SCIENCE DIPLOMACY IN THE GLOBAL AGE: EXAMPLES FROM TURKEY AND THE WORLD

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Approval of the Graduate School of Social Sciences

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This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Doctor of Philosophy.

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ABSTRACT

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EXAMPLES FROM TURKEY AND THE WORLD

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In today's global and multipolar international system, different diplomatic methods are practiced besides the traditional diplomatic methods. Science Diplomacy, which is based on knowledge-based international scientific and technological cooperation, emerges as an important foreign policy tool. Science Diplomacy has three main components, which are namely "science in diplomacy", "diplomacy for science" and "science for diplomacy". In this PhD thesis, the main reasons behind the development and usage of Science Diplomacy as a contemporary method of diplomacy, especially in the post-Cold War period are analyzed. In this context, the possible premises of mainstream International Relations theories in analyzing the practice of Science Diplomacy in the modern international system are also defined. The main research question is the place and role of Science Diplomacy in the future international role of Turkey as an emerging world economy. In this respect, the USA and Germany examples are also studied. In terms of the methodology, it is mainly based on qualitative research method using secondary resources, besides interviews with science diplomats and experts as well as short study-visits to the key governmental and academic institutions both in Turkey and abroad. It is considered to be one of the first academic studies at the PhD level on the topic of Science Diplomacy in Turkey. It ends with some policy recommendations for Turkey in the field of Science Diplomacy.

Keywords: Science Diplomacy, Diplomacy for Science, Turkey, Realism

ÖZ

KÜRESEL ÇAĞDA BİLİM DİPLOMASİSİ:
TÜRKİYE VE DÜNYADAN ÖRNEKLER

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Mayıs 2015, 276 sayfa

Günümüz küresel ve çok kutuplu uluslararası sisteminde geleneksel diplomasi yöntemlerinin yanısıra, farklı diplomasi yöntemleri de gelişmiş ve gelişmekte olan ülkeler tarafından tercih edilmektedir. Bilim diplomasisi de bu bağlamda bilgi temelli uluslararası bilimsel ve teknolojik ortaklıklara dayalı önemli bir dış politika aracı olarak ortaya çıkmaktadır. Bilim diplomasisinin, "diplomaside bilim", "bilim için diplomasi" ve "diplomasi için bilim" şeklinde üç temel bileşeni bulunmaktadır. Bu Doktora çalışmasında, özellikle Soğuk Savaş sonrası dönemde, bilim diplomasisi kavramının tarihsel gelişimini, uluslararası ilişkiler teorileri kapsamında ve çeşitli ülke örneklerinden yola çıkarak incelenmektedir. Bu çalışmada temel araştırma sorusu, yükselen bir dünya ekonomisi olarak Türkiye'nin gelecekteki uluslararası rolünde Bilim Diplomasisinin yeridir. Bu bağlamda, ABD ya da Almanya gibi ülke örnekleri de incelenmektedir. Yöntem olarak, ikincil kaynaklara dayanan nitel araştırma yöntemi esas alınmıştır. Bunun dışında, bu konuda yazılı literatürün çok sınırlı olması sebebiyle, hem Türkiye'de, hem dünyada gerek kamu, gerek araştırma kuruluşlarındaki bilim diplomasisi uzmanları ve bilim diplomatları ile röportajlar gerçekleştirilmiştir. Bu çalışma, doktora düzeyinde Bilim Diplomasisi konusunda Türkiye'de yapılmış ilk akademik çalışmalardandır. Sonuç kısmında, Türkiye için Bilim Diplomasisi konusunda bazı politika önerileri sunulmaktadır.

Anahtar Kelimeler: Bilim Diplomasisi, Bilim için Diplomasi, Türkiye, Realizm.

To My Mother and Father

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I always remember both of grandfathers, who have been great examples of success and determination for me. They taught me that success is not by coincidence and they always encouraged me to do my best. I miss you a lot.

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LIST OF ABBREVIATIONS

AA	German Federal Foreign Service
AAAS	American Association for the Advancement of Science
ACE	American Council on Education
AFOSR	Air Force Office of Scientific Research
ATC	American - Turkish Council
AvH	Alexander von Humboldt Foundation
AwP	Connecting Worlds of Knowledge - AussenWissenschaftsPolitik
BERD	Business Enterprise Research and Development
BILAT USA	Bilateral coordination for the enhancement and development of S&T partnerships between the European Union and the United States of America
BMBF	German Federal Ministry of Education and Research
BMELV	German Federal Ministry of Food and Agriculture
BMGF	Bill & Melinda Gates Foundation
BMWi	German Federal Ministry of Economics and Energy
BMZ	German Federal Ministry for Economic Cooperation and Development
BREAD	Basic Research to Enable Agricultural Development
BRICS	Brazil, Russia, India, China, South Africa
BTYK	Supreme Council for Science and Technology
CERN	European Organization for Nuclear Research
CGS	Council of Graduate Schools
CIA	Central Intelligence Agency
CIS	Community of Independent States
CISAC	Committee on International Security and Arms Control
COST	European Cooperation in Science and Technology
CRDF	Civilian Research and Development Foundation
CSA	Chief Scientific Adviser
CSTP	Committee for Science and Technological Policy
DAAD	German Academic Exchange Service
DFG	German Research Foundation

DG	Directorate General
DIHK	German Chambers of Industry and Commerce
DIW	German Institute for Economic Research
DLR	German Aerospace Center
DoE	Department of Energy
DoS	Department of State
DSEE	Institute of World Systems, Economies and Strategic Research
DWIH	German House for Science and Innovation
EC	European Commission
ECSC	European Coal and Steel Community
EMBO	European Molecular Biology Organisation
EOP	Executive Office of the President
ERA	European Research Area
ESF	European Science Foundation
ESTH	Environment, Science, Technology and Health
EU	European Union
EURATOM	European Atomic Energy Community
FCO	Foreign and Commonwealth Office
FP7	7th Framework Programme
FTE	Full Time Equivalent
GERD	Gross Domestic Expenditure on Research and Development
GCCIJ	German Chamber of Commerce and Industry in Japan
GDP	Gross Domestic Product
GIST	Global Innovation through Science and Technology
GSO	Group of Senior Officials
HFG	Helmholtz Research Center
ICC	International Call for Chemistry
ICSU	International Council on Science
ICTP	International Centre for Theoretical Physics
INCO	FP7 International Cooperation
IPCC	International Panel on Climate Change
IR	International Relations

ISPRA	Institute for Environmental Protection and Research
ISTA	International Scientific and Technological Cooperation Agreements
ITER	International Thermonuclear Experimental Reactor
JRC	Joint Research Center
JST	Japan Science and Technology Agency
JSF	Jefferson Science Fellowships
LDC	Least Developed Countries
LHC	Large Hadron Collider
MERC	Middle East Regional Cooperation
MIT	Massachusetts Institute of Technology
MoSIT	Ministry of Science, Industry and Technology
MoU	Memorandum of Understanding
MPG	Max Planck Gesellschaft
MWN	Materials World Network
NAS	National Academy of Sciences
NASA	National Aeronautics and Space Administration
NATO	North Atlantic Treaty Organisation
NCCAP	National Climate Change Action Plan
NGO	Non Governmental Organisation
NIH	National Institutes of Health
NIAID	National Institute of Allergy and Infectious Diseases
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NRC	National Research Center
NSC	National Science Council
NSTC	National Science and Technology Council
NSF	National Science Foundation
NYAS	New York Academy of Sciences
OECD	Organisation for Economic Cooperation and Development
OES	Bureau of Oceans and International Environmental and Scientific Affairs
OSTP	Office of Science and Technology Policy

PEER	Partnership for Enhanced Engagement in Research
PGRP	Plant Genome Research Program
PT-DLR	Project Management Agency of the German Aerospace Center
RCC	Regional Cooperation Council
R&D	Research and Development
RTÜK	Radio and Television Supreme Council
SASSCAL	Southern African Science Service Centre for Climate Change and Adaptive Land Management
SAFARI	Southern African Regional Science Initiative
SFIC	Strategic Forum for International S&T Cooperation
SOM	Senior Officials Meeting
STC	Science and Technology Cooperation Office
S&E	Science and Engineering
S&T	Science and Technology
SEA	Single European Act
SEECP	South East European Cooperation Process
SESAME	Synchrotron-light for Experimental Science Applications in the Middle East
STAS	Science and Technology Adviser to the Secretary of State
STEM	Science, Technology, Education and Math
STH	Science, Technology and Health
STI	Science, Technology and Innovation
STS	Science and Technology in Society
TAEK	Turkish Atomic Energy Council
TASSA	Turkish American Scientists & Scholars Association
TOBB	Union of Chambers and Commodity Exchanges of Turkey
TUR&BO	Turkish Research and Business Organisation
TÜBA	Turkish Academy of Science
TÜBİTAK	The Scientific and Technological Council of Turkey
TÜSSİDE	Turkish Institute of Management Sciences
TWAS	The World Academy of Sciences
UBTYS	National Science, Technology and Innovation Strategy

UN	United Nations
UNAM	National Nanotechnology Research Center
UNESCO	United Nations Educational, Scientific and Cultural Organisation
UNIDO	United Nations Industrial Development Organisation
UNU-MERIT	United Nations University - Maastricht Economic and Social Research Institute on Innovation and Technology
USAID	United States Agency for International Development
USGS	United States Geological Survey
WASCALL	West African Science Service Center on Climate Change and Adapted Land Use
WB	World Bank
YÖK	Higher Education Council
ZEW	Center for Economic Research

CHAPTER 1

INTRODUCTION

1.1 Background

The interaction between International Relations and Science and Technology (S&T) is rather an old phenomenon. Throughout the world history, they mutually influenced and had an impact on each other.

Scientific age is said to have begun in the seventeenth century "with Francis Bacon's recognition of the significance of a disciplined method for development, testing and verification of theory".[1] Afterwards, technological development went together with the economic growth. The dynamic of change influenced by the economic and technological developments impacted social structures, political systems as well as the military power.[2] By the end of the nineteenth century, role of science has become related to application more closely as industrial research laboratories began to be established. In the twentieth century, industrial structured research and experiment became a self-sustaining system, especially in the Western world. Another important factor in the development of technological innovation in the twentieth century was the increase in the governmental support to Science and Technology (S&T) in key areas of interest, primarily for the security reasons. So there occurred an advancement of S&T, especially in the military technologies in the interwar years. It

[1] Eugene B. Skolnikoff (1994) *The Elusive Transformation: Science, Technology, and the Evolution of International Politics,* New Jersey: Princeton University Press, p.16.

[2] Paul Kennedy (1987) *The Rise and Fall of the Great Powers: Economic Change and Military Conflict from 1500 to 2000.* New York: Random House, p.17.

was used to reach certain political aims of the states at that time and the United States (U.S.) emerged as the dominant power in S&T from the postwar era.[3]

When we come to the post-Cold War era and the twenty-first century, new security challenges have become more prominent, such as human rights, environmental security, political stability and democracy, social issues, culture and religious identity and immigration as well as weapons of mass destruction, humanitarian crises, energy supplies, social tensions, rogue states, nationalism and so on.[4]

These new so-called global challenges required new methods of international cooperation and diplomacy. In today's world, many of the global challenges, such as climate change, food safety, nuclear proliferation have a scientific aspect and no one single nation is capable of tackling these challenges alone. In other words, "global problems require global solutions"[5].

In this context, science diplomacy as a concept and a non-traditional method of diplomacy has gained importance. In fact, it is not new, but as a concept it is quite contemporary. As can be exemplified through different country examples, the British Royal Society, which was established in the eighteenth century, has always used science as a tool to solve military and political problems since then.

The concept gained importance, especially after the World War II, but even before that United Kingdom (UK) appointed its first accredited scientific representative to Washington in 1941. Then another British representative was sent to China between the years 1942-1946.

[3] Eugene B. Skolnikoff (1994), op.cit., pp.18-19.

[4] Heinz Gärtner, Adrian Hyde-Price and Erich Reiter (eds.) (2001), *Europe's New Security Challenges.* London: Lynne Rienner Publishers, p.5.

[5] The Royal Society Report, *New frontiers in science diplomacy: Navigating the changing balance of power*, London, p.v, (2010).

NATO set up a science program in 1957 and US National Academy of Sciences (NAS) ran parallel Committees on International Security and Arms Control (CISAC) together with the Soviet Union Academy of Sciences (ASUSSR) throughout 1980s.[6] After the end of the Cold War, the activities of Science Diplomacy gained a momentum in the countries like USA, UK and Japan. In the US, the post of Science and Technology Adviser to the US Secretary of State was established in 2000. In terms of the UK, their government established the Science and Innovation Network (SIN) by 2000. This network is comprised of more than ninety staff working in forty cities in twenty-five countries and their main aim is to promote the scientific expertise of UK abroad and to build international collaborations in the area of S&T. Japan is another active country in this respect and has a formal science diplomacy policy since 2007 with the aim of increasing participation of Japanese scientists into international research programmes; providing international scientific advice; building scientific capacity and using science for power.[7]

These country examples can be extended. However, as a novel and contemporary tool of diplomacy, science diplomacy is usually analyzed under three main categories in the literature, which are namely:[8]

[6] Ibid., pp.1-2.

[7] Ibid., pp.2-3.

[8] For different definitions and examples of the Science Diplomacy concept, please refer to AAAS Science Diplomacy Center (http://diplomacy.aaas.org/files/scidip_framework_aaas_2009.pdf), Flink, T., Schreiterer, U., *Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches*, Science and Public Diplomacy, 37(9), p: 665-677, (2010), The Royal Society Report, *New frontiers in science diplomacy: Navigating the changing balance of power*, London, p:1-32, (2010), Wilton Park Conference Report, *Science Diplomacy: Applying Science and Innovation to International Challenges*, 1037, p:1-10, 24-27.06.2010.

1) **Science in Diplomacy**

It means informing the officials involved in foreign policymaking or diplomatic processes with scientific information and advice when necessary. Arms control agreements (such as the Anti-Ballistic Missile Treaty, Comprehensive Test Ban Treaty), international environmental agreements or the creation of the Science Adviser to the Secretary of State position in the US can be given as such examples.

2) **Diplomacy for Science**

It is the usage of diplomacy for extending and advancing international scientific cooperation among countries. Large scale international S&T projects, such as the International Thermonuclear Experimental Reactor (ITER) or the European Organization for Nuclear Research (CERN) can be given as examples to this concept.

3) **Science for Diplomacy**

It is a mechanism to enhance or develop relations among countries. Cooperation between American and Soviet atomic scientists during the Cold War period, increased S&T cooperation among US and Japan in 1960s and US-China umbrella S&T agreement signed in 1979 are some of the examples of "science for diplomacy" activities.

1.2 Scope and Objectıve

In today's global and multipolar international system, different diplomatic methods are practiced besides the traditional diplomatic methods. Science Diplomacy, which is based on knowledge-based international scientific and technological cooperation, emerges as an important foreign policy tool Science Diplomacy has three main components, which are namely "science in diplomacy", "diplomacy for science" and "science for diplomacy".

In this PhD thesis, I would like to analyze the main reasons behind the development and usage of Science Diplomacy as a contemporary method of diplomacy, especially in the post-Cold War period. In this context, the possible premises of mainstream International Relations theories in analyzing the practice of Science Diplomacy in the modern international system would also be defined. The main research question would be the place and role of Science Diplomacy in the future international role of Turkey as an emerging world economy. Would a science diplomacy model from the Western world, such as the USA or Germany be appropriate where the main aim is influence and control?

In analyzing the Science Diplomacy systems and activities of different country examples, such as the USA, Germany and Turkey, the focus would be the "Diplomacy for Science" aspect of the Science Diplomacy, which means developing international scientific and technological cooperation in its broadest definition.

In terms of the methodology, it is mainly based on qualitative research method using secondary resources, besides interviews with science diplomats and experts as well as short study-visits to the key governmental and academic institutions both in Turkey and abroad. Semi-structured interview technique was used mainly since the written literature on Science Diplomacy is rather limited in Turkey and the world. The details would be provided at the Methodology section of this Chapter.

1.3 Main Research Question and Argument of the Dissertation

Main Research Question

Quo Vadis Turkey in Science Diplomacy?:

What is the place and role of Science Diplomacy for the future international role of Turkey as an emerging world economy in the context of International Relations discipline?

Subsidiary Research Questions

- What are the main reasons behind the development and usage of Science Diplomacy as a contemporary method of diplomacy especially after the Second World War?
- What are the possible premises of mainstream International Relations (IR) theories in analyzing and understanding the practice of Science Diplomacy in the modern international system?
- How is Science Diplomacy used as a tool of influence or power in the Western world, such as the U.S. and Germany?

