing environmental challenges. Food security therefore is dependent on the seed security of farming communities. (FAO, 2014)

Despite the clear advantages of improved varieties, especially with regard to yield, their use in subsistence agricultural systems must be appraised carefully. Because they are generally commercial products, they usually depend on market availability, are protected by intellectual property rights and often require more costly inputs like fertilizers and pesticides. In addition, some of them (like hybrids) require the purchase of seed every season.

Furthermore, the process of developing new varieties which have the desired characteristics and which have the requirements of distinctness, uniformity and stability takes a great deal of time and resources; at the same time, the resultant new varieties generally can be easily and quickly reproduced by consecutive seed-saving and replanting. For this reason, plant breeding companies usually protect their new varieties with intellectual property rights.

That is similar to the work pharmaceutical companies do to produce drugs that don't work, or do not receive FDA approval. In both cases, the company needs to make up for the cost of failed experiments by charging more money for the successful ones. As a result, when you pay for hybrid seeds, you are paying for both the successful and unsuccessful experiments. There is no way around this – after all, it's called "research" for a reason.

These important issues should be taken into account when planning the introduction of improved varieties because the issue will be transferred from the farmer to the decision makers or to the government, since the farmer will complain to the government which in turn encounters a lot of strategic and financial issues to plan the purchase of seeds each year with a monopolized market at rising prices from one year to another which has an impact on the economic balance.

Impact of hybrid seeds in world-market

Year in and year out farmers are losing the seeds from their own plants, and are forced to purchase them anew from seed providers. Monsanto has monopolized the seed market which has significantly limited the variety of plants available on the market. The consequences of which have had fatal effects on both our environment, and the farmers that harness crops from it. The seed industry is more concentrated today than it ever was before.

The ten largest seed corporations dominate three quarters of the commercial seed market. The top three of these, Monsanto, DuPont and Syngenta, represent more than half (53 per cent) of the market. Even more striking are the figures of genetically modified (GM) seeds - according to Greenpeace, Monsanto sold 90 per cent of GM seeds worldwide in 2009 (Reset, 2015).

Outlook for the impact of hybrid seeds in Tunisia

The use of auto species produced by farmers is steadily declining; it went from 65 per cent in 1975 to 42 per cent in 1994 and to 25 per cent in 2004. Among these species, some are characterized by their rarity (tomato, chilli pepper, potato, pasthéque, melon, wheat, barley…) and others are threatened with extinction Currently the selected varieties are widely distributed on farms that support themselves because of their high productivity and this is how hybrids and genetically modified organisms entered the country without anyone being able to report the reality While cereal crops and arboriculture (olive, fig, almond, palm, pomegranate, etc.), a very widespread culture in Tunisia, have kept their specificities (Dabbabi, 2013).

Outlook for the impact of hybrid seeds in India

As a result of a monopolized seed economy and the limited engineering of seed varieties, the overall loss of plant diversity has significantly increased. Over the course of the 20th century, according to the FAO, approximately 75 per cent of crop diversity has been lost. Before the Green Revolution in India there were roughly 50,000 rice varieties, and within twenty years this number dropped to a mere 40-40 from 50,000. Many of the new hybrid variations being created would not be able to keep up considering they share many genetic characteristics (Reset, 2015).

Science diplomacy holds enormous potential for solving problems and building international relationships

Science diplomacy is the use of scientific collaborations among nations to address the common problems facing 21st century humanity and to build constructive international partnerships. There are many ways that scientists can contribute to this process. The global food crisis of 2008 triggered food riots in more than 30 countries and calls for a new Green Revolution. The first Green Revolution, however, was relatively straightforward, if not easy:

Improved crop varieties and increased fertilizer use. The next Green Revolution will be more difficult, even if we succeed in overcoming the deep and widespread mistrust of using modern methods for the genetic improvement of crop plants (Fedoroff, 2009).