Hypothetical Assumptions

- Realist paradigm seems to be an appropriate framework for the analysis of Science Diplomacy concept.
- Turkey needs to give priority and enhance its Science Diplomacy activities to be a global player in the world.
- Science diplomacy is mainly used as a tool for influence and control in the Western models, such as Germany or the USA.

1.4 Methodology

Methodology of this thesis is mainly based on qualitative research method. Besides this, interviews and short study-visits to the key governmental and non-governmental institutions both in Turkey and abroad were conducted. It is an interdisciplinary study.

Interview technique was especially helpful since there are not many written resources in Science Diplomacy. There are certain online resources and some scientific articles written on this subject, but books in English on Science Diplomacy are very rare. For the Turkish case there is almost no literature, since it is a new concept.

In this regard, interviews with relevant governmental and non-governmental institutions in Turkey and abroad, which are main actors of the science diplomacy system were conducted. Countries that were analyzed in the frame of this thesis have science attaches in Turkey, such as the U.S., Germany, France and so on. It was also useful to make interviews with them and get first-hand information and advices on the science diplomacy activities of those countries in this respect.

Moreover some study-trips to the leading science diplomacy-related agencies abroad were organized in order to get more information on their science diplomacy activities and conduct interviews with the leading scholars and officials on science diplomacy in those countries. The details of these interviews would be provided below.

The qualitative research method was realized mainly by analyzing relevant secondary sources, such as textbooks, books, journals, articles, news from various news agencies and governmental institutions of the countries observed. Research in the Sciences Po University in Paris was conducted since I have continued my PhD studies in France/Paris between June 2013 and June 2014 for one year.

My work is mainly based on qualitative research method and interviews in Turkey and abroad. In this regard, I have made meetings and interviews with 42 experts in

total, from 28 different institutions, both governmental and research institutions, mainly in France, as well as Germany, Netherlands, Belgium and Turkey related to my PhD Dissertation in one year (September 2013-September 2014).

A field trip to Germany/Bonn was made on 25-26 February 2014, where key governmental institutions for German Science Diplomacy activities were visited, such as the German Research Foundation (DFG), German Aerospace Center-Project Management Agency (PT-DLR), Federal Ministry of Education and Research (BMBF) and the Alexander von Humboldt Foundation (AvH).

A field trip to Netherlands/Maastricht was made on 23-24 April 2014, where one-to-one meetings were organized with the experts on Science Diplomacy in the universities such as the United Nations University-Maastricht Economic and social Research institute on Innovation and Technology (UNU-MERIT) and the Maastricht University. Besides that a field trip was made to Belgium/Brussels on 3 June 2014 in order to meet experts from the European Commission as well as the U.S. Embassy in Brussels.

In Turkey, individual interviews were conducted with some academicians and governmental officials who have experience either in the field of Science Diplomacy or in the science policy decision-making processes in Turkey, such as the Turkish Ministry of Foreign Affairs, Bilkent University, İstanbul Kültür University and so on. Their experience in the bilateral S&T cooperation between Turkey and the USA or Turkey and Germany was also considered in the selection process.

During the writing process of this PhD Dissertation, among these interviews, some of them were selected in line with the scope and objectives of this study. Therefore not all of the interviews were included in the Dissertation.

In terms of the case studies, I would like to provide some information on the selection process of the interviews.

In total, there were interviews/meetings conducted with 42 experts from 28 different institutions as stated above, either governmental or research institutions as well as universities throughout the PhD Dissertation process.

In the case of the U.S., individual interviews were conducted with the science diplomats in the U.S. Embassy as well as researchers from the institutions, such as the U.S. National Science Foundation (NSF) or the Bilkent University. Taken into consideration the geographical distance, the experts from the U.S. that the individual meetings were made, were mainly based in Europe, such as France, Belgium or Turkey. Of course, the opinions of the U.S.-based individual contacts in the U.S. Department of State or the American Association for the Advancement of Science (AAAS) were also taken since they are important actors in the U.S. Science Diplomacy system.

Apart from that several interviews and field trips were made in Europe. In the case of Germany, a field trip was conducted to Bonn and Berlin as indicated above. In these trips, individual interviews were conducted with the governmental officials in the German institutions that are important actors in the German Science Diplomacy system, such as the German Academic Exchange Service (DAAD), German Research Foundation (DFG), German Ministry of Foreign Affairs (AA), German Federal Ministry of Education and Research (BMBF), German Aerospace Agency (DLR) and the Alexander von Humboldt Foundation (AvH). Apart from these, there were meetings made with the science diplomats in the German Embassy in Paris.

Although France was not considered as a separate case study in the dissertation, considering the fact of being located in France for one year during my research and as France having one of the oldest and largest system and network of science diplomats in the world, many individual interviews were also made in France with governmental officials, such as the Ministry of Higher Education and Research, Ministry of Foreign Affairs or universities and research centers, such as the National Research Center of France (CNRS), Sciences Po University, Institute for Research

and Innovation in Society (IFRIS), Institute of Research for Development (IRD), Telecom-EM University and so on. This has contributed to obtain opinions about the Science Diplomacy system of France from both sides, namely academy and government.

In Europe, a field trip was also made to Netherlands/Maastricht as indicated above because of the fact that there are important academic institutions there who work on the science policy making and science diplomacy fields, namely the UNU-MERIT and the Maastricht University. This was especially useful in terms of understanding the concept of "Science Diplomacy" from different perspectives.

In this respect, the opinion of the experts from the European Commission on the Science Diplomacy concept was also valuable and a field trip was made to Belgium/Brussels in this respect to meet with the experts from the European Commission as well as the U.S. science diplomats based in Brussels.

Last but not least, individual interviews were made with the experts in certain international organisations that are based in Paris and that conduct science diplomacy activities, such as the Organisation for Economic Cooperation and Development (OECD) and the United Nations Educational, Scientific and Cultural Organisation (UNESCO).

Examples from the Interview Questions:

- Their role in the "Diplomacy for Science" (international scientific and technological cooperation) activities of their country
- Their place in this system and their relation with other related research institutions
- International cooperation activities/types/mechanisms
- Selection criteria for the bilateral scientific and technological cooperation
- Activities and qualifications of their science diplomats

- Activities of them in the frame of the European Union (EU) 7th Framework Programme (FP7) and Horizon 2020 (H2020) programs
- Science diplomacy relations between Turkey and the related country, especially in the recent years
- Impact assessment of their international cooperation activities
- Their Science Diplomacy Strategies

The selection of the Case Studies:

As examining the case of Turkey in its early stages of the Science Diplomacy, it may be appropriate to have examples from the world that have developed a long-lasting Science Diplomacy system. In this sense, the USA and Germany examples were selected for three main reasons:

1. They have a traditional and long history of Science Diplomacy system and quite a large network of science diplomats;
2. The USA and Germany are among the first countries that Turkey is considering to send its first science diplomats;
3. There is a considerable Turkish diaspora of scientists and students in these countries and an important potential of international scientific and technological cooperation.

Therefore these country examples were chosen in terms of their Science Diplomacy systems and activities. In this regard, interviews with experts from those countries (both governmental and academic institutions) were conducted as mentioned above. It should also be noted that the data is up to date as of December 2014.

1.5 Review of Literature

As stated above, the written literature on the concept of Science Diplomacy is rather limited. There are certain online resources, for instance the "Science & Diplomacy" is an online journal that is published quarterly by the Center for Science Diplomacy of the AAAS (American Association for the Advancement of Science), which is online since March 2012.[9] There are many valuable inputs on the theme of Science Diplomacy in this journal by the experts from different parts of the world.

There are also some articles on Science Diplomacy published by the *Science* journal, Royal Society as well as the World Academy of Sciences (TWAS).

The main articles on the concept of Science Diplomacy could be counted as; Flink, T., Schreiterer, U., *Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches*, Science and Public Diplomacy, 2010; the Royal Society Report, *New frontiers in science diplomacy: Navigating the changing balance of power,* 2010 and; the Wilton Park Conference Report, *Science Diplomacy: Applying Science and Innovation to International Challenges,* 2010.

Especially, the so-called Royal Society and Wilton Park reports were groundbreaking reference documents in terms of the definition and typology of the Science Diplomacy concept as it is used today.

In Turkey, Mr. Numan Hazar, who was a retired Ambassador of Turkey also wrote a book in Turkish, called "Bilim ve Teknolojinin Uygarlıklar ve Dış Politika Üzerindeki Etkileri: Bilim ve Teknoloji Diplomasisi" (The Impacts of Science and Technology on Civilizations and Foreign Policy: Science and Technology Diplomacy) in 2012. This book is mainly related with the development of science throughout the human civilizations and in the Turkey.

[9] http://www.sciencediplomacy.org/

A recent publication on Science Diplomacy is maybe one of the first edited books on this theme, called "Science Diplomacy: New Day or False Dawn?" written by Lloyd S. Davis and Robert G. Patman from the University of Otago in New Zealand. It was published recently in February 2015.

1.6 Contribution to the Literature

In Turkey as well as in the world, "Science Diplomacy" is a new concept. There are not many written resources on it, except some international articles published in the recent years. In this regard, this PhD Dissertation is considered to be one of the first academic studies at the PhD level on the topic of Science Diplomacy in Turkey.

Moreover in this study there is also a comparison of different Science Diplomacy systems, namely the USA, Germany and Turkey. In addition to that other country examples were provided in the Conceptual Chapter. Its originality also comes from the analysis of the Science Diplomacy concept from different mainstream International Relations (IR) theories for the first time.

In this PhD Dissertation, one of the main contributions is the analysis of the Science Diplomacy concept in a limited literature from the Turkish perspective as a "late-comer".

It is also a novel study in analyzing the concept of Science Diplomacy from the perspective of mainstream International Relations theories.

1.7 Structure of the Chapters

In this regard, after the introductory chapter, in the first part of the thesis, possible premises of mainstream IR theories in analyzing and understanding the practice of Science Diplomacy in the modern international system would be analyzed in the following chapter. In this sense, possible strengths and weaknesses of the mainstream IR theories in explaining Science Diplomacy concept would be analyzed.

Then a special section would be devoted to the concept of Science Diplomacy, its background, aims and certain examples of science diplomacy, especially in the post-Cold War period would be examined.

Last but not least, the development of science diplomacy activities in the Turkish case would be explained. In explaining the Turkish case, science diplomacy activities and systems of different country examples from the Western World would be examined and it would be questioned if a science diplomacy model from the Western world, such as the USA or Germany would be appropriate for Turkey where the main aim is influence and control? Therefore there are two separate chapters on the Science Diplomacy system and activities of the U.S. as well as Germany.

The historical context of analysis of science diplomacy systems and activities of different countries would be post-Cold War period.

The study ends with a Conclusion section that includes Policy Recommendations for Turkey in the area of Science Diplomacy.

CHAPTER 2

THEORETICAL FRAMEWORK

2.1 Introduction

In terms of the theoretical framework, much of the theoretical discussion on the Science Diplomacy is explained mainly with the "soft power" concept[10] for now, which is developed by Prof. Joseph S. Nye, Jr. in 1990, who is a Professor of International Relations at the Harvard University and has also worked in Pentagon once.

Nye analyzes the concept of soft power with comparison to hard power and argues that it is "the second face of power".[11] It is about the ability to shape preferences of others and not same with influence, because influence can also rest on hard power of threats and so on. It is also more than persuasion and has something to do with the ability to attract. In this respect, soft power can be derived from moral authority, legitimacy, international rules and institutions or cultural values and the soft power of a country rests mainly on three resources, namely its culture, its political values and its foreign policies, which are seen legitimate and moral.[12]

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[10] For some of the examples of soft power and science diplomacy relationship, see Zewail, A., *The Soft Power of Science*, Vacation, p:117-119, 2010; Flink, T., Schreiterer, U., *Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches*, Science and Public Diplomacy, 37(9), p: 665-677, 2010; Yakushiji, T., *The Potential of Science and Technology Diplomacy*, Asia-Pacific Review, 16(1), 2009.

[11] Joseph S.Nye Jr., "*Soft Power: The Means to Success in World Politics*", US: Public Affairs, 2004, p.5.

[12] Ibid., p.11.

For instance, Prof. Ahmed Zewail, who is America's first Science Envoy to the Middle East and who has visited Egypt, Turkey and Qatar, stated in his article that "(b)y harnessing the soft power of science in the service of diplomacy, America can demonstrate its desire to bring the best of its culture and heritage to bear on building better and broader relations with the Muslim world and beyond". It is in America's best interest to foster relations with these countries by using the soft power of science[13].

In another report prepared by Japan on the potential of Science Diplomacy, it is mentioned that the "Council for Science and Technology Policy's interim and final reports on strengthening Japanese science and technology diplomacy regard science and technology as diplomatic resources that serve to increase Japanese soft power".[14]

Although making an important contribution to the literature, there is a need to analyze the Science Diplomacy concept from different International Relations (IR) theories, especially the mainstream theories. It would be an important contribution to the IR literature.

This lack of analysis of not only science diplomacy, but changes in science and technology by the theories of IR was also pointed out by many experts, such as Krishna-Hensel[15] "(t)here is as yet no systematic examination within the field of IR as how these changes are going to influence the debates on power, deterrence, diplomacy, and other instruments of international relations".

[13] Ahmed Zewail, The Soft Power of Science, *Vacation*, 2010, p.118.

[14] Taizo Yakushiji, T., The Potential of Science and Technology Diplomacy, *Asia-Pacific Review,* 16(1), 2009, p.2.

[15]Sai Felicia Krishna-Hensel, "Technology and International Relations", *The International Studies Encyclopedia,* Denmark, Robert A. Blackwell Publishing, 2010.

In this respect, the Science Diplomacy concept and the outcomes of the Science Diplomacy activities would be analyzed from the perspective of three different mainstream IR theories, namely Realism, Liberalism and English School (or International Society). While analyzing this concept, first of all brief background information on the development of each theory and their main assumptions would be provided together with their criticisms. Afterwards their possible contributions to the Science Diplomacy concept would be analyzed.

While making this analysis, three dimensions of the Science Diplomacy concept would be mentioned, which are namely:

- **Science in Diplomacy:** Inclusion of science in foreign policy objectives.
- **Diplomacy for Science:** Promotion of international scientific cooperation.
- **Science for Diplomacy:** Use of science in order to develop international relations.

2.2 Realism and Science Diplomacy

International system is characterized by constant conflict and tension according to the traditional realist IR thinkers. It is reflected in the writings of very ancient realist thinkers such as Thomas Hobbes (in seventeenth century) as well as scholars, such as Hans Morgenthau, who has lived in the post-World War II period and contributed to the development of contemporary realist IR theory. For them, conflict is inevitable because there is always a "struggle for power".[16]

Realism is "regarded by an overwhelming majority of scholars to be definitive tradition in the field of international relations". Power concept is central for the realist tradition in terms of understanding the behaviors of states. Nation states act in order to maximize their power.[17]

[16] Joyce P. Kaufman, *Introduction to International Relations: Theory and Practice*, 2013, pp.44-46.

[17] Ibid., p.44.

Political realism has different variants and has been and still is the dominant paradigm in IR. It is important to understand that states could use any kind of diplomatic or non-diplomatic method if it is vital for their survival and if it is in their national interest according to this paradigm. For the sake of this paper, main focus will be on classical realism and to some extent the so-called "neorealism".

According to Robert Gilpin, "all realist writers—neoclassical, structural, or what have you—may be said to share three assumptions regarding political life".[18]

The first is the essentially conflictual nature of international relations, where "the final arbiter of things political is power".

The second is that "the essence of social reality is the group". In the modern world, it is named as the "nation- state".

The third assumption is "the primacy in all political life of power and security is human motivation".

It is based on three main assumptions, which are:
1) Centrality of the state in the anarchical international system;
2) Survival as the main objective and the most important national interest of the state and;
3) No other state can be trusted in terms of survival, coexistence can be achieved by the balance of power. [19]

Realism defines "national interest in terms of power" so that by having power, a country could achieve its main goals. There are also "core interests" of a country,

[18] Robert G. Gilpin (1984). The Richness of the Tradition of Political Realism. *International Organisations*, 38(2), p.290.