How do we as scientists begin to think—and act—on a global scale to address such complicated problems? We must first become citizens not just of our own nations, but of this world without borders. We need to see, experience, and identify with the peoples and the problems of other nations and to recognize the complexity and interconnections among the challenges facing humanity. And perhaps most importantly of all, we need to understand, at a deep gut level, that all our fates are truly intertwined. We must move quickly to develop the science that will allow us to model and understand the complex system that is our planet and its crust of human activities. We need to solve the small and poor farmer in developing country. We need to invest in the research that will allow us to improve how we manage water, grow food, battle disease, and build economies into the next generation— and the next. Science, of course, provides the common language to build bridges between cultures. Education is a stumbling block.

The Green Revolution in India and the establishment of multiple CGIAR Centres across many countries are some of the successful instances where the international partnerships in S&T ked by the national governments have played a critical role.

Speed breeding technology is a powerful tool to accelerate crop

The process of developing new varieties takes a great deal of time, therefore for most crop plants, the breeding of new, advanced cultivars takes several years. Following crossing of selected parent lines, 4–6 generations of inbreeding are typically required to develop genetically stable lines for evaluation of agronomic traits and yield, as a result the farmer

cannot wait and he will need seeds to work, to live.

"Speed breeding" technology shortens the breeding cycle and accelerates crop research through rapid generation advancement. Speed breeding can be carried out in numerous ways, one of which involves extending the duration of plants' daily exposure to light, combined with early seed harvest, to cycle quickly from seed to seed, thereby reducing the generation times for some long-day or day-neutral crops.

Speed breeding can be used to achieve up to 6 generations per year for wheat, barley, chickpea and pea, and 4 generations for canola, instead of 2–3 under normal glasshouse conditions. The technique has also been successfully adapted to oat, various Brassica species, grass pea, quinoa, Medicago truncatula. (Watson *et al*, 2018).

Speed breeding in controlled environment growth chambers can accelerate plant development for research purposes, including phenotyping of adult plant traits, mutant studies and transformation. The use of supplemental lighting using LEDs in a glasshouse environment allows rapid generation cycling through single seed descent (SSD) and plant density can be scaled-up for large crop improvement programs.(Ghosh *et al*, 2018)

Conclusion and Challenges

Science diplomacy links the two policy domains of foreign affairs and science. Competitive thinking and the ways in which this affects global challenges are now putting the globalisation trends in science, technology and innovation under pressure.

In fact, international centers such as International Maize and Wheat Improvement Center (CIMMYT) and International Center for Agricultural Research in the Dry Areas (ICARDA) can supply developing countries and small farmers with varieties that have potential for tolerance.

Tunisia and India has increased cooperation during the last decades in different areas but it is still not sufficient, particularly, in science, agronomic research and technology disciplines. Compared to the number of scientists and researchers who are interested in pursuing their education or for capacity building training in India, the number of seats made available to them is much less. There is good potential but it is virtually unexplored. Addressing this issue is important for both the countries. Moreover, science diplomacy can play an important role in transferring the Indian technology in agricultural sector which it can be a first step forward to an ultimate Tunisian-India collaboration, initiatives and could be an excellent start up to fulfill above possible technologies to be transferred and shared. Therefore the establishment of good scientific relations between the two countries, many problems will be resolved and specifically the varieties problem which is becoming more and more serious in Tunisia. In fact, it is gradually starting to put small farmers into unemployment, which has an impact on young people who are increasingly leaving agricultural work.

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Role of Science Diplomacy in the Framework of Multilateralism: The Case of Uruguay's Accession to Trade Facilitation Agreement

Claudia Natalie Widmaier Müller*

Introduction

Trade facilitation encompasses the simplification, standardisation and rationalisation of procedures and information exchanges corresponding to commercial import and export merchandise operations. The efficiency of the chain that is part of the logistics of international trade is considered as the essence of the concept of trade facilitation, so that concept includes the optimization of the multiple processes involved in the marketing of goods, involving both the public and private s.

In 18 years, the Trade Facilitation Agreement (TFA) was the first multilateral trade agreement successfully negotiated and the first such accord concluded by the WTO. It marked a decisive turning point in several ways. One of those ways was the expectation among all WTO developing countries members about the new topics of discussion that were put on the table.

In the words of Nora Neufel, Counsellor in WTO's Trade Policy Review Division, "…Trade Facilitation Agreement broke new ground in the decentralised, bottom-up way the negotiations were structured, in the manner the capacities and resources of developing countries were explicitly addressed, and in how the Agreement has shifted the system's focus beyond the "software" of trade – policy barriers – towards the "hardware" – process frictions" (World Trade Organisation, 2014).