[19] Tim Dunne and Brian C. Schmidt, "Realism" in John Baylis and Steve Smith (eds.) (2011), *The Globalization of World Politics*, Oxford University Press, pp.93-96.

which means that security is more than traditional military security, but also a country's economic strength, its values and other such things as defined by Barry Hughes.[20]

For the famous realist thinker Machiavelli "the ends justify the means" so that it can be decided whether an action is good or evil by looking at its results.[21] According to him, diplomacy is a tool that is used by the states for deception of others.[22]

For the realists, there is a state of anarchy and war that shapes the structure of the international system since there is no central world government or an equivalent political authority above the national and sovereign states. Therefore for them, use of war and diplomacy by states is still important in modern international system. Moreover power is the motivation that shapes states' behaviours.[23]

There is also the Security Dilemma, meaning that "an effort by one state to increase its security decreases the security of other states" and for this reason the "only way it can be resolved is for states to find ways, through law and diplomacy, to keep an eye on each other."[24]

Classical Realism is based on the views of Edward H. Carr (The Twenty Years' Crisis) and Hans Morgenthau (Politics among Nations: The Struggle for Power and Peace). According to them, states struggle to increase their capabilities. Conflictual

[20] Kaufman, op.cit., p.33.

[21] Ibid., p.46.

[22] Temel İskit, *Diplomacy: Tarihi, Teorisi, Kurumları ve Uygulaması*, İstanbul Bilgi Üniversitesi Yayınları, 2007, p.23.

[23] James N. Rosenau, Mary Durfee, *Thinking theory thoroughly: coherent approaches to an incoherent world* / James N. Rosenau, Mary Durfee, Boulder, Colo.: Westview Press, 2000, p.13.

[24] Ibid., p.17.

behaviour is explained by human failings and bad policy-makers. They believe that policymakers always make rational choices as argued by the Rational Choice Theory of Morgenthau.

"They see more variation in order and stability *within* domestic and international systems than they do between them."[25] Morgenthau also makes this sharp distinction between the domestic and international politics. For Morgenthau, balance of power is a general social phenomenon that can be found at all levels of social interaction. Politics is a struggle for power and "an autonomous sphere of action" according to the classical realists.

According to Morgenthau, diplomacy has four main functions, namely[26]:

1. Determination of the major objectives of the state and the power to reach them;
2. Assessment of the objectives of other states according to same criterion;
3. Assessment of the compatibility of these objectives;
4. Employment of the means to pursue these objectives. These means are persuasion, agreement and threat of the use of force.

"Many contemporary realists also believe in the primacy of self-interest over moral principle, and, regard considerations of justice as inappropriate." [27] For them, interest and justice are not to separate and they mutually complete each other.

On the other hand, Neorealism is based on Kenneth Waltz's "Theory of International Politics" publication mainly. Two elements of international system are constant according to Waltz: anarchy and self-help. Main difference between classical realism

[25]Richard Ned Lebow, "Classical Realism" in Tim Dunne, Milja Kurki, Steve Smith (eds.), *International Relations Theories: Discipline and Diversity*, OUP, 2007, p.55.

[26] Temel İskit, op.cit., p.53.

[27] Richard Ned Lebow, op.cit., p.58.

and neorealism is the source and content of states' preferences.[28] Waltz's aim is to explain why all international systems which are similarly structured seem to be characterized by similar outcomes.

For the neorealism, the whole thing is based on the "structure of the international system". It is constant and constrains the states from taking certain actions according to Kenneth Waltz. For them, there can be unipolar, bipolar, or multipolar international system. The multipolar system is the least stable one as there are many power centers.[29]

The core assumptions of neorealism are:[30]

- States and other actors are in an anarchical international system without a central authority.
- The structure of the system determines the behavior of the actor.
- States are self-interested and they are rational actors that try to maximize their benefits and minimize their losses.
- The most critical problem is survival due to the anarchical system.
- States see the other states as their enemies and this causes security dilemma as a result.

After the end of the Cold War period, like the international system itself and many other concepts, the definition and content of the concept of "security" was also contested. The definition of the security concept has evolved from conventional and so-called "hard-security" threats to more social, economic and even environmental threats aggregated by some uneven and undemocratic regimes established after the Cold War. Security and/or insecurity began to be defined by more unexpected or

[28] Colin Elman,"Realism" in Paul D. Williams (ed.)(2008), *Security Studies: An Introduction*. New York : Routledge, pp.15-27.

[29] Kaufman, op.cit., p.50.

[30] Steven L. Lamy "Contemporary mainstream approaches: neo-realism and neo-liberalism" in John Baylis and Steve Smith (eds.) (2011), *The Globalization of World Politics*, Oxford University Press, p.119.

internal threats, rather than more predictable threats of the bipolar international system of the Cold War period. It can be argued that a crucial turning point in this sense was the events of 11th September 2001.

Of course, as with the changes of the international system and security, the place and effectiveness of realism in today's international system is also questioned by many scholars and IR theories, both mainstreams and poststructuralist ones.

2.2.1 Summary

Robert Gilpin, who is also from the realist IR tradition, responded as that not only political-military, but economic matters are also major concern for realist scholars. However, "international economy is not regarded as an autonomous sphere, as liberals argue, nor is it in itself the driving force behind politics, as the Marxists would have us believe"[31] according to Gilpin. Also even they conceive state as the principal actor of international relations, they accept the existence of other individual or collective actors as well. Both for the classical and neorealists, structure constrains and influences the behavior of the states.

"According to this interpretation of realism, states should pursue their national interests, not those of a particular dynasty or political party. Statesmen are admonished to carry out a foreign policy in the interest of the whole nation and not just in the selfish interests of the ruling elite".[32]

On the other hand, technological change had an impact on the governmental autonomy although limited and realist school argues that "those alternate sources of power are dependent on the fundamental power of the nation-state, not separate from

[31] Robert Gilpin, op.cit., p.295.

[32] Ibid., p.303.

it". Realism is said to be a parsimonious (few elements explaining many things) theory (Rosenau) and this may also be a reason of the survival of realism today.[33]

The use of international scientific collaborations with the aim of establishing constructive international partnerships[34] has been witnessed mainly in the USA and Europe. This points out that science is not always made in the sake of science. In most cases, it is used as an effective foreign policy tool. States follow the practice of science diplomacy when or where they see a national interest. In the anarchical nature of IR, states give priority to some other states to develop scientific relations. In fact, science diplomacy was first developed for arms control and non-proliferation issues, which also include realist national security concerns.

Nevertheless, applying to softer methods do only justify one of the main assumptions of the realist paradigm, which is that the states could pursue their national interests in order to survive in an anarchical international system. However, it should also be noted that the states are also responsible to take necessary cautions in order not to loose "real" science in the face of national interests.

Today traditional diplomacy methods are not sufficient in the conflict areas and there is a necessity to use different tools. In this context, science diplomacy activities gain importance. Even though science can be used both for good and bad, one of the main assumptions of science diplomacy is that scientific cooperation could support peaceful solutions.[35]

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[33]Eugene B. Skolnikoff, *The Elusive Transformation: Science, Technology, and the Evolution of International Politics,* Princeton University Press, 1993, pp.242-246.

[34] Royal Society, *New Frontiers in Science Diplomacy: Navigating the Changing Balance of Power*, 2010, p.2.

[35] Wilton Park Conference Report, *Science Diplomacy: Applying Science and Innovation to International Challenges*, 24-27 June 2010, p.4.

2.3 Liberalism and Science Diplomacy

This approach is also known as pluralist or idealist approach in the discipline of International Relations. It has emerged as a crucial theory in the field of IR really in 1970s as a criticism to realism. They focus on economic interdependence, transnational actors, concepts like integration and cooperation.[36] Before that it was in the form of "idealism" in the interwar years, reflected especially in the fourteen principles of Wilson and the establishment of the League of Nations.

Main assumption of liberalism is that individual is an important actor and basically human beings are good as well as moral. This of course does not mean that states are unimportant. They are important; however there are other important actors as well.[37]

Liberalism puts the values of order, liberty, justice and tolerance at the core of international relations. Both domestic and international institutions should protect these values according to them.[38]

For the liberals, free trade is also very important for sustaining the peace and stability across the globe since they believe that free trade would bring comparative advantage and artificial barriers among the nations would be eliminated by this way.[39]

[36] Kaufman,op.cit., p.53.

[37] Ibid., pp.54-55.

[38] Tim Dunne "Liberalism" in John Baylis and Steve Smith (eds.) (2011), *The Globalization of World Politics*, Oxford University Press, p.103.

[39] Scott Burchill "Liberalism" in Scott Burchill, Andrew Linklater, Richard Devetak, Jack Donnelly, Matthew Paterson, Christian Reus-Smit and Jacqui True, *Theories of International Relations*, Palgrave Macmillan: NY, 2005, p.63.

They also believe that wars could be avoided and they are not inevitable when countries cooperate. It is based on the views of some early philosophers, such as Adam Smith, who "sees mutually beneficial exchanges, especially economic exchange, as central."[40]

War and conflict can be mitigated by cooperation or collective action. Everybody would benefit from working in cooperation in this regard. The main assumption is that "when nations work together, the result will be a more peaceful and cooperative world."[41]

Democratic Peace Theory was developed by Micheal Doyle, based on an article of him that was published in 1983 and argued that democratic states do not fight with each other. He based his assumption on the data that since 19th century, almost no liberal states fought with each other. This theory was based on the relationship between democracy and peace in the sense that conflicts and wars were not very common among the democratic states.[42]

They believe that liberal democracies can also fight with authoritarian states (Democratic Peace Theory) and can spread liberal and democratic mode of governments in the world. One barrier to the spread of liberal democratic governments around the globe is the resistance of third countries to this mode of governance.[43]

[40] Kaufman, op.cit., p.54.

[41] Ibid., p.57.

[42] Cornelia Navari, "Liberalism" in Paul D.Williams (ed.)(2008), *Security Studies : An Introduction*. New York: Routledge, p.36.

[43] Scott Burchill, op.cit., p.60.

There is a positive conception of liberalism, which supports for interventionist foreign policies as well as strong international institutions and also there is a negative conception of liberalism, which puts more emphasis on tolerance and non-intervention.[44]
There is another approach within the liberal IR tradition, which is neoliberalism. They also assume that state is a unitary actor and works for its interest like realism. However unlike the realist approach, they believe that conflict is not inevitable and cooperation is also in state's interest.[45]

Neo-liberalism is also associated with the promotion of capitalism and Western values in the policy world. It has been influenced by commercial, republican, sociological as well as institutional liberalism. They see the institutions as mediators to achieve international cooperation and they promote cooperation for protecting national interests. Cooperation would be easier among countries where there are mutual areas of interest. For them, the biggest obstacle on the way of cooperation is "cheating". Neo-realists on the other hand are more cautious in terms of cooperation and for them there is still competition in the world "where self-interest rules".[46]

Another approach is the neoliberal institutionalism, which believes that formation of international institutions is the best way to sustain security and cooperation.[47]

It is considered to be one of the most convincing opposition to the realist/neorealist theories. It is based on the functional and regional integration studies of 1950s/1960s. Their basic argument was that if independent states pool some of their resources to common institutions or regimes, peace and prosperity can be achieved. The European

[44] Tim Dunne, op.cit., p.103.

[45] Kaufman, op.cit., p.57.

[46] Steven L. Lamy, op.cit., p.125.

[47] Kaufman, op.cit., p.58.

Union is a good example of such a regional community. Keohane and Nye are pioneers of neoliberal institutionalist approach in 1970s. They argued that the world became more pluralistic and the actors were more interdependent in that international system.[48]

Liberal institutionalists argue that institutions can provide a framework for cooperation that can help to overcome the dangers of security competition among states. They also argue that mutual interests will increase tendency to cooperation.

They criticize neorealists, because of their too much emphasize on conflict and since neorealists do not see too much room for cooperation among the actors of international system, mainly states in terms of enhancing security.[49]

Main criticisms of liberalism come from neorealism. Before it was between the so-called "idealist liberalism" and "pessimist realism". The main debate between them was about the "human nature" since the realists have a more pessimistic view of the human nature as compared to liberals.

This debate lost its relevance because of the complexity of human nature and the influence of behaviouralism.[50]

As it is known, classical realists have a non-progressive understanding of history. For them, the anarchical nature of the international system; self-help and security dilemma are constant things, they could not change throughout the history. According to liberals, history is progressive. Realists criticize this as well as the

[48] Steven L. Lamy, op.cit., p.121.

[49] Ibid., p.123.

[50] Robert Jackson & Georg Sorensen, *Introduction to International Relations: Theories & Approaches*, OUP: NY, 2010, p.113.

notion of “economic interdependence” of liberalism. For neorealists, “economic interdependence is nothing new”.[51]

Neorealists are also critical of the importance of international institutions and the republican liberalism, meaning that there is always the risk of a liberal or democratic state turning to an authoritarian or non-democratic state. They argue that anarchy persists all the time.[52]

2.3.1 Summary

The liberal responses to these critics are categorized under two camps of liberalism, which are the so-called “weak liberalism” and “strong liberalism”.

The so-called “weak liberals” accept some of the basic assumptions of realism. On the other hand “strong liberals” do not accept these criticisms, such as Keohane and Nye. They focus on the role of international institutions and complex interdependence.

For them, there could be anarchy, but it does not mean that there is no control or no governments at all. There are good examples of consolidated liberal democracies for them. For instance, North America or Japan could be counted as those “security communities” according to the liberal approach.[53]

In terms of their contribution to the Science Diplomacy, especially the “Diplomacy for Science” activities which mean that promotion of international scientific and technological cooperation could have a liberal component since one of its aims is to

[51] Ibid., p.114.

[52] Ibid., p.115.

[53] Ibid., pp.115-116.

sustain international peace and development through international scientific and technological cooperation.

Of course, the contribution of Prof. Joseph Nye with the "soft power" concept to the literature could also be counted as a liberal contribution to the Science Diplomacy.

2.4 English School (International Society) and Science Diplomacy

This theory is developed by a group of British scholars in 1970s, who claimed that the "international society" is the main unit of analysis. Most famous of its scholars include Hedley Bull, Martin Wight, Adam Watson and John Vincent.

According to this approach, sovereign states constitute a society in an anarchic system. However this so-called "anarchical society" is controlled by international law and morality. It could be named as a middle approach between realism and liberalism.

For them, international system is not necessarily a state of war, but there are ways of control and compromise among the states. They have a more optimistic view about global reform and compromise. However they also believe that "the survival of international order can never be taken for granted because it can be undermined by revolutionary or aggressive powers."[54]

They stress on high levels of order that exists among independent political communities in an anarchical international system.

[54] Andrew Linklater "The English School" in Scott Burchill, Andrew Linklater, Richard Devetak, Jack Donnelly, Matthew Paterson, Christian Reus-Smit and Jacqui True, *Theories of International Relations*, Palgrave Macmillan: NY, 2005, p.88.

Bull makes a distinction between a "system of states" (international system) and "society of states" (international society), in which international society is composed of a group of states which have common interests and common values.

Bull also emphasizes on the importance of the "diplomatic culture" and argues that "this might change if different elites across the world came to share a 'cosmopolitan culture' of modernity".[55]

He also rejects the "domestic analogy" of realism and does not make a sharp distinction between domestic vs international system. For them, there is also no need for a higher central authority to mitigate the effects of anarchical international system.

It is also questioned by the scholars of the English school if the state system is in decline. Especially with the outbreak of the First and Second World Wars, it was shaken a lot. The international law system, which has its European origins was also challenged by some of the non-European states from Asia or Africa. The diplomatic relations between the states of two blocs were also shaken badly in the Cold War years.[56]

They do not believe in the possibility of a "world government" where sovereign states subordinate themselves. It could happen only as a result of a catastrophe, such as a nuclear war or a world economic crisis according to them.[57]

[55] Ibid., p.90.

[56] Hedley Bull "The Decline of the States System?" in Stephen Chan and Cerwyn Moore (eds.). *Theories of International Relations,* Volume I: Approaches to International Relations: Realism, SAGE Publications, 2006, p.118.

[57] Ibid., pp.120-121.

The reasons why they do not believe in the possibility of a world government are that:[58]

1. Presence of a nuclear stalemate that sustains the stability between the USA and Russia.
2. The growth of a multilateral balance of power, especially after 1970s.
3. Political activisation of the people around the world.

In this regard, they have commonalities with the realist approach, which also states that there is an anarchical world order due to the lack of a world government.

Four key elements of this theory are:[59]

1. There is an emphasis on leading operative ideas that shape the thoughts, policies and the activities of the people in the international relations.
2. There should not be a one-dimensional approach in the international relations.
3. They emphasize on the historical dimension of the international relations.
4. They also emphasize on the normative aspect of the international relations.

Unlike realism, they do not think that the sovereign nation states are the only important actors in world politics. However, for them, there is not also a trend towards new medievalism either. Five features of the contemporary world politics could be summarized as such according to the English school:[60]

1. Some states engage in regional integration and integrate with larger units, such as the European integration.

[58] Ibid., pp.121-122.