Importance of Science Diplomacy in the Negotiations of TFA

There are three forms of Science Diplomacy: Diplomacy for Science, Science in Diplomacy and Science for Diplomacy. This last one uses

* *Dirección Nacional de Aduanas Uruguay (Uruguay National Customs), Licenciada en Relaciones Internacionales (Degree in International Relations), Foreign Trade Technique Foreign Trade Department Salto – Uruguay.*

science as a tool to build and improve relations between states. Scientific collaboration is used here to provide collaborative relationships that are based upon a non-ideological basis. The goal is here to support foreign policy actions by mobilising scientific networks (Van Langenhove, Luk. 2006).

For a developing country like Uruguay, it is essential to have human resources trained and understood in the subject of Science Diplomacy, and how it works in negotiations about international trade as well as technology and science, especially south-south cooperation" focused on national programs for technological innovation. The aim of this is paper is to identify which are the economy and integration challenges of Uruguay to have a proactive connection with other developing countries. Also, how they can work together and the ways to do it using national science and technology.

In the Singapore Ministerial Conference held in December 1996, trade facilitation became a topic of debate, in which Members entrusted the Merchandise Trade Council "to carry out exploratory and analytical work on the simplification of the procedures governing trade [...] in order to assess whether it is appropriate to establish WTO rules in this area" (Singapore Ministerial Declaration, 1996).

In July 2004 the WTO Members formally agreed to start negotiations on trade facilitation, based on the modalities set out in Annex D of the so-called "July Package". After an arduous process of debugging and review that lasted for months, the proposals became part of the final text of the Agreement on Trade Facilitation agreed by Members at the Bali Ministerial Conference held in December 2013.

The Agreement officially entered into force on February 22, 2017, after its ratification by two-thirds of WTO Members (WTC, 2017).

How science diplomacy can help developing countries in the framework of the Multilateralism?

All trade facilitation measures aimed at simplifying the formalities and giving greater transparency to the application of the regulations and accelerating the control operations are based on the incorporation of ICT.

In addition, another major change has been induced by the development of information and communication technologies (ICTs), which significantly lowered the salience of borders and simulated worldwide flows of goods and information. As a result, the national economies of the sovereign states have become very interconnected. According to Luk Van Langenhove (2006), here were signs that the existing multilateral system that was designed after the Second World War was undergoing a transformation from mode 1.0 to mode 2.0. A multilateralism 2.0 is more open instead of closed, more networked than hierarchical and less state-centric" (Van Langenhove, 2006).

States have now rolled out a global agenda with measurable goals and have agreed up involving the Science and Technology community in both achieving and monitoring the global goals. That is Multilateralism 2.0 in action. ICTs are the central point in the facilitation measures that are being negotiated in the WTO, and in the new multilateralism called "Multilateralism 2.0". Some of the reasons why this is the main issue for the introduction of technology in developing countries are:

- The globalisation of production trade processes
- The growing importance of security in the supply chain that has led to the adoption of the Regulatory Framework to Secure and Facilitate the Global Trade of the World Customs Organisation, among other measures.

One example of science and technology (S&T) as a tool to cooperate and based on the development of electronic information system is the use of a "Single Window" ("Ventanilla Unica" or "VUCE" in Spanish) that provides the service of the presentation only once and before a single authority of all the documentation and information necessary to comply with the requirements associated with imports and exports. The "Single Window" is an instrument for facilitation for foreign trade and involves a substantial transformation of the processes of foreign trade where the state intervenes and without changing the functional conception of the intervening agencies.

Influence of Science Diplomacy in Uruguay's Technological Development and Innovation

In October 2011, Inter-American Development Bank (IDB) approved a loan of US$10.85 million to improve the quality of e-government services provided to citizens and businesses in Uruguay, and to advance in the simplification of procedures. The Electronic Government Management Support Program-II has the specific objectives of improving the internal coordination of the Uruguayan State in the development of electronic government solutions and new digital public services. The program components include support for e-government projects with a high impact on citizens and businesses (Inter-American Development Bank News, 2011).