[59] Jackson & Sorensen, op.cit., p.138.

[60] Hedley Bull, op.cit., pp.122-130.

2. Disintegration of states, such as Yugoslavia or the Soviet Union.
3. Restoration of international violence by non-state groups. In other words, "the state is losing its monopoly of the legitimate use of violence…".
4. There is now much more presence of the transnational organisations, although it is questionable if they undermine the states system.
5. The world is now technologically more unified, which is also named as "spaceship earth" or the "global village".

English school also focuses on the "normative institutional factors" in the international society, which is also very different than the neo-realist perspective. Through these rules, norms and institutions, international order and justice could be sustained.

English school is mainly about progress, maintaining order and justice. They believe in progress. They are also aware that it is not easy to find solutions to the global problems as in the writings of Bull. Still they believe that there are states that play a positive role in the international relations and there is not yet a better version of governance other than the "society of states" despite its failures.

Some even argued that Kant was "less cosmopolitan and universalist in his writings on international affairs than Bull suggests."

Criticisms to the English School approach came from various IR theories:[61]
Realists criticize them on the ground that there is no evidence of the international norms determining the state behavior or the state policies. Liberals criticize them for downplaying the domestic politics. International Political Economy (IPE) scholars argue that they do not take the international economic relations into account. There

[61] Jackson & Sorensen, op.cit., p.151.

are also certain solidarist critiques within the English School itself, such as the limitations of the political modernity theory.

2.4.1 Summary

The English School could be seen as a middle-way between realism and liberalism in IR. Although admitting the anarchical nature of the international system, they believe that it could be mitigated through some common norms and rules and in this way there would be a transition from the "system of states" to the "society of states".

Their contribution to the Science Diplomacy could be questioned. One of the explanations would be the "diplomatic culture" and the "role of diplomacy", which they give quite importance for the establishment of a cosmopolitan world culture. The role of science diplomats could be explained by it.

Science could be one of the common norms that contribute to the formation of the international society in a sense.

2.5 Conclusion: Analysis from a "Science Diplomacy" Perspective

According to the realist paradigm of the International Relations (IR), power is the most important determinant of the relations between states. As stated in the famous book of one of the classical realists Hans Morgenthau, "politics among nations is a struggle for power and peace" [62] He even goes further to define the concept of "interest" in terms of "power". For the classical realists, power is "anything that maintains the control of man over man".

[62] Hans Morgenthau, *Politics Among Nations: The Struggle for Power and Peace* (1948), New York NY: Alfred A. Knopf.

As can be analyzed today in many examples from the developed world (mainly in the USA and Europe), science is not always made in the sake of science and in most cases, it is used as an effective foreign policy tool in the "science for diplomacy" examples, which means the use of scientific cooperation for improving relations between countries.[63]

This kind of examples can be justified as one of the main assumptions of the realist paradigm is that the states could pursue their national interests in order to survive in an anarchical international system. However it should also be noted that the states are also responsible to take necessary cautions in order not to lose "real" science in the face of national interests.

Moreover science diplomacy is mainly a state-based paradigm and implemented through governmental institutions mostly, which proves the centrality of the "state" as a main actor in the realist paradigm of IR. Science diplomacy activities that are conducted by states, rather than independent agencies are more effective and permanent. Since there is the primacy of power in the realist IR paradigm and the science diplomacy is used as a soft power tool to strengthen relations with the rest of the world, it is also relevant in this respect.

In terms of the other mainstream IR paradigms, such as liberalism or English school the relevance of their main assumptions regarding Science Diplomacy should be analyzed.

Liberalism is based on the view that war is not inevitable in international relations and there is room for cooperation and collaboration in contrast to the realist view.

[63] The Royal Society Report, op.cit., p. vi.

They also argue that in the long run, mutual interests of states would prevail. The liberal approach is closely connected with the process of modernization.[64]

This approach is relevant especially for the "diplomacy for science" activities of science diplomacy, since it means developing international scientific cooperation among nations for mutual benefit.

There are various types of liberalism. For instance, the sociological liberalism approach of James Rosenau, which emphasizes on "transnationalism" may be relevant in some aspects of science diplomacy.

Interdependence liberalism, which points the importance of mutual dependence and complex interdependence may also be relevant in the sense that global challenges require interdependence and common solutions in a sense. Moreover the functionalist theory of David Mitrany, which argue that technical and economic collaboration would lead to political and other means of collaboration in the long run, is a useful framework to analyze how scientific and technological collaboration among nations lead to political collaboration in the long run.

In terms of the International Society or English School approach[65], they can be placed between realism and idealism since they argue that although admitting the anarchic nature of the international society, international order and justice can be sustained. They also argue that national interests should be guided by justice.

For them, certain rules, norms and values transform the international system to an international society. English school puts emphasis on the historical and normative dimension of IR.

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[64] Robert Jackson and Georg Sorensen, *"Introduction to International Relations, Theories and Approaches",* Oxford University Press, New York, 2010, pp.96-124.

[65] Ibid., pp.128-157.

Although having important contributions for IR theories, at first this approach may not be a relevant framework to analyze science diplomacy concept.

The reasons behind the Science Diplomacy can be expressed in its three "E"s as mentioned before, which are namely:[66]"expressing national power or influence"; "equipping decision makers with information to support policy"; and "enhancing bilateral and multilateral relations".

All of these reasons behind the development of science diplomacy, which are namely "influence", "access to resources" and "promotion" are related with the realist notion of "power" and "national interest".

Through the practice of science diplomacy, states could access the scientific and technological resources beyond their borders that may not be available to them otherwise. They could also promote their research landscape abroad as well as influencing the international policymakers through the use of science. Using these tools of science diplomacy, they strengthen their national power as well as international presence in the world, which is a very realist motive in its nature.

When we look at the international scientific and technological collaborations today, especially in the Western world that is also case studies of this PhD Dissertation, it is still based on the preferences that are in line with the national interests of these countries. Even technology transfer is made to certain countries in certain areas that are in the interests of major powers in the world.

Let us take the example of the Least Developed Countries (LDCs) or certain African countries, technology transfer is limited there. Also the major powers in the world do not share information on the critical high-tech technologies, such as space,

[66] Vaughan C. Turekian, "Building a National Science Diplomacy System," Science & Diplomacy, Vol. 1, No. 4 (December 2012), p.1. http://www.sciencediplomacy.org/editorial/2012/building-national-science-diplomacy-system

nanotechnologies or cybersecurity issues. This means that Science Diplomacy is still limited with the "Power Politics" today as the realists argue. There is competition in certain cutting-edge technologies among the developed countries as well.

Another example is the Climate Change and development of green economies as a response. This again requires considerable amounts of financial investment and even though it is very important for tackling global challenges of tomorrow, still there is not much transfer of know-how to developing countries or scientific collaborations by the bigger powers with the developing world on this issue.

These kinds of examples justify the claims of realism in Science Diplomacy in a way that states remain the main actor in science diplomacy activities and national interests are vital.

Even regarding certain sensitive areas of national security, the international cooperation among the scientists can pave the way for opening negotiations between countries.

US President Obama's opening to the Middle East following his famous Cairo speech in 2009 is another example of how Science and Technology is used as an effective tool of diplomacy for developing relations with these countries where other political or military tools did not work. This case would be analyzed in detail in the chapter dealing with the Science Diplomacy activities of the U.S.A. This is a good example of "Science for Diplomacy", meaning the use of science as a tool for developing diplomatic relations among countries.

As stated by one of the science attaches of France, science diplomacy is in fact in line with the national interests of the government. Even the countries or priority areas selected for international scientific and technological cooperation are selected on this basis. Cooperation in science is in universal interest of all countries.

In the Diplomacy for Science activities, mostly inter-state scientific and technological activities are involved, which sometimes impedes the involvement of weak states or the states which are in the state of conflict from involving in such activities, because in this kind of states, state is often not strong and acts on behalf of certain interest groups.[67]

"Countries may have different motivations for promoting international science cooperation. For some, it may be to further economic growth and increase wealth; for others, it may be as a means to address inequality and reduce poverty. Nevertheless, science cooperation is of universal interest to all countries, and that gives science considerable potential as a soft power tool in both national and international ambits".[68]

As pointed out by one French researcher[69], the political dimension of science diplomacy is still related to the "state diplomacy".

[67] Wilton Park Report, op.cit., p.4.

[68] Wilton Park Conference Report, op.cit., p.2.

[69] Meeting with Rigas Arvanitis, IRD, Paris, 04.12.2013.

CHAPTER 3

CONCEPTUALIZATION OF SCIENCE DIPLOMACY

3.1 Science Diplomacy as a Concept

The global challenges, such as climate change, infectious diseases, famines, migration, nuclear non-proliferation or terrorism necessitate international scientific and technological cooperation in order to tackle the multi-layered problems associated with these challenges.[70] These global challenges have scientific dimensions and countries need to cooperate to solve them. This requires the use of different foreign policy tools and methods.

In this context, science diplomacy as a concept and a non-traditional method of diplomacy has gained importance. In fact, it is not new, but as a concept it is quite contemporary.

Today there is a science, health, technology or environmental component in all international policy issues. Therefore the role of scientists in the global policy making systems has increased over the past years.[71]

However these efforts for establishing the global connections, mechanisms and norms in order to benefit the diversity of scientific resources are still new and not adequate enough. There is a necessity to develop new international partnership types,

[70] Flink, T., Schreiterer, U., Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches, *Science and Public Diplomacy*, 37(9), p.665, (2010).

[71] Alan Leshner, "The Partnership of Scientists and Diplomats", *Science & Diplomacy*, Vol. 3, No. 4, p.1, (December 2014). http://www.sciencediplomacy.org/editorial/2014/partnershipscientists-and-diplomats

networks, instruments and forums. There is a need for both scientific and diplomatic expertise in order to ensure the globalization of science as well as scientific solutions to global problems with these new policies. "Only through the partnerships of scientists and diplomats can we truly advance global science for the benefit of all peoples".[72]

Before the "science diplomacy" concept, "science bridges" have been used similarly in defining the cooperation regarding arms control and non-proliferation issues. "In short, it provides a politically acceptable way to open diplomatic channels of communication between otherwise hostile states."[73]

For instance during the interview with the US National Science Foundation (NSF) officials in Paris, it was mentioned that science diplomacy concept does not have a specific definition for the NSF, but it means "utilizing the existing good relations between scientists of different countries to reach foreign policy aims".[74]

Science Diplomacy is rather a new concept. It was first derived from "hard vs soft power" discussions. You need this today to be "counted" in the world, especially for emerging countries, such as Turkey with the aim of "information and influence".[75]

It was first developed in the United States as a concept and used widely in the English-speaking world. Science diplomacy was defined as "the use and application of science cooperation to help build bridges and enhance relationships between and

[72] Ibid., p.3.

[73] *Wiltonpark Conference Report*, Science Diplomacy: Applying Science and Innovation to International Challenges, 1037, p.5, 24-27.06.2010.

[74] Meeting with Dr. Carmen Huber, Head of NSF Europe, Paris, 04.09.2013.

[75] Meeting with Dr. Rigas Arvanitis, IRD, Paris, 04.12.2013.

amongst societies, with a particular interest in working in areas where there might not be other mechanisms for engagement at an official level."[76]

Even before the "Science Diplomacy" term was coined by the Anglo-Saxon world, there was Science Diplomacy in fact and people had already been practicing that.

"Science" is based on objective truths, on the other hand in "diplomacy" there are national interests as well as common interests, like the global challenges and it is an act of solving things in a non-violent way. So there is a kind of tension among these two concepts in a sense.

In terms of the theoretical framework, much of the theoretical discussion on the Science Diplomacy is explained mainly with the "soft power" concept[77] for now, which is developed by Prof. Joseph S. Nye, Jr. in 1990. It was discussed in detail in the Theoretical Chapter.

Cooperation in science is in universal interest to all countries and in this regard it is considered as a potential soft power tool for both national and universal means.

Moreover science diplomacy does not necessitate the traditional means and boundaries of diplomacy. It can work outside the foreign ministries by global networks through the support of the research agencies.[78]

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[76] *Science Diplomacy for France Report*, French Ministry of Foreign Affairs, France, 2013, p.3.

[77] For some of the examples of soft power and science diplomacy relationship, see Zewail, A., *The Soft Power of Science*, Vacation, p:117-119, 2010; Flink, T., Schreiterer, U., *Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches*, Science and Public Diplomacy, 37(9), p: 665-677, 2010; YAKUSHIJI, T., *The Potential of Science and Technology Diplomacy*, Asia-Pacific Review, 16(1), 2009.

[78] Wiltonpark Conference Report, op.cit., p.3.

International cooperation in science not only strengthens the knowledge and innovation base of the nations, but it can also work as an effective tool for managing conflicts, improving global understanding as well as mutual respect and contributing to the capacity-building in less developed parts of the world.[79]

In today's global politics, the nature of both diplomacy and science diplomacy are changing in the sense that diplomatic activities are now multilateral, complex and many non-governmental actors are also involved.

As stated by Prof. Dr. Luc Soete, who is currently the Rector of the Maastricht University, there is a worldwide community of scientists around the world. Researchers could already find their colleagues without too much difficulty since Internet became an essential tool for the exchange of research output and for international research networking. States should follow and even go beyond this. There exist different national perspectives about it. International diplomacy of science can learn a lot from these different perspectives.[80]

Science Diplomacy is "pure soft power" according to some scholars, such as Prof. Luc Soete in the sense that scientist-to-scientist cooperation will never be capable of preventing wars between states, but can contribute to keep the mutual exchange based on scientific evidence open between nations which are politically no longer on speaking terms. Of course, there are some other scholars in the U.S. for instance that argue for the opposite of this view, such as the prevention of hot conflict between the U.S. and the Soviet Union.[81]

[79] Flink, T. and Shreiterer, U., op.cit., p.665.

[80] Meeting with Prof. Dr. Luc Soete, Rector of the Maastricht University, Maastricht, 23.04.2014.

[81] Ibid.

On the other hand, there is also a view that the Americans and the Russians (Soviet) have cooperated not in dangerous issues, but more in other issues such as climate change, demographic issues, social sciences…etc. As a result after the collapse of the Soviet Union, they saw themselves disconnected from some of the scientific breakthroughs in the U.S., in particular those related to microcomputers and digital communication.[82]

The reasons behind the Science Diplomacy can be expressed in its three "E"s, which are namely:[83]

- "expressing national power or influence",
- "equipping decision makers with information to support policy",
- "enhancing bilateral and multilateral relations"

On the other hand, Flink and Shreiterer defined the goals of Science Diplomacy as follows:[84]

1) Access

By access, it is meant to access researchers, research findings and facilities as well as natural resources with the aim of improving a nation's innovation capacity and competitiveness.

This is especially important in so-called "big science" projects, such as "the International Thermonuclear Experimental Reactor" (ITER) or the International Space Station, where no single country can afford alone.

[82] Ibid.

[83] Vaughan C. Turekian, "Building a National Science Diplomacy System", *Science & Diplomacy*, Vol. 1, No. 4 (December 2012), p.1. http://www.sciencediplomacy.org/editorial/2012/building-national-science-diplomacy-system

[84] Flink, T. and Shreiterer, U., op.cit., p.669.

2) Promotion

It means promotion of a nation's successes in R&D as a means of attracting the best brains in the world by global marketing and increasing international scientific collaborations.

3) Influence

By influence, it is meant to influence the public opinion, politicians and decision-makers of other countries by using the "soft-power" of science diplomacy.

Science diplomacy can be exemplified through different country examples. One of the oldest country examples is from the UK in this sense. The British Royal Society, which was established in the eighteenth century, has always used science as a tool to solve military and political problems since then.

The concept gained importance, especially after World War II, but even before that United Kingdom appointed its first accredited scientific representative to Washington in 1941. Then another British representative, Mr. Joseph Needham was sent to China between the years 1942-1946. Mr. Needham has published a very important publication, named "Science and Civilization in China" there and as a result of his efforts on fostering international scientific cooperation, natural sciences were incorporated in the mandate of the United Nations Educational, Scientific and Cultural Organization (UNESCO).[85]

The Second World War and invention of the atomic bomb was a turning point in the development of science diplomacy, since then scientists have become more proactive in conflict resolution.

[85] Royal Society Report, op.cit., p.1.

Science diplomacy prevented the Cold War from becoming "too hot" in a sense and has now the potential to tackle current diplomatic challenges with the countries like Iran and North Korea.[86]

It was also useful to "ease tensions and promote some rapprochement between the Communist block and the Western world at the heights of the Cold War".[87]

As can be seen, there are various policy approaches and initiatives of Science Diplomacy in different countries around the world with a great number of different governmental and non-governmental organizations involved. So there is no "one-size-fits-all" approach, "nor the rules of the game are well-defined".