With this background, the Foreign Trade Single Window or "VUCE" project is created, which formally commenced with the signing of the Project Constitution Act in March 2011. Subsequently, in January 2012, the Constitution Act is passed for the second phase of the project, where the structure, the source of financing and some relevant milestones are formalised. (Inter-American Development Bank News, 2011)

Under the project, the modernisation of the Uruguay National Customs is led by the Interministerial Commission for Foreign Trade Affairs (CIACEX), a commission that brings together the main Ministries involved in Foreign Trade. This program is executed by Uruguay XXI, a non-state public organisation that aims to internationalise the Uruguayan economy through the promotion.

From the promulgation of the Uruguay National Law of Accountability Nº 19.149 on the 11th November 2013, the "Single Window" of Foreign Trade ("VUCE") is formally created, which integrated the Institute for the Promotion of Investments and Exports - Uruguay XXI and remaining within it the power of implementing this facilitation mechanism. It is a clear example of how science and technology can help to not only multilateralism but also "south-south cooperation". This relates to two of the five modalities of development compact, namely "capacity building" & "technology" (Chaturvedi, 2020).

The project "VUCE" seeks to comprehensively redesign the foreign trade processes including the *revision of the regulations and the incorporation of the necessary technology for operability into a single platform*. Actually, "VUCE" has been integrated with Uruguayan Customs, which allows automatic crossing with customs information. Likewise, certificates of origin can be verified electronically and those issued by other countries can be reviewed.

In addition, technology has been used and negotiated in the framework of "south-south cooperation" in MERCOSUR agreement between Brasil, Paraguay, Argentina and Uruguay, and associated states such as Bolivia, Chile, Colombia, Ecuador, Guyana, Peru and Surinam. In this aspect, Science Diplomacy is the main way to make agreements on platforms like "VUCE" because it is necessary to discuss common issues. Technology in this aspect is used for public and private interaction, as well as international, but it has to be used responsibly and proactive, "…challenges requires two things: (i) a deep understanding of the problems in order to generate ideas about possible solutions and (ii) policy actions by different governance actors at both local and global level" (Van Langenhove, 2006).

Actually, there is a **preferential trade agreement between MERCOSUR and the Republic of India**, signed in January 2004, which aims to:

- strengthen relations
- promote foreign trade
- establish conditions and mechanisms to promote such trade
- create free trade areas

The MERCOSUR-India foreign trade preferential agreement eliminated tariff rates for about 900 products. Some of the national objectives of Uruguay in the accession of TFA were:

- Design, plan and carry out the agenda of Uruguay as a Non-Permanent Member of the Security Council of the United Nations
- Administrative simplification and modernisation Technological at the service of the compatriot
- Strengthen the political dimension of the international cooperation and the promotion of cultural activities as a tool Foreign policy
- Specify new cooperation actions that extend the

action coverage of Uruguay in those regions defined as Strategic
- Contribute to the improvement of education and promotion of scientific knowledge and Technological through technical exchanges
- Improvement of a Human Resources policy that responds to the needs and objectives raised

Although TFA was signed and internalised by Uruguay after the creation of "VUCE" project, the framework, within science and innovation could not be concluded. The context in which TFA was being negotiated is much different after its entry into force, therefore, incentives to create innovations using human resources in science and technology as well as other agencies like Inter-American Development Bank, were necessary to cooperate with developing countries. For example, Uruguayan customs created "VUCE" platform together with CIACEX, the Inter-Ministerial Commission for Foreign Trade Affairs. Without this, some aspects of the TFA such us technology and innovation could not be concluded by Uruguay in the multilateralism aspect.

Conclusion

The TFA represented a new way of negotiating a multilateral trade agreement. The novel Science and Diplomacy terms clearly broke new ground and infused new confidence in the negotiation process. However, they also raised countries' expectations that were not always easy to manage. Indeed, the reason why the negotiations took so long to conclude can often be traced back to the problem of expectations. Much of 10 years of negotiations were spent on finding a commonly accepted way of making the Science Diplomacy segment work.

In the framework of Science Diplomacy and how it works together with technology, "VUCE" is a clear example of "south-south cooperation", and how developing countries have to create new proactive relations based on science and innovation, using "capacity building" and "technology".

Despite Uruguay used international resources to create "VUCE" project, the importance is how it works in the national level, how the country create a technological platform using national human resources as well as national e-government, and also, how it is used in international trade in the framework of "*south-south cooperation*" in the MERCOSUR agreement. Uruguay National Customs is now in a modernisation process, which is being successful by using national technology, and science diplomacy to insert our national projects in the framework of international relations. Uruguay is a country that does not have a lot of money but human resources to improved science and technology.

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Enhancing Vietnam - India Energy Cooperation: Status and Prospects

Thi Mai Huong Bui*

Introduction

India and Vietnam have established diplomatic relations since 1972. In 2007, the two countries entered into a "Strategic Partnership" agreement which was upgraded to "Comprehensive Strategic Partnership" pact during the official visit of Prime Minister Narendra Modi to Hanoi in September 2016. Over time, the bilateral ties between the two countries have grown robust in several areas ranging from defence to economic as well as culture, education, training, and energy. In particular, the energy cooperation was viewed as one of the three main pillars of the Vietnam-India Comprehensive Strategic Partnership. Contrary to the potential and expectations of each country, however, the energy cooperation has remained limited. This paper analyses the status of energy cooperation between the two countries in the fields of oil and gas, electrical energy, nuclear energy, and renewable energy, thereby assessing the prospects of energy cooperation in the future.

Status of Vietnam - India Energy Cooperation

Oil and Gas

Vietnam and India have developed oil and gas cooperation since 1988. Vietnam permitted India to exploit natural gas fields in Block 6.1 including two sub-fields LanTay and Lan Do off Vung Tau Sea. The discovery of these two gas fields laid the foundation for the first foreign-invested project on gas exploitation in Vietnam. The ONGC Videsh Limited (OVL), an Indian state company has invested about 360 million USD in 3 Blocks namely, block 6.1, 127 and 128 respectively. India's natural gas exploitation activities has resulted in mining two billion cubic meters of gas in 2011-2012 as part of India's

* *Senior Officer, International Cooperation Division, Counter Narcotics Police Department, Ministry of Public Security of Vietnam*

45 percent participating interest (Ghosh, 2013). Since 2011 however, China has objected to India's exploration activities in block 127 and 128. Also, during mid-2012 and till the end of 2013, several oil projects of India in Vietnam suffered due to the lack of economic capacity and China's illegal activities in the South China Sea.

During the official visit of President Tran Dai Quang to India in March 2018, the two countries adopted a joint statement on strengthening energy cooperation. Vietnam Government has strongly encouraged Indian businesses to expand their oil and gas exploration and exploitation activities on the land, on the continental shelf, as well as in Vietnam's exclusive economic zone (EEZ) (EVNPECC1, 2018). This is an important motivation for future development in energy cooperation between Vietnam and India.

Electrical energy

India has invested in the Long Phu-II Thermal Power Station project in Soc-Trang province with a capacity of 1,320 MW. The two units of the project are sponsored by Tata Power Group with an estimated cost of about 2.2 billion USD. Accordingly, the Ministry of Industry and Trade of Vietnam and India's Tata Power Group signed a Memorandum of Understanding on Project Implementation (MoU) to put Unit 1 into commercial operation in 2022 and Unit 2 in 2023 (EVNPECC1, 2018). In 2007, India announced a preferential credit worth 45 million USD for Vietnam's Nam Chien Hydropower Project. This credit loan agreement was signed in January 2008 (Cổng thông tin điện tử Chính phủ nước Cộng hòa xã hội chủ nghĩa Việt Nam, 2009). In addition, the Government of India also lent Vietnam another preferential credit worth 19.5 million USD in 2009 to build 3 Hydropower Projects including Nam Trai 4 Hydropower Plant with a capacity of 9.6 MWin in Son La province; Yan Tann Sien Hydropower Plant with a total capacity of 19.5 MW in Lam Dong province and the Nam He Plant with a capacity 14.4 MW in Dien Bien province (VNExpress, 2009).