Although governments may think of the scientific community and research institutes as a means of their own national economic and political goals in the international level, researchers still engage in collaborative research projects for receiving funds as well as gaining leverage.[88]

One of the main goals of Science Diplomacy for the policy makers and scientists is "to tap into the growing science base beyond a nation's borders including research facilities and human resources".[89]

The countries, which are larger and more advanced in science have been actively involved in Science Diplomacy for many decades, while now newly developing or developed countries also express great interest in Science Diplomacy.[90]

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[86] Wiltonpark Report, p.2.

[87] Flink, T. and Shreiterer, U., op.cit., p.668.

[88] Ibid., p.669.

[89] Atsushi Sunami, Tomoko Hamachi, and Shigeru Kitaba, "The Rise of Science and Technology Diplomacy in Japan", *Science & Diplomacy*, Vol. 2, No. 1 (March 2013), p.1. http://www.sciencediplomacy.org/article/2013/rise-science-and-technology-diplomacy-injapan

For instance, the European Commission (EC) also has Science Counsellors, in the industrialized as well as BRIC countries, namely the U.S., Japan, China, Russia, Brazil, India, African Union, Canada as well as local staff in Israel and Egypt. They have to choose those countries strategically since their budget is limited.

Thus it is not only an inter-state concept, but it is also applicable to the activities of certain international organizations as well.

3.2 Three Dimensions of Science Diplomacy

The country examples can be extended. There can be different categorizations of the concept of Science Diplomacy. However, as a novel and contemporary tool of diplomacy, science diplomacy is usually analyzed under three main categories in the literature and in this PhD Dissertation this categorization would be used, which are namely:[91]

[90] V. Turekian, op.cit., p.2.

[91] For different definitions and examples of the Science Diplomacy concept, please refer to AAAS Science Diplomacy Center (http://diplomacy.aaas.org/files/scidip_framework_aaas_2009.pdf), Flink, T., Schreiterer, U., *Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches,* Science and Public Diplomacy, 37(9), p: 665-677, (2010), The Royal Society Report, *New frontiers in science diplomacy: Navigating the changing balance of power,* London, p:1-32, (2010), Wilton Park Conference Report, *Science Diplomacy: Applying Science and Innovation to International Challenges,* 1037, p:1-10, 24-27.06.2010.

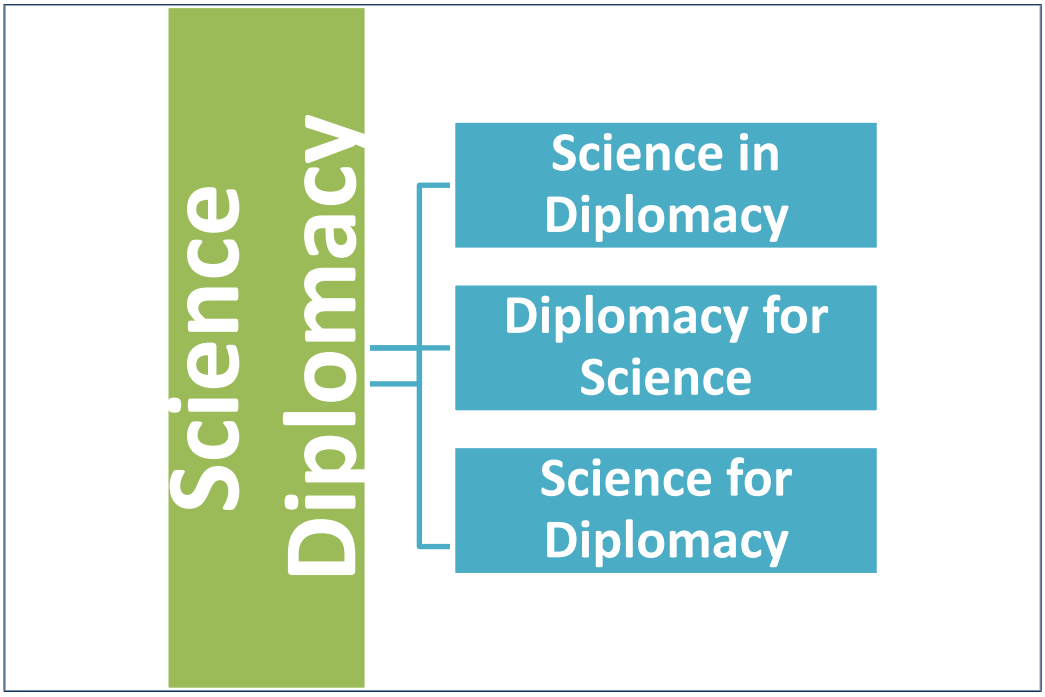

Figure 1 Three Dimensions of Science Diplomacy

3.2.1 Science in Diplomacy

In the last thirty years' time period, global challenges, such as the food and water scarcity, inadequate energy resources, cross-border conflicts and migration shaped the diplomacy and foreign relations agendas of the world governments. The Chief Scientific Advisor to the Government of the UK, Prof. Dr. John Beddington defined it as the "Perfect Storm".[92]

These issues "are growing more important in the conduct and execution of a robust policy in an increasingly connected and less polarized world" as well as countries are in a competition to attract the best talents in the world in order to foster innovation and economic growth.[93]

[92] Royal Society Report, op.cit., p.5.

[93] V. Turekian, op.cit., p.1.

Science in Diplomacy means informing the officials involved in foreign policymaking or diplomatic processes with scientific information and advice when necessary. Arms control agreements (such as the Anti-Ballistic Missile Treaty, Comprehensive Test Ban Treaty), international environmental agreements or the creation of the Science Adviser to the Secretary of State position in the US can be given as such examples.

A good example of Science in Diplomacy is the Intergovernmental Panel on Climate Change (IPCC), which was established in 1988 with the aim of providing information regarding the current situation of the climate change and its socio-economic results. Scientists all over the world contribute to the work of IPCC on a voluntary basis. It received Nobel Prize as a result of the important work done in the area of climate change.[94]

Even regarding certain sensitive areas of national security, the international cooperation among the scientists can pave the way for opening negotiations between countries. For instance, regarding arms control, Chinese Scientists Group on Arms Control has published the first Chinese-English dictionary of nuclear terms in cooperation with the US National Academy of Sciences Committee on International Security and Arms Control (CISAC). The aim of this joint work is to avoid misunderstandings and uncertainties in the phase of diplomatic negotiations regarding the basic terminology of the nuclear issues.[95]

Another such example for Science in Diplomacy is the first detailed Atlas of the Arctic through the joint collaboration of scientists from Canada, Denmark, Norway,

[94] Royal Society Report, op.cit., p.5.

[95] Ibid., p.6.

Sweden, Russia and USA in order to end conflicts regarding the sovereignty issues in the Arctic.[96]

In order to use scientific advice in diplomacy effectively, the international policymakers should have a minimum understanding of scientific knowledge or access to this knowledge. "Global science must aid the deployment of creative ingenuity to ease crises and to unite us all in a common search for a better, more prosperous future. Diplomats must challenge their short-term political paymasters and create a dialogue that reaches beyond the borders of states and ideologies. Similarly, scientists must acknowledge their responsibility to convey scientific discourse to the policy arena".[97]

Since science and diplomacy are different by their nature and require different skills, scientific training should be part of the diplomatic career in order to get diplomats some understanding of scientific issues.[98]

In this regard, a suggestion could be the formation of inter-ministerial working groups that would bring scientific and foreign policy communities together. There are many country examples of ministries related to science and research leading the international scientific efforts. If this could be linked better to the Ministry of Foreign Affairs, the potential for science to achieve foreign policy objectives would be strengthened.[99]

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[96] Ibid., p.6.

[97] Sumaya bint El Hassan, "New Partnerships to Sustain the Middle East and the World," *Science & Diplomacy,* Vol. 1, No. 3 (September 2012), p.5.
http://www.sciencediplomacy.org/perspective/2012/new-partnerships-sustain-middle-east-and-world

[98] Wilton Park Report, op.cit., p.3.

[99] V. Turekian, op.cit., p.2.

Another opportunity could be the appointment of scientists in the Ministry of Foreign Affairs through fellowship programs for a short-term period so that their expertise would be shared by the foreign ministry officials and the scientists would get familiar with the foreign policy issues which could be beneficial for both sides.

The Jefferson Science Fellowships Program of the National Academies of USA or the Science Fellowships of the American Association for the Advancement of Science (AAAS) are good examples of such a program where US scientists are appointed in the US Department of State for short-time periods within the scope of this Fellowship. This helps to increase the science and technology literacy of the US Department of State and bridges the foreign policy and science communities.[100]

In this regard, countries should develop a strategic approach to science diplomacy through establishing mechanisms to increase the interaction among scientific and foreign policy communities and capacity of the Foreign Ministries could be increased to pursue issues of science.

The capacity for understanding science diplomacy is necessary for the foreign policy experts and practitioners in order to make use of it effectively. The training of professionals of international relations (including the diplomats and international science managers) and formal as well as informal education are main components to increase this capacity.[101]

[100] Ibid., p.3.

[101] Vaughan C. Turekian and Tom C. Wang, "Educating for Science Diplomacy," *Science & Diplomacy*, Vol. 3, No. 1 (March 2014), p.1.
http://www.sciencediplomacy.org/editorial/2014/educating-for-science-diplomacy

There can be a broad range of themes and subjects in the education and training of science diplomacy, such as the weapons of mass destruction or topics on international security, which are S&T related international issues. Some of the recent topics of interest are water diplomacy, environmental science policy...etc.

This kind of orientation-type training on the S&T related issues is given to the U.S. foreign service officers for instance who would be appointed to the overseas ESTH (environment, science, technology, and health) positions and do not have a S&T background normally.[102]
In terms of addressing the priorities of S&T related foreign policy, foreign ministries and diplomatic academies can train the diplomats. They can also provide hands-on learning to the professionals in S&T that are interested in diplomacy.

The World Academy of Sciences (TWAS) has developed a short course on the recent topics of science diplomacy towards diplomats, policy makers and scientists from the developing World for instance.[103]

As another example, the new role of chief scientific adviser (CSA) to the Foreign and Commonwealth Office (FCO) was formed in the UK, who would bring together science with international policy making and diplomacy. It is a huge organization covering more than 160 countries and employing more than thousand people, most of them located outside the UK.[104]

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[102] Ibid., p.2.

[103] Ibid., p.2.

[104] David C. Clary, "A Scientist in the Foreign Office,", *Science & Diplomacy*, Vol. 2, No. 3 (September 2013), p.1. http://www.sciencediplomacy.org/editorial/2013/scientist-in-foreign-office

UK Science and Innovation Network is a unique organization involving "about ninety officers in UK embassies and high commissions in twenty-five countries".[105] They aim at developing international relations through scientific cooperation among the UK and other countries.

In Jordan, SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East) project "is a prime example of adventurous scientific diplomacy".[106]

On the other hand, an individual can go to Antarctica only if dealing with science according to the Antarctic Treaty. This is a good example of science diplomacy where people from different nations come together for the scientific purposes under extreme conditions.

"Science in Diplomacy" is a very important dimension in the climate change negotiations. Scientific services of the European Commission (EC) provide scientific data when needed.

In all of the recent summits of the EC, there is an important paragraph on scientific cooperation. For example, in the UN Resolution of the 68th session in 2014, there was the "2015 Development Framework" set and S&T has been recognized as an important driving force.

Another example of Science Diplomacy is the Science and Technology in Society (STS) Forum, which is a platform that brings together experts from different fields in order to discuss the global drivers of change. It "aims to strengthen the lights and

[105] Ibid., p.2.

[106] Ibid., p.2.

control the shadows of science and technology". In this Forum, more than thousand leaders in the areas of science, business, government as well as media from around a hundred countries (both from developed and developing countries) and many international organizations come together. The participation is by invitation only.[107]

At every annual meeting, outreach through science and technology diplomacy is discussed. Diplomacy plays a central role in terms of fostering international cooperation and capacity building in science and technology, especially in support for developing countries.

Over the past years, the STS Forum has become a global movement more than a conference in order to develop science and technology for the benefit of all. "Collaboration in the international community is vital if we are to succeed in reinforcing the lights and weakening the shadows cast by science and technology". Working together, there could be found ways to innovate a more sustainable future.[108]

3.2.2 Diplomacy for Science

Diplomacy for Science is the usage of diplomacy for extending and advancing international scientific cooperation among countries. Large scale international Science and Technology projects, such as the International Thermonuclear Experimental Reactor (ITER), Large Hadron Collider (LHC) or the European Organization for Nuclear Research (CERN) can be given as examples to this concept.[109]

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[107] Koji Omi, "Constructing a Global Science Forum," *Science & Diplomacy*, Vol. 3, No. 4, December 2014, p.2. http://www.sciencediplomacy.org/letter-field/2014/constructing-global-science-forum

[108] Ibid., p.3.

[109] Royal Society Report, op.cit., p.9.

It can be implemented either through a "top-down" approach by implementing strategic priorities in scientific research or through a "bottom-up" approach by individual scientists.

Diplomacy for Science activities can be examined everyday among individual scientists and institutions. Thousands of researchers at global scale are engaged in international scientific cooperation activities, not as they are told to so, but through their free will in order to share their knowledge and expertise with their counterparts. Science can play a bridge between the countries, which have weak political relations through their scientists. Many countries in this regard organize bilateral scientific and technological cooperation summits, such as the UK, which organizes regular and high-level science as well as innovation summits with countries like Brazil, China, India, Russia, South Africa and South Korea. They generate funding initiatives, such as the UK-India Education and Research Initiative and the Science Bridges schemes with China, India and the US.[110]

In the Diplomacy for Science activities, mostly inter-state scientific and technological activities are involved, which sometimes impedes the involvement of weak states or the states which are in the state of conflict from involving in such activities, because in this kind of states, state is often not strong and acts on behalf of certain interest groups.[111]

On the other hand, international cooperation in science and technology does not mean science diplomacy *per se*. Science diplomacy involves understanding and regulating the effects of science on an international level.[112]

[110] Ibid., p.9.

[111] Wilton Park Report, op.cit., p.4.

[112] Ibid., p.7.

Science and diplomacy have their mutual benefits on both sides. In the large-scale programs such as the ITER, scientists from all over the world, including the big powers such as China, Russia, US, Japan, India, Korea and the European Union come together to develop fusion energy. On the other hand, diplomacy also gives the chance to make research in parts of world which are crucial for the advancement of science. For example, making astronomical observation in Australia or archaeological research in Libya require international diplomatic efforts.[113]

Moreover it is useful to have an interdisciplinary approach that involves not only the scientific and technological dimensions, but also socio-economic dimensions of research in terms of finding solutions to global political challenges. The International Council on Science (ICSU) is a good example of such an approach as "the future of earth system research" of ICSU "highlighted 'the complex inter-relationships between biological, geochemical, climate and social systems".[114]

Science and technology is named as the "invisible pillar" of the transatlantic cooperation as well. It is an integral part of the transatlantic relations. The USA and the EU are the world leaders in research and development (R&D) with an accounting of 55% of the world's R&D expenditures according to the statistics of 2010. Their strength in science and technology make their scientists attractive as partners with other parts of the world.[115]

The US National Science Foundation (NSF) collaborates with thirteen European countries as well as others in the NSF Materials World Network call, which also

[113] Lord, K. M., Turekian, V. C., Time for a New Era of Science Diplomacy, *Science*, 315, p.770, 2007.

[114] Royal Society Report, op.cit., p.10.

[115] Cathleen Fisher, "The Invisible Pillar of Transatlantic Cooperation: Activating Untapped Science & Technology Assets," *Science & Diplomacy*, Vol. 2, No. 1 (March 2013), p.3. http://www.sciencediplomacy.org/article/2013/invisible-pillar-transatlantic-cooperation

includes Turkey. US scientists also collaborate with their European counterparts in the NSF International Collaboration in Chemistry call.

From January 2007 to June 2012, more than 220 collaborative research projects that involve more than 270 researchers and research institutes from the US are funded under the EU 7th Framework Program for Research and Technological Development (EU FP7), especially in the areas of health, information technology and environment.[116]

Japan concluded twenty-four scientific and technological cooperation agreements with thirty-four countries around the world by 2000. Now they have thirty-two agreements forty-six countries and the European Commission. They understood the necessity and importance of integrating their R&D system with resources to the rest of the world, including the developing countries.[117]

Switzerland is another country, whose competitiveness and prosperity is based on a strong knowledge economy to a large extend, provided joint science and technology programs with researchers of their "target countries" outside the USA and Europe in its Education, Research, and Innovation Plan for 2008-2011.[118]

Switzerland sent its first science attaché to the U.S. in 1958. He was mainly responsible for observing and reporting back to Switzerland about the development of nuclear technology in the U.S. In the past 55 years (as of 2013), they added 18 science counsellors and 6 swissnex ("a public-private partnership to promote

[116] Ibid., p.3.