Nuclear energy

In 2016, Vietnam and India signed a Memorandum of Understanding (MoU) for cooperation in peaceful uses of atomic energy. In accordance with the MoU, the Indian government intends to support and cooperate with the Ministry of Science and Technology and Vietnam Atomic Energy Institute to build a Center for Nuclear Science and Technology. The centre will pursue research in nuclear sciences and technologies relevant to Vietnam's national needs. The two sides also agreed to pursue cooperation in the field of nuclear medicine. These include specific areas such as the production of radioisotopes and developing cures for cancer patients; application of nuclear techniques and radiation technology in industry and agriculture, serving export and training of nuclear human resources (LA, 2018). In March 2018, during the visit to President Tran Dai Quang to India, the two countries signed a memorandum of understanding (MoU) to further strengthen cooperation in the field of nuclear energy. The Memorandum of Understanding was signed by India's Department of Atomic Energy Ministry (DAE) and the Vietnam's Deputy Minister of Foreign Affairs. Lauding the agreement, the Indian Prime Minister Narendra Modi exhorted that, "The purpose of the MoU is to strengthen technical cooperation in the field of atomic energy for peaceful purposes". Among other, the MoU also calls for cooperation between India's Global Center for Nuclear Energy Partnership (GCNEP) and Vietnam's Atomic Energy Institute (Vinatom) (LA, 2018).

Renewable energy

Over the past decade, Vietnam has strongly promoted the development of national renewable energy grid. In this context, the Vietnamese government has invited Indian energy companies to explore opportunities in Vietnam's renewable energy sector. Furthermore, during the official visit of Vietnam's President to India in March 2018, the Joint Statement called for businesses of the two sides to explore new investment opportunities in the integrated field of renewable energy (Dinh Lien, 2018).

Prospects for Energy Cooperation

Oil and Gas

Oil and gas is an important area of cooperation between India and Vietnam, Indian companies

invest significantly in this field. With the signing of the Memorandum of Understanding (MoU), the two countries agreed to enhance cooperation between ONGC Group of India and PVN Group of Vietnam in the field of oil and gas, as well as to promote search and exploration work in newer blocks. The two sides also agreed to expeditiously implement oil and gas exploration MoUs, explore projects in third countries, and at the same time, consider the possibility of cooperation with a third country to expand oil and gas exploration and exploitation (Duc Tuan, 2018). Oil and gas exploration in the South China Sea is a sensitive issue in Vietnam-China relations. China has been opposed to India's Oil and Natural Gas Corporation (ONGC) to exploit oil in areas in South China Sea, in which Vietnam claims its sovereignty. India has asserted that ONGC's exploration activities are purely commercial in nature and that New Delhi does not intend to aggravate disputes (NDTV, 2018). This outlook is in line with India's Act East Policy, which puts Vietnam at its centre stage. In 2017, Vietnam extended the contract with India's ONGC group for another two years to explore oil and gas in Block 128 (Pandey, 2018).

Electrical Energy

According to the data of Vietnam Electricity, the current total capacity of Vietnam electricity industry is 40,000 MW with consumption of about 162 billion Kwh. Energy consumption in Vietnam is expected to increase at 10 percent per year. To meet the growing demand, Vietnam's electricity industry is required to reach 87,000 MW of generation capacity by 2025 and 130,000 MW by 2030 (Trang tin điện tử ngành điện, 2016). Electricity experts however are skeptical about achieving these generation capacities. Therefore, the efficient use of electrical energy is a key issue. In this connection, Vietnam has also pursued cooperation with India's Energy Efficiency Services Limited (EESL), a state-owned enterprise under the India's Ministry of Power. With the support of the Government of India, EESL has provided Vietnam with 177 million LED light bulbs, which will contribute to saving over 62.72 million units of electricity every day thereby reducing 3.5 million USD on the total electricity bill of consumers. It will also reduce 4,584 MW in total peak electricity demand, as well as reduce 50,810 tons of CO2 emissions. EESL has also replaced over 1.3 million streetlights. EESL's efforts have benefited many consumers, municipalities, domestic distribution companies and governments (H.T, 2016). This cooperation will help Vietnam regulate energy needs without affecting output quality in the future. In the field of electricity, TATA Group of India is implementing a BOT (build-operate-transfer) project to set-up Long-Phu 2 thermal power plant in Soc-Trang at the projected cost 2 billion USD, and is expected to become operational in 2022 (Tài nguyên & Môi trường, 2015).

Nuclear energy

In November 2018, Prime Minister Nguyen Xuan Phuc decided to set up a Vietnam Sub-Committee in the Vietnam-India Joint Committee on Atomic Energy Cooperation. The Sub-committee will strengthen the partnership and enforce agreements between Vietnam and India in using atomic energy for peaceful purposes. It will become a conjuncture point for ministries, sectors and agencies to implement the agreement, ensuring the effective operation of the Vietnam-India Joint Committee on Atomic Energy Cooperation. At the same time, it will host or work with the Indian side to hold meetings of the Joint Committee (VNA, 2018). In addition, because the Ninh Thuan nuclear power plant project - in cooperation with Russia - recently has been halted for many reasons, India's openness and goodwill have opened up new prospects.

Renewable energy

Renewable energy is a potential area of cooperation between the two countries. Because coal is a finite source of energy, with electricity demand expected to increase over 10 percent annually until 2030; The Government of Vietnam is looking forward to developing renewable energy sources to ensure energy security. In 2016, the Vietnamese government revised the 7th Energy Development Plan from now to 2030 and placed a stronger emphasis on developing renewable energy and market liberalisation (Mike Vinkenborg, 2016).

With such high capital requirements, the Government of Vietnam is implementing many preferential policies on investment capital which allow foreign companies to invest 100 percent of

capital in the energy sector. Renewable energy projects benefit from the exemption of import duties on imported goods to establish fixed assets, materials and semi-finished products. Tax incentives include preferential corporate income tax (CIT) rate of 10 percent for 15 years; CIT exemption for four years and a reduction of 50 percent for the following nine years (Koushan Das, 2019). Indian companies' investment projects in the fields of renewable energy such as solar and wind power are welcome in Vietnam.

Solar Power

This is a potential area of cooperation between the two countries. Vietnam's long coastline and long hours of sunshine provide Vietnam with lots of potential for solar resources. Solar energy is comparable to countries like Italy, Spain, China and Thailand. However, the current market of solar PV in Vietnam is estimated at only 5 MWp (Energypedia). India's Tata Power Group has invested in a solar power project with a total investment of 54 millionUSD. This solar power project has a capacity of about 49 MW with a land lease area of about 55 ha in Loc Tan commune, Loc Ninh district, Binh Phuoc province. In addition, Tata Group has also made a proposal to the People's Committee of Binh Phuoc Province on creating conditions for the project to be completed before June 2019 so that investors can take advantage of the preferential price of electricity sold by the Government of Vietnam (EVNGENCO2, 2018).

Wind energy

Besides solar power, wind energy is also expected to help Vietnam catch up with the rapid growth in electricity demand in both short and long term. With the advantage of a long coastline and favorable terrain, the construction of wind power stations is a solution that can help improve Vietnam's electricity output in the coming years.Vietnam has the potential to develop wind power with more than 3,000 square km of the coastline. Under the roadmap, Vietnam will develop 800 MW of wind power by 2020, accounting for about 0.8% of total electricity demand. The goal is to develop 2,000 MW of wind power by 2025 and 6,000 MW by 2030 (AEEC, 2019).

Conclusion

It can be seen that strengthening energy cooperation will benefit both Vietnam and India. The energy cooperation entails extensive cooperation relating to science diplomacy and through such cooperation, India can support Vietnam in transferring energy technologies, especially the renewable energy technologies. India regards Vietnam as a strategic energy partner with two countries achieving important achievements. However, the cooperation is still not commensurate with the desired potential. With diverse energy sources from oil and gas to hydro electricity, nuclear and renewable energy as well as well-irradiated terrain, well connected with national transport and grid infrastructure, Vietnam has great potential to develop these industries. With such great potential, several Indian companies are willing to invest in Vietnam's energy industry. So far, India has invested in 176 projects in Vietnam with a total investment of 814 million USD, ranking 28th among the countries and territories investing in Vietnam. Among Indian investors, Tata Group, Adani Green Energy Ltd., M+ Energy, Avaada, Sprng Energy and Suzlon Energy Ltd and many other giant companies pave the way for Indian businesses in the energy sector.

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Fax: 91-11-24682173-74, Email: dgoffice@ris.org.in
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