[117] Atsushi Sunami, Tomoko Hamachi, and Shigeru Kitaba, op.cit., p.3.

[118] Flink, T. and Shreiterer, U., op.cit., p.666.

cooperation in science, technology, and innovation") and formed a big network of Swiss science diplomacy in this way. [119]

The Swiss State Secretariat for Education, Research and Innovation and the Federal Department of Foreign Affairs lead the science diplomacy activities of Switzerland, which is very much important in terms of supporting the economic and technological leadership of Switzerland. For instance, the bilateral activities of Switzerland in the U.S. and China serve as good examples of this approach.[120]

The main aims of their science diplomacy activities are ensuring the participation of institutions and researchers from Switzerland to the global networks of excellence and international funding schemes.

Switzerland has a science diplomacy network in 25 locations in 19 countries. They have nineteen science counsellors in capitals of hosting countries and six swissnex consular annexes in global science and innovation hot spots in the areas of education, research and innovation. Each of these counsellors are affiliated with an embassy or consulate. They cooperate with trade offices (Switzerland Global Enterprise), Pro Helvetia (the Swiss Arts Council), and other partners in the country.[121] The science counselors are part of the embassy and usually career diplomats. They lead the science section, which has one or two staff members. One third of the science counselors work on a full time basis. Their role is to analyze the STI related policy developments and search for cooperation opportunities.

[119] Flavia Schlegel, "Swiss Science Diplomacy: Harnessing the Inventiveness and Excellence of the Private and Public Sectors," *Science & Diplomacy*, Vol. 3, No. 1 (March 2014), p.1. http://www.sciencediplomacy.org/editorial/2014/educating-for-science-diplomacy

[120] Ibid., p.6.

[121] Ibid., p.4.

Another example of the "Diplomacy for Science" program is the Middle East Regional Cooperation (MERC) program, which "is a competitive research grants program, financed by the U.S. Agency for International Development that supports cooperation between Arab and Israeli scientists on topics that are likely to produce long-term development results". These projects are mainly focused on agriculture, water, environment, and health. Countries, such as Egypt, Jordan, Morocco, Lebanon and Tunisia are also involved in this project. By 2011, there were thirty-seven active Arab-Israeli MERC projects with seventeen institutions that involve West Bank and Gaza.[122]

In the Southern Africa, the project called SAFARI (Southern African Regional Science Initiative) brought together more than two hundred scientists in sixteen countries between 1998-2003 with the aim of building transactional as well as transformational scientific engagements in the region.[123]

The Higgs particle was discovered by the European Organization for Nuclear Research (CERN), which was founded to build the Europe after the World War II in a way that brought together former enemies. This is a good example of effective science diplomacy. Besides Europe, scientists from the U.S. can also participate to CERN. It "illustrates the importance of science and international research institutions in uniting nations to pursue a single noble goal".[124]

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[122] Kira E. Mock, "The Middle East Regional Cooperation Program: Opportunities for Israeli Palestinian Collaborative Research", *Science & Diplomacy*, Vol. 2, No. 1 (March 2013), p.1. http://www.sciencediplomacy.org/perspective/2013/middle-east-regional-cooperation-program

[123] Harold J. Annegarn and Robert J. Swap, "SAFARI 2000: A Southern African Example of Science Diplomacy", *Science & Diplomacy*, Vol. 1, No. 4 (December 2012), p.1. http://www.sciencediplomacy.org/article/2012/safari-2000

[124] Fernando Quevedo, "The Importance of International Research Institutions for Science Diplomacy", *Science & Diplomacy*, Vol. 2, No. 3 (September 2013), p.1. http://www.sciencediplomacy.org/perspective/2013/importance-international-research-institutions-for-science-diplomacy

Besides the CERN, the Abdus Salam International Centre for Theoretical Physics (ICTP) that is located in Trieste, Italy is a very old international research institution. It is also a good example of the crucial role played by the international research institutions in terms of bridging the political and developmental divides in the world through international collaboration that focus on grand scientific challenges.[125]

ICTP was mainly the only place in the West in the 1960s where scientists from the both sides of Iron Curtain met and shared their scientific expertise. This exemplifies an early and successful science diplomacy effort.

It brings scientists from all over the world in many different research topics. Since 1964, visitors from more than 185 countries have visited the center. They regularly come together, teach each other, learn their cultures and start new collaborations. It is not only about science, but they also exchange their views on politics, arts, religion, food...etc.[126]

Both CERN and ICTP believe that science is pure international activity, transcending all cultural, national or religious differences.

One of the most important examples of their joint efforts is their support to the SESAME (Synchrotron-light for Experimental Science and Applications in the Middle East), in Amman, Jordan that brings together members from Bahrain, Southern Cyprus, Egypt, Iran, Israel, Jordan, Pakistan, Turkey and the Palestinian Authority. It also builds bridges among the countries in the Middle East.[127]

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[125] Ibid., p.2.

[126] Ibid., p.2.

[127] Ibid., p.4

In terms of the "Diplomacy for Science" dimension, President of the EU and the President of China initiated "Innovation Dialogue" at the highest political level since 2014. Likewise the UK and China started a very big bilateral scientific program recently. There is also a Chinese Science Park in Belgium.

These examples show the power of diplomacy and science in building international collaborations worldwide, which may not be possible otherwise with the traditional means of diplomacy.

3.2.3 Science for Diplomacy

It is a mechanism to enhance or develop relations among countries. Cooperation between American and Soviet atomic scientists during the Cold War period, increased scientific and technological cooperation among US and Japan in 1960s and US-China umbrella Science and Technology Agreement signed in 1979 are some of the examples of "science for diplomacy" activities.

For instance, the US President John Kennedy announced the US-Japan Committee on Science Cooperation in 1961, which was first of its kind, in order to repair the "broken dialog" between the scientific communities of both countries.

In 1972, during their visit to China, US side wanted to offer something concrete and substantive beyond the policy changes and science was included as one of the future areas of cooperation among United States and China at the Shanghai Communiqué, which was signed as a result of this visit. Today America's one of the biggest cooperation programs in science and technology is with China in many disciplines.[128]

[128] Vaughan C. Turekian and Norman P. Neureiter, "Science and Diplomacy: The Past as Prologue," Science & Diplomacy, Vol. 1, No. 1 (March 2012), p.2. http://www.sciencediplomacy.org/editorial/2012/science-and-diplomacy

After the end of the Cold War, the activities of Science Diplomacy gained a momentum in the countries like USA, UK and Japan. In the USA for instance, the post of Science and Technology Adviser to the US Secretary of State was established in 2000.

The strength of a nation in science is interrelated to not only its economic strength but also its overall impact and weight on the international scale.

In this respect, science can be seen as an "unconventional language that they need to learn if they are to undertake their role in this field effectively".[129]

"Research can be an effective channel of political dialogue and contribute to developing or maintaining inter-state relations when traditional diplomacy has reached its limits".[130]

In fact, more countries use science and technology as a part of their diplomatic toolkits in order to develop relations with the civil societies in the regions of the world where official relations are broken or not working well. Therefore Science Diplomacy has an important role to play also in this respect.[131]

[129] Wilton Park Report, op.cit., p.9.

[130] Science Diplomacy for France, op.cit., p.9.

[131] Flink, T. and Shreiterer, U., op.cit., p.666.

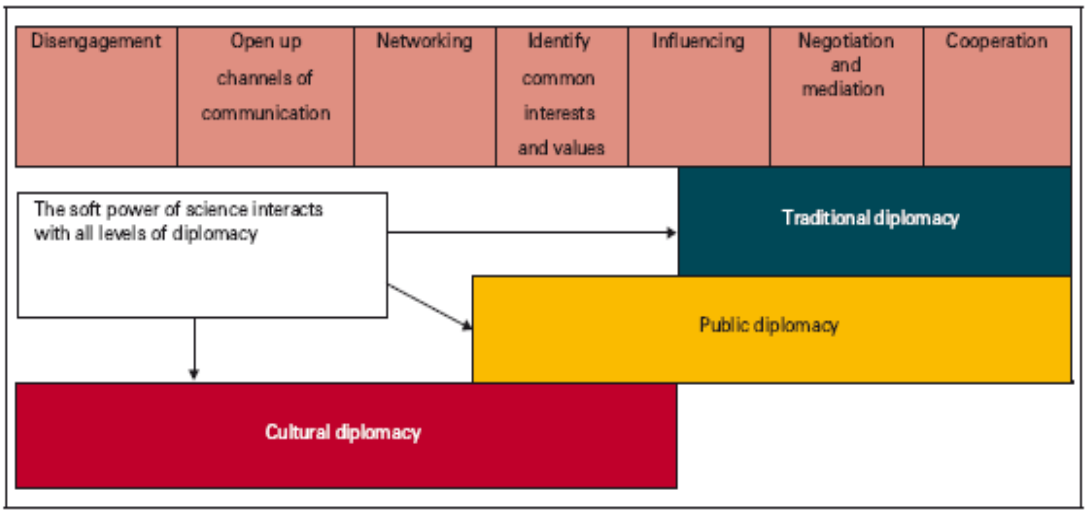

Figure 2 The Soft Power of Science (Royal Society, 2010)

Science for Diplomacy involves these kinds of activities:[132]

- International scientific and technological cooperation agreements
- International organizations, such as the European Organization for Nuclear Research (CERN)
- Educational scholarships (ex. The Newton International Fellowships scheme by the Royal Society)
- "Track two diplomacy": It means the involvement of the academicians and scientists as mediators in the negotiations besides the formal negotiations. The meetings organized between the National Academies in the Cold War years, besides the political meetings, can be given as such examples of Science for Diplomacy activities.
- Science exhibitions and festivals

For instance, in the SESAME project as mentioned above, these countries bring their resources together in order to contribute building of a scientific capacity in the region.[133]

[132] Royal Society Report, op.cit., pp.11-12.

[133] Ibid., p.20.

Another such projects is called Atlas of Islamic-World Science and Innovation, which aims to make a mapping of science and technology activities of the Islamic world and increase the potential areas of scientific collaboration among these countries. Royal Society, Organization of Islamic Conference, Nature magazine, British Council, Qatar Foundation and the International Development Research Center are partners in this project.[134]

Citizens gain the necessary skills of critical thinking for successfully participating in governance and global economic competition with the help of scientific education. For instance, according to surveys in many Middle Eastern countries, where United States is unpopular, science and technology is the single most respected part of the US society. It is indicated in many social science research findings that cooperation with the aim of solving common problems is one of the best ways to develop positive relations among the groups.[135]

Experienced (US) researchers can use their existing networks/alumni of former students that are working in different parts of the world in order to develop international scientific cooperation with their counterparts in those countries. In this way, new international bridges and trust can be built apart from any governmental policies.[136]

As part of their Science for Diplomacy activities, North American and European countries cooperate with the BRIC countries at an increasing level. This also paved way for an increasing scientific collaboration between United States and Iran in the last decade. The US National Science Foundation (NSF) has "identified the

[134] Ibid., p.20.

[135] Lord, K.M. & Turekian, V.C., op.cit., p.769.

[136] Bollyky, T. J., Bollyky, P. L., Obama and the Promotion of International Science, *Science,* 338, p: 610-611, 2012.

documented output of science and engineering articles published by Iranian scientists as the "first globally" with respect to growth, with an annual growth rate of 25.2 percent". They cooperate especially in the areas of "health services delivery, food-borne diseases, neurosciences, water and sanitation, ophthalmology, and bioethics" under the biomedical sciences and health.[137]

Science and technology projects could help to accomplish certain political goals in the areas of conflict, such as humanizing the adversaries; building confidence among the conflicting parties; supporting the economic development and developing new modes of humanitarian assistance.[138]

Therefore one needs to be careful in using ST for short-term political benefits or giving too much credit to Science and Technology in improving International Relations.[139]

Cooperation programs in Science and Technology require long-term periods of time, which can only be followed by the embassy personnel or science attaches effectively since they can follow up the international contacts made by science envoys and assess the scientific and technological capabilities as well as needs of a country through collecting opinions of local decision-makers and professionals.[140]

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[137] Irene Anne Jillson, "The United States and Iran: Gaining and Sharing Scientific Knowledge through Collaboration" *Science & Diplomacy*, Vol. 2, No. 1 (March 2013), p.2. http://www.sciencediplomacy.org/article/2013/united-states-and-iran

[138] Michael Thomas, "Advancing Palestinian Science and Promoting Cooperation under LongTerm Occupation", *Science & Diplomacy,* Vol. 2, No. 1 (March 2013), p.1. http://www.sciencediplomacy.org/article/2013/advancing-palestinian-science-and-promotingcooperation-under-long-term-occupation

[139] Flink, T. and Shreiterer, U., op.cit., p.676.

[140] El-Baz, F., Science Attaches in Embassies, *Science*, 329, p.13, 2010.

The Ministry of Foreign Affairs in different countries can benefit from the experiences and information base of various state agencies in appointing their science attaches, such as the National Academies of Science or Department of Agriculture and so on. It is the governmental agencies, such as "the National Science Foundation, National Institute for Standards and Technology, and National Oceanic and Atmospheric Administration" in the United States that "could provide staff for a Science Attaché program".[141]

When everything is going bad in terms of politics, you can still talk about "science" above others as stated by one of the officials. In the post Second World War Europe, first forms of unifications were "scientific" in nature, like the European Cooperation in Science and Technology (COST), CERN or the European Coal and Steel Community (ECSC). Science has unified Europe after two World Wars. They said "Let's get over these wars." so that Science Diplomacy could develop.

3.3 Conclusion

In today's world, the global challenges such as the climate change, food security, energy security, non-proliferation…etc. requires international scientific cooperation among different countries.

In this respect, traditional foreign policy tools and methods based on the inter-state relations are not adequate to cope with these challenges. Besides there is also the need of scientific expertise and knowledge in foreign policy making processes in the contemporary world.

In this context, the "Science Diplomacy" concept gained importance today. Although it seems a bit contrary, it is an extraordinary combination of "science" and "diplomacy". According to some it has already been practiced, for instance between

[141] Bollyky & Bollyky, op.cit., p.611.

the U.S. and the Soviet Union scientists in the Cold War years, but it was not named as such. According to some other resources, it is a rather new concept, which was first developed in the U.S. and widely used in the English-speaking world.

It may be argued that as a new concept, it became popular especially with the efforts of the Western world, such as the U.S. or the UK. They have a long traditional system of Science Diplomacy and a large network of science diplomats.

The main goals of the Science Diplomacy could be summarized as: to build international scientific collaborations around the world; to attract the so-called "best brains" in the world and to influence public opinion by using the power of science.

In this chapter, science diplomacy examples from many Western countries, such as the US, the UK, Germany, France and Switzerland are given. There are also good examples from non-Western countries like Japan or China, who are advanced in science diplomacy.

The countries, which are larger and more advanced in science have been actively involved in Science Diplomacy for many decades, while now newly developing or developed countries also express great interest in Science Diplomacy.

It is not a country-specific concept, in the sense that there are science diplomacy activities as well as science diplomats of many international organizations as well, such as the European Commission (EC) or the Organisation for Economic Cooperation and Development (OECD)…etc.

Each of these countries and/or organizations uses Science Diplomacy for different purposes. Therefore it is mainly analyzed under three sub-dimensions, which are:

1. Diplomacy in Science
2. Diplomacy for Science
3. Science for Diplomacy

For the sake of this work, science diplomacy activities and systems of different countries, namely Turkey, the USA and Germany would be analyzed from the "Diplomacy for Science" perspective, meaning building international scientific and technological collaborations.

Science diplomacy is very useful as a means of foreign policy in the sense that it does not necessitate the traditional means and boundaries of diplomacy. It can work outside the foreign ministries by global networks through the support of the research agencies. As stated above, "when everything is going bad in terms of politics, you can still talk about "science" above others."

Science can moreover play a bridging role between the countries, which have weak political relations through their scientists.

In this PhD Dissertation, the main focus would be the place of science diplomacy in the future international role of Turkey and what can be learned from other country examples that are advanced in their science diplomacy system and activities.

CHAPTER 4

SCIENCE DIPLOMACY SYSTEM AND ACTIVITIES OF THE UNITED STATES

4.1 Introduction

Excellence and leadership of United States (U.S.) in the areas of science, technology and innovation are considered as essential for the national interests of the U.S. It has also importance in U.S. diplomacy in order to advance prosperity, peace as well as security in the world. In this regard, the Science, Technology and Innovation (STI) basis in the U.S. needs to adapt itself to new challenges and opportunities in the global science landscape.[142]

In the second half of the twentieth century, the U.S. dominance in terms of scientific research is replaced by a rather multipolar STI landscape. U.S. is still a strong actor in the global STI landscape, but it has become less dominant in STI according to the new data presented in the National Science Board's Science and Engineering Indicators 2014. It needs "synergistic partnerships" in order to maintain leadership in STI.[143]

It needs such a strategy "to leverage scientific expertise, facilities, and funding around the world; continue to attract the "best and brightest"; train a globally engaged workforce; find new research and industrial partners and new markets; build

[142] E. William Colglazier and Elizabeth E. Lyons, "The United States Looks to the Global Science, Technology, and Innovation Horizon," *Science & Diplomacy,* Vol.3, No.3 (September 2014), p.1. http://www.sciencediplomacy.org/perspective/2014/united-states-looks-global-science-technology-and innovation-horizon

[143] Ibid., p.2.

strong international relationships; and drive innovative solutions for international development".[144]

The main aim of the Science Diplomacy activities of the U.S. is to gather information and networking. Science Diplomacy could also be realized through non-governmental instruments, such as the Academy of Sciences or the Frontiers of Science programs.[145]

The objectives of the U.S. in International Research and Development Programs are defined as follows:[146]

1. Performing science to the highest standards by improving the U.S. scientific quality through global standards of excellence.
2. Access to the frontiers of science by providing access to the U.S. researchers to international scientific frontiers.
3. Access to scientific talent by supporting the international scientific collaborations between U.S. scientists with the leading scientists worldwide.
4. Augmentation of scientific human capital by strengthening U.S. science through scientific visits, exchanges and mutual visits between excellent scientists all over the world.
5. Security through technology-based equity so that U.S. national security and economic prosperity would be improved by advancing the conditions in other countries through increased technical capability.
6. Leveraging on foreign science capabilities so that scientific progress would be accelerated beyond U.S. borders and its own resources.

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[144] Ibid., p.2.

[145] Interview with Prof. Dr. Adnan Akay, Vice President of the Bilkent University, 10.10.2013, Ankara.

[146] John Marburger, Director, Office of Science and Technology Policy, Bush Administration, "National Science Board Hearing on International Science Partnerships," speech, May 11, 2006.

7. Science diplomacy in order to improve understanding about the U.S. values by other nations.

8. Global support for global scientific issues with the aim of addressing global U.S. interests that the U.S. cannot sustain individually.

9. Science as a tradable asset in connection with treaties.

10. Science for glory to increase U.S. prestige and influence as to other nations.

Expert committees that have assessed the international S&T diplomacy efforts of the U.S. express concerns about:[147]

> (1) the lack of S&T expertise, presence, and global engagement at [Department of State] DOS,
> (2) a decline in support for S&T capacity at [United States Agency for International Development] USAID,
> (3) a lack of coherent and integrated international S&T policy direction and federal coordination role at [Office of Science and Technology Policy] OSTP, and
> (4) insufficient technological research to respond to development challenges. The following sections discuss proposed recommendations to respond to these concerns.

All in all, as stated in one of the latest reports of the National Science Board of the U.S.; **"**The U.S. is no longer the unquestioned leader in certain Science and Engineering (S&E) fields, such as national cyber-infrastructure networking, and must increasingly rely on and learn from other countries"[148]. This can only be achieved through the effective use of science diplomacy.

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[147] Ibid., p.8.

[148] National Science Board, *International Science and Engineering Partnerships: A Priority for U.S. Foreign Policy and Our Nation's Innovation Enterprise*, 2008, p.1.

Accordingly in this chapter, the U.S. science diplomacy system and recent activities would be analyzed. In this regard, first of all a historical background of the science diplomacy activities of the U.S. would be provided. It would be followed by the analysis of the general structure and main governmental as well as non-governmental actors in this system. A special part of the chapter is devoted to the science diplomacy activities of the U.S. in the Obama period since it was a turning point in terms of the new "U.S. Science Envoys" program. In the final part, general assessment of this system would be done with reference to the "Diplomacy for Science" activities of the United States.

4.2 Historical Background of the Science Diplomacy Activities of the United States

Benjamin Franklin and Thomas Jefferson are thought to be the first science diplomats of the United States (U.S.), dating back to 1700s.[149]

U.S. experienced many cases as a result of the use of science as a diplomatic tool throughout its history. The US science diplomacy system, which was in line with its basic national interests of security and economic well-being[150], was built upon these historical examples. Considering the advantages of using science as a diplomatic tool as mentioned above, applying science diplomacy has not been new for the US foreign policymakers.

A good example is the International Geophysical Year of 1957-58, in which the U.S. cooperated with the Soviet Union alongside with more than 60 other nations in the area of satellite surveillance and understood the fact that "if nations could cooperate

[149] Deborah D. Stine, op.cit., p.1.

[150] Elizabeth L. Chalecki, Knowledge in Sheep's Clothing: How Science Informs American Diplomacy, *Diplomacy and Statecraft*, 19, 2008, p.1

on matters of science, perhaps they could cooperate on other matters as well", which as a result lessens the likelihood of war among nations[151].

It was seen in the U.S. "national interest to seek and expand science cooperation with the Soviet Union"[152] . Scientists were seen more reliable than the diplomats in a sense.

During the history of the U.S., federal scientists, engineers and other related experts provided scientific and technological advice to the Presidents. Advisory boards and committees in the areas of S&T have been formed since 1930s to provide scientific advice to the Presidents, although not being permanent. New advisory boards and committees have been formed when needed.

The importance of research and development (R&D) has become more evident for the economic and military strength of the U.S. before the World War II.[153]

The important and decisive role of science in the U.S. foreign policy making processes dating back to 1950s was also exemplified in the Berkner Report of 1950, which stressed the importance of a Science Office in the Department of State and establishment of a science attaché system in the U.S.[154]

[151] Ibid., p.8.

[152] *Science Diplomacy and the Prevention of Conflict*, Proceedings of the USC Center on Public Diplomacy Conference, February 4-5, 2010, p.17.

[153] John F. Sargent Jr. & Dana A. Shea, The President's Office of Science and Technology Policy (OSTP): Issues for Congress, November 26, 2012, p.1

[154] Book Review on "Science, Technology and American Diplomacy: An Extended Study of the Interactions of Science and Technology with US Foreign Policy", House Committee on international Relations; Subcommittee on International Security and Affairs GPO, 1977 in the *Bulletin of the Atomic Scientists*, by W. Murray Todd, June 1978, p.53.

During the Cold War era, science diplomacy was performed by US in order to alleviate tension and allow establishing dialogue between the Soviet bloc and the Western community. First with the Baruch Plan of 1946, the control of nuclear energy was internationalized. Then the U.S. President Eisenhower delivered the famous "Atoms for Peace" speech in 1953 at the United Nations General Assembly. In addition to these, the use of scientific exchanges between the U.S. and China was a good example of the use of science diplomacy by the U.S. in those years in order to establish a friendly dialogue between two countries[155]. There has been a Scientific Advisor in the Department of State since 1950s. They focused more on the issues of nuclear security, military technologies during 1970s in the context of the Cold War. Following that the Central Intelligence Agency (CIA)'s Office of Scientific Intelligence in 1949 and the Office of Science Adviser and Special Assistant to the Secretary of State in 1950 were formed.

"The Office of Science Adviser and Special Assistant to the Secretary of State" became a bureau officially in 1965, "with the new name of Office of International Scientific and Technological Affairs".[156]

In addition to the historical examples, there are also many other successful examples of science diplomacy that clarify the role of science diplomacy in the contemporary U.S. foreign policy. One of the most interesting ones is the scientific cooperation between the U.S. and North Korea, which may be unthinkable by traditional methods of diplomacy. With the efforts and scientific activities of the U.S. Civilian Research and Development Foundation (CRDF) Global, the American Association for the Advancement of Science (AAAS) as well as the Korea Society, science proved to be

[155] Tim Flink and Ulrich Schreiterer, Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches, *Science and Public Policy*, 37(9), November 2010, p.668.

[156] Erica Pincus, "The Science and Technology Adviser to the U.S. Secretary of State: The History and Evolution of the Role," *Science & Diplomacy*, Vol. 3, No. 4, December 2014, p.2. http://www.sciencediplomacy.org/article/2014/science-and-technology-advisers-us-secretary- state.

necessary to be used as "a positive attractor force" in the U.S.'s relation to the North Korea[157]. Similarly, in a report of the U.S. National Academy of Sciences (NAS) of 1999, it was stated that 13 out of 16 US foreign policy goals were related with Science and Technology and Health[158].

The structure changed a bit in the U.S. following the changes in the nature and importance of Science Diplomacy in the time being.

For instance, there was a scientific advisor in the frame of the U.S. Department of State in the 1950s. This position underlines the importance of nuclear security, military technology...etc. in the Cold War years. In 1974, the focus was directed to civilian research more and the U.S. Congress formed the position of Assistant Secretary of State for Oceans, International and Environmental Affairs (OES). This reflected the importance given to global scientific and environmental affairs by the U.S.[159]

On the other hand, due to the budget restrictions in 1980s and 1990s, interest of the Department of State was diminished in these issues. The Secretary of State of that time Mrs. Madeleine Albright demanded a study from the U.S. National Academy of Sciences in 1998 that analyzes how they can be more successful in the scientific and foreign relations related issues. One of its recommendations was that "the Secretary should select a highly qualified STH [Science, Technology, and Health] Senior Advisor to the Secretary and to the selected undersecretary to provide expert advice,

[157] Science Diplomacy and the Prevention of Conflict, op.cit., p.26.

[158] Vaughan C. Turekian and Norman P. Neureiter, "Science and Diplomacy: The Past as Prologue," *Science & Diplomacy*, Vol. 1, No. 1, March 2012, p.3. http://www.sciencediplomacy.org/editorial/2012/science-and-diplomacy.

[159] Tim Flink and Ulrich Schreiterer, op.cit., p.674.

drawing on the resources of the American STH communities, as necessary, on current and emerging issues."[160]

As a result, it was decided to increase the scientific capacity and establish a scientific advisory position in the frame of the Department of State. Moreover the U.S. government started the AAAS diplomacy fellowships and Jefferson science fellowships that bring together young scientists.[161] The details of these fellowships would be provided in the next part.

Following the 1999 National Research Council (NRC) report's recommendations, Secretary Albright set up a task force and that resulted in the 2000 policy statement titled "Science and Diplomacy: Strengthening State for the 21st Century." There have been four advisers up to now, namely Norman Neureiter, George Atkinson, Nina Fedoroff, and William Colglazier. [162]

There is a small staff that gives support to the Science and Technology Advisor to the Secretary (STAS) position. That allows strategic mobility in order to address different needs in the department. STAS is complementary to the OES, which is responsible for S&T related foreign policy issues like the Arctic issues, infectious diseases, climate change, space and bilateral S&T cooperation.[163]

[160] Erica Pincus, op.cit., p.1.

[161] Tim Flink and Ulrich Schreiterer, op.cit., p.675.

[162] Erica Pincus, op.cit., p.2.

[163] Ibid., p.2.

As of November 2010, there is 200 personnel working in the OES and the science attaches from OES are appointed to the Environment, Science, Technology and Health (ESTH) departments of the US embassies all over the world.[164]

Daily duties and interest areas of the ESTH offices include; establishing scientific projects between research centers, firms and individual researchers; disarmament and biodiversity issues; anti-terrorism activities as well as intellectual property rights issues.

In contrast to many other countries, marketing of the U.S. R&D and higher education activities or enhancing inter-institutional scientific relations are not defined as the duties of U.S. science attachés.[165]

In the interviews that are made with the ESTH officials in Paris, they indicated that Science Diplomacy is a portion of their portfolios and there is a certain flexibility in how to balance it among their many other ESTH issues. For example, they also deal with other issues, such as space, women in science, energy, green technology…etc. With the wide-ranging issues an ESTH section follows, Science diplomacy is often triaged "when it comes up!" in their words. For the U.S., science diplomacy has economic motivations as well as being driven by maintaining strong science partnerships and the benefits of shared global research priorities. "Diplomacy of Science" activities are mainly run by Bureau of Oceans and International Environmental and Scientific Affairs (OES) through bilateral agreements mainly.[166] They also have the "Embassy Science Fellows Program" in which scientists are

[164] According to the latest data received from the U.S. Department of State, there are "218 officers overseas whose portfolios include science and technology. Of those, 64 are dedicated to environment, science, technology, and health issues". (Cleverley, 2013).

[165] Tim Flink and Ulrich Schreiterer, op.cit., p.675.

[166] Interviews with Mr. Blake Butler, Mrs. Mary Weld and Mr. Thomas N. Halphen, US Embassy in Paris, 10.09.2013.

appointed in the U.S. governmental organizations, such as the Department of State or Department of Energy for up to one year and the costs are shared between the institutions involved.

In the U.S. embassy science attaché program, a scientist serves as an advisor to the ambassador and reports on scientific developments abroad.[167]

Even though it was successful in the beginning in terms of promoting diplomatic cooperation, in the mid-1990s it was eliminated as a permanent position because of the efforts for reduction of the public expenditures.[168]

The utilization of the science attaché program and others has some concrete benefits. In the past decades, science attachés that had PhDs and operated within the U.S. Department of State focused on the "science for diplomacy" activities.[169]

A new law on the International Scientific and Technological Cooperation was accepted by the U.S. Congress on 26 March 2009. Following that US science attaches were sent all over the world and it was decided to initiate a global scientific fund in order to enhance international cooperation in the areas of Science and Technology. This development also indicates US's increasing attention and importance given to this issue.[170]

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[167] Igor Linkov, Benjamin Trump, Elisa Tatham, Sankar Basu, Mihail C. Roco, "Diplomacy for Science Two Generations Later," *Science & Diplomacy*, Vol. 3, No. 1, March 2014, p.1.

http:// www.sciencediplomacy.org/perspective/2014/diplomacy-for-science-two-generations-later.

[168] Ibid., p.1.

[169] Ibid., p.2.

[170] Tim Flink and Ulrich Schreiterer, op.cit., p.675.

The first U.S. science attaché was appointed to Germany in 1898. Since then the U.S. efforts for engagement in science with the aim of advancing diplomatic goals continued to fuel the science diplomacy.

There are Environment, Science, Technology and Health (ESTH) officers today in the U.S. embassies. They do not necessarily have scientific education, but they focus especially on policy issues, like energy security, climate change and protection of biodiversity.

Even though the science attaché program did not continue, there have been established some other programs, such as the U.S. Department of State's Embassy Science Fellows in 2001 and the White House's Science Envoy Program in 2009. They believe the potential role of scientists in U.S. foreign policy. Therefore these programs were established.

Through the Science and Technology Policy Fellowships, the AAAS sends scientists to the Department of State (AAAS Diplomacy Fellowships) from one- to two-years since 1980. These science fellows focus on a specific set of science policy issues, whereas a centralized science attaché is responsible for a wide assortment of interests.[171]

It is expected that these new positions would address three main challenges that American scientists, academicians and business sector face, namely:[172]

First, there is a necessity for large-scale international cooperation projects, such as space stations that are important topics of "diplomacy for science" activities.

[171] Igor Linkov, Benjamin Trump, Elisa Tatham, Sankar Basu, Mihail C. Roco, op.cit., p.3.

[172] Ibid., p.4.

Second, since there is now more interconnectedness within the industrial production as well as international technological systems, this requires collaborative solutions.

Third, it is essential to obtain timely information and contacts in terms of scientific breakthroughs, new R&D programs and technological developments in order "to operate at the cutting edge of scientific discovery".

One mechanism could be the extension of the duration of the Embassy Science Fellows Program in order to allow one year assignments. It was discussed at the Department of State as well as at the NSF, which was one of the first agencies that participated in this program fifteen years ago.[173]

Last, but not least, science attachés could be appointed to a specific region rather than a particular country due to limited resources and regional needs.

The U.S. Department of State identified some key elements for success in Science and Technology Diplomacy initiatives[174], such as (1) breaking new grounds in some neglected areas of science; (2) programs should be transformative in nature in terms of education and development; (3) they should address main developmental issues related to human development and poverty; (4) promotion of sustainable use of natural resources; (5) stimulating new jobs and investment of private sector; and (6) projects should be collaborative with tangible results.

[173] Ibid., p.5.

[174] Deborah D. Stine, Science, Technology, and American Diplomacy: Background and Issues for Congress, 2009, p.8.

Interview with Dr. Susan Vesel (Science Counsellor, US Embassy in Brussels, 03.06.2014):

What is the role of ESTH office in Brussels? [175]

Three people from the U.S. Embassy work there. It is part of Energy, Environment and Climate Change themes. Mrs. Vesel is responsible for Science & Technology issues. She has a PhD degree in Economics field. She is not only responsible for Science Diplomacy activities, but also Climate Change, Commercial Space Cooperation and High-level delegation visits, which could be exemplified as part of it. U.S. Embassy ESTH office in Paris is also not only dealing with Science and Technology issues.

They work very closely with the European Commission (EC) Directorate General (DG) for Research in Brussels, more than other DGs and they operate more at the governmental or high-level of cooperation. She gave a different example from Canada since they also deal with one-to-one university cooperation issues.

They are also responsible from the policies for priorities of cooperation. They act like a "filter" or a "translator" between the U.S. government and the European Union (EU) research system in a sense.

Science diplomats of the USA are from the U.S. Department of State (DoS), but in fact the DoS is not a funding or science policy making body. It has both its advantages and disadvantages in this sense. They have a facilitating role with other U.S. agencies and coordination between governments.

[175] Interview with Dr. Susan Vesel, Science Counsellor, US Embassy in Brussels, 03.06.2014.

The main science policy making body in the USA is the Office of Science and Technology Policy (OSTP) under the U.S. Congress. They fund over 100 US agencies related to Science and Technology. DoS provides input to them.

There is normally no funding relation between the U.S. and the EU. So the big question is "what to do with the EU?" They have different Science Diplomacy approaches. A good example of Science Diplomacy cooperation between the EU and the USA is the "Transatlantic Ocean Research Alliance" established between the USA, the EU as well as Canada.

In terms of the U.S. Science Envoys program (2009), Mrs. Vesel, also based on her experience in Afghanistan, thinks that in the areas of conflict, it is good to have scientists. High-level meetings without "politics" could be realized.

She finds the "U.S. Embassy Science Fellows" program "super successful" in her words. U.S. Embassy in a specific country makes a request on a specific topic and scientists from the U.S. research funding institutions, such as the National Science Foundation (NSF), the National Oceanic and Atmospheric Administration (NOAA) or the Department of Energy (DoE) to work in these embassies so that they can benefit from the experience of these agencies.

In terms of the Turkish-USA S&T cooperation, which has gained a new momentum with the first high-level S&T meeting between Turkey and the USA on 3-4 April 2013 in Ankara, is going well. The details of this meeting would be provided in the Turkey chapter.

In terms of the budget-cuts in the US S&T budget and its possible effects, Mrs. Vessels argue that the S&T policies are very much political in the USA, like Turkey. Important research funding institutions in the USA, such as the NSF, the U.S. Geological Survey (USGS) or NOAA faced serious budget-cuts in terms of international cooperation or international travels. It hurts scientific cooperation and

disrupts joint funding unfortunately. Normally annual budgets of them are approved and funded by the US Congress.

There are around 20 AAAS fellows in the DoS as well. They are "fresh scientists" on foreign policy issues.

Given all these factors, it should be questioned if the US case is a best practice example in terms of Science Diplomacy for Turkey.

4.3 General Structure and the Main Actors of the Science Diplomacy System in the United States

As for the science diplomacy system of the United States, there are many governmental, research and private sector organizations that are responsible for defining different dimensions of the science policies in the U.S. The White House Office of Science and Technology Policy (OSTP) is mainly responsible for the coordination of the science and technology activities. Other than that there is no equivalent of a Ministry for Science in the U.S.[176]

In this structure, it is not possible to coordinate the scientific foreign policy from one hand. In this regard, the international science and technology policies of the U.S. are diversified and each related institution in this system has its own policy agenda in line with its own institutional interests.

Since the U.S. Department of State does not have funds to support international scientific partnerships, it does not have much influence on shaping the international

[176] Tim Flink and Ulrich Schreiterer, op.cit., p.674.

scientific policies of the U.S. This sometimes impedes the US from using its soft power in its Science Diplomacy activities.[177]

Although the Department of State is responsible for the negotiation and control of the ongoing bilateral International Scientific and Technological Cooperation Agreements (ISTA), it does not bear the necessary human resources and administrative capacity for the governance of research programs and activities. These agreements are not considered very seriously since they do not necessitate bilateral funding responsibility.[178]

Current legal guide for the international S&T policy of the United States is provided by the Title V of the Foreign Relations Authorization Act, FY1979 (P.L. 95-426). Accordingly the Department of State (DoS) is the lead federal agency in terms of developing S&T agreements. It is stated by the National Science and Technology Policy, Organization, and Priorities Act of 1976 (P.L. 94-282) that "the director of the White House Office of Science and Technology Policy (OSTP) is to advise the President on international S&T cooperation policies and the role of S&T considerations in foreign relations".[179]

OSTP is a staff office within the Executive Office of the President (EOP), which does not fund domestic or international programs. The Assistant to the Director for International Relations has a liaison role within the EOP, "to organizations such as the National Security Council; with federal agencies, including DOS and the international offices of federal agencies such as the National Science Foundation; and with the science liaisons of foreign country embassies in the United States".[180]

[177] Ibid., p.674.

[178] According to the latest data received from the U.S. Department of State, there are 56 such bilateral agreements, although not all of them being active (Cleverley, 2013).

[179] Book Review on "Science, Technology and American Diplomacy: An Extended Study of the Interactions of Science and Technology with US Foreign Policy", op.cit., p.54.

[180] Deborah D. Stine, op.cit., p.4.

Other than that there are some other U.S. federal agencies that support research and international science diplomacy efforts of the USA, such as the National Science Foundation (NSF), National Institutes of Health (NIH), Department of Energy, National Aeronautics and Space Administration (NASA), Department of Agriculture, Environmental Protection Agency, Department of Interior…etc.

In this context the following U.S. governmental and non-governmental institutions would be briefly analyzed in the context of the U.S. Science Diplomacy system:

a. The Department of State (DoS)
b. The Bureau of Oceans and International Environmental and Scientific Affairs (OES)
c. The Science and Technology Advisor to the State (STAS)
d. The Office of Science and Technology Policy (OSTP)
e. The American Association for the Advancement of Science (AAAS) and the Center for Science Diplomacy
f. The National Science and Technology Council (NSTC)
g. The U.S. Agency for International Development (USAID)
h. The National Science Foundation (NSF)
i. The U.S. Civilian Research and Development Foundation (CRDF)
j. The National Academy of Sciences (NAS)
k. The Global Innovation through Science and Technology (GIST) initiative

4.3.1 Department of State (DOS)

DOS is responsible for setting the overall policy direction for U.S. international S&T diplomacy, and works in cooperation with other federal agencies when needed.

In May 2007, DOS and USAID prepared a strategic plan for the years 2007-2012 and identified the following strategies that are keys to science diplomacy:[181]

- Encouragement of science and technology cooperation in order to advance knowledge in water management;
- Promotion of knowledge sharing among the scientific community at the international level in order to increase international scientific cooperation;
- Strengthening international cooperation on cutting-edge energy technology research and development;
- Application of research that includes promoting technological improvements for more sustainable use of resources, biodiversity conversation and so on;
- Supporting scientific and technological applications, such as biotechnology, agricultural productivity and more affordable food supply;
- Enhancing outreach to the key private sector.

DoS has various tools for the implementation of this strategy, such as formal bilateral S&T cooperation agreements for facilitating the international collaboration by federal agencies; promotion and support of S&T entrepreneurs and innovators; exchange of scientists and students; workshops, conferences, and meetings; public-private partnerships; seed funding for the implementation of scientific programs and innovation activities; and production of educational materials, like films, websites, posters, and cards.

[181] Ibid., p.2.

Within the State Department, the Bureau of Oceans and International Environmental and Scientific Affairs (OES) is responsible from the coordination of international S&T activities, "and the Science and Technology Advisor (STAS) provides S&T advice to the Secretary of State, DOS staff, and the director of USAID".[182]

There are various ways that the U.S. does scientific cooperation with other countries, like informal cooperation among scientists; cooperation among research institutes or formal agreements.[183]

Six broad categories of the U.S. international S&T cooperative activities were defined as; "(1) agreements; (2) research; (3) facilities and equipment; (4) academic opportunities from primary through post-secondary education; (5) meetings, dialogues, and visits; and (6) private sector activities. International S&T cooperative activities can be multinational, regional, or bilateral".[184]

In the Cold War period, S&T agreements became important diplomatic tools for cooperation. For example, the U.S. and Japan signed S&T agreement in 1960s to mend the so-called "broken dialogue" among them.[185]

[182] Ibid., p.3.

[183] Bridget M. Dolan, "Science and Technology Agreements as Tools for Science Diplomacy: A U.S. Case Study," *Science & Diplomacy*, Vol. 1, No. 4, December 2012, p.2. http://www.sciencediplomacy.org/article/2012/science-and-technology-agreements-tools-for-science-diplomacy.

[184] Deborah D. Stine, op.cit., p.8.

[185] Bridget M. Dolan, op.cit., p. 2.

Contemporary Drivers for U.S. S&T Agreements are:[186]

- *Transforming a Diplomatic Relationship*
- *Promoting Public Diplomacy*
- *Highlighting Cooperation during a Diplomatic Visit*
- *Protecting U.S. National Security*

Even the U.S. has S&T agreements with over sixty countries, only three of them are dedicated to funding, namely: Egypt, Pakistan, and India. It also has joint S&T funding programs with Israel, but without an umbrella S&T agreement.

4.3.2 The Bureau of Oceans and International Environmental and Scientific Affairs (OES)

The Bureau of Oceans and International Environmental and Scientific Affairs (OES) was established in 1974 by the U.S. Congress. It was headed by Assistant Secretary General Dr. Kerri-Ann Jones as of 2013. Its aim is to work on to develop U.S. foreign policy aims in the areas of climate change, renewable energy, scarcity of resources, polar issues, oceans, infectious diseases, science and technology as well as space policies.

OES is coordinating international science and technology cooperation activities throughout the federal government. The Health, Space, and Science Directorate works with federal agencies on S&T policy issues within OES. Moreover some U.S. embassies have bilateral Environment, Science, Technology, and Health Foreign Service officers.[187]

Science and science-based approaches provide concrete developments in human life and if applied strategically science and technology could be a strong tool to reach

[186] Ibid., pp.3-4.

[187] Deborah D. Stine, op.cit., p.3.

important segments of the civil society. Through scientific and technological cooperation, U.S. scientific standards and applications play an important role in the definition of the international references. Moreover scientific and technological cooperation has indirect benefits that also contribute to sustainable economic growth, such as strengthening of the political relations, development of the democracy and civil society and enlargement of the civil society.

In this regard, the Oceans and International Environmental and Scientific Affairs/Science and Technology Cooperation Office (OES/STC) works for the realization of the binding bilateral and multilateral science and technology cooperation agreements. These agreements support sustainable development, empowering the role of women in science and society, development of science-based decision-making processes, good governance as well as global security.

The USA has more than fifty science and technology cooperation agreements worldwide and through these agreements, a bilateral framework for sharing the scientific results is provided; intellectual property rights are protected; new opportunities for the researchers are provided; taxation issues are covered; and the issues of economic development, local security and regional stability are covered.

Scientific and technological cooperation supports the establishment of science-based industry, as well as encourages international trade and dialogue issues, such as the environmental protection and management of natural resources that also affect national scientific infrastructure and global security.

This S&T cooperation also helps the U.S. governmental institutions to develop cooperation with their counterpart institutions abroad. These relations also enable the governmental institutions to realize their individual responsibilities through providing the opportunity to reach all partners, new resources, materials as well as information and research opportunities. Priority research areas are defined, such as agricultural and industrial biotechnology research (microorganisms, plant and animal

genetic materials…etc.); health sciences; naval research; chemistry of natural products; and environmental and energy research.[188]

4.3.3 Science and Technology Advisor to the Secretary of State (STAS)

The Science and Technology Advisor to the Secretary of State (STAS) acts as an advisor for both DOS and USAID. It is placed within the Department of State, but not related to the OES. Its goals are enhancing the S&T literacy and capacity of DOS; building partnerships within the U.S. government, with the outside S&T community, with S&T partners abroad as well as the foreign embassies in the United States; providing accurate S&T advice to DOS; and shaping a global perspective related to the emerging and upcoming S&T developments that could affect the future foreign policy of the U.S.[189]

Fedoroff was the first STAS and also served as S&T adviser to the USAID administrator. She had a more policy focused role; her main goals were "getting science more front and center into policy and getting the idea that science was probably our best diplomatic foot forward into the mainstream." [190]

The most recent STAS, Colglazier had five main goals during his position:[191]

1. Developing a good relationship with the OES;
2. Making STAS's usefulness known within the Department of State;
3. Fulfilling his goals and responsibilities related to science diplomacy;

[188] http://www.state.gov/e/oes/ Retrieved in November 2013.

[189] Deborah D. Stine, op.cit., p.3.

[190] Erica Pincus, op.cit., p.5.

[191] Ibid., p.5.

4. Helping U.S. institutions, such as the universities, to serve as a "science ambassador" and their international engagements;
5. Providing technological information regarding foreign relations.

According to the NRC report of 1999, the Senior Advisor should have knowledge on the Science, Technology and Health (STH) issues by education or experience and should be familiar with the STH infrastructure of the country. The Senior Advisor should also have international experience and capacity to interlink STH and foreign policy issues.[192]

According to Atkinson[193], four skills are necessary for a successful science and technology adviser: first, practical experience in science or engineering disciplines; second, skills in mentorship or teaching; third, the ability in listening, providing reliable information, and when necessary willingness to be wrong; and fourth, the ability in convincing people.

4.3.4 Office of Science and Technology Policy (OSTP)

Office of Science and Technology Policy (OSTP) was founded in 1976 by the U.S. Congress in order to inform the US President and the members of the Executive Office about the impacts of science and technology on domestic and foreign politics. In line with the related law that was enacted in 1976, OSTP was given an authority to develop and implement meaningful science and technology policies as well as budgets. In this regard, it would also be responsible for the coordination of interagency activities of the private sector, government, local governments, scientific and higher education associations and other countries to work on this aim.[194]

[192] Ibid., p.4.

[193] Ibid., p.7.

[194] http://www.whitehouse.gov/administration/eop/ostp/about/ Retrieved in November 2013.

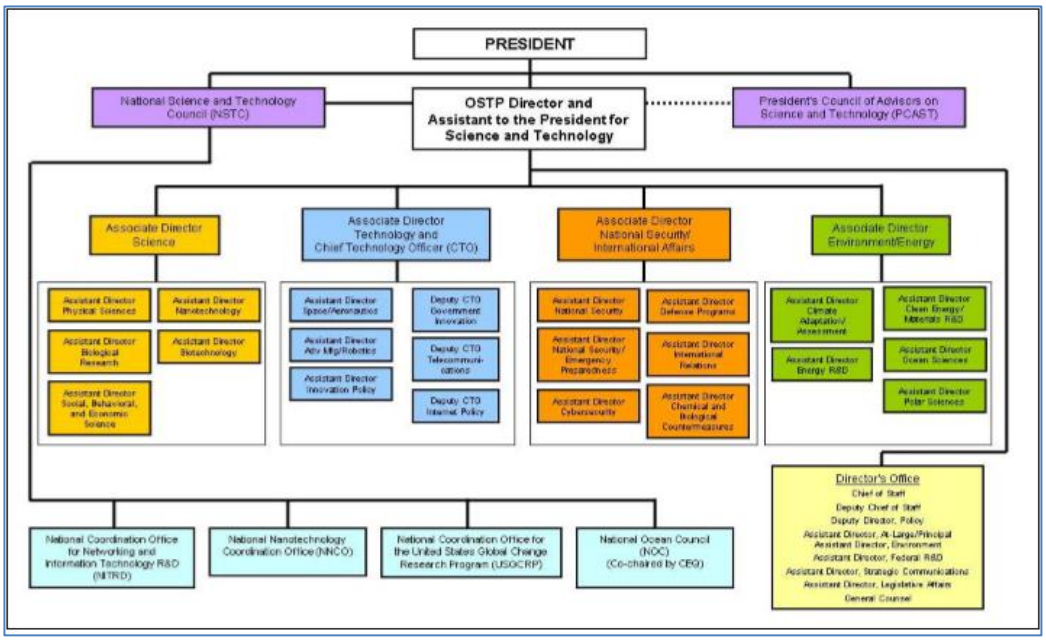

Figure 3 Office of Science and Technology Policy Organization[195]

OSTP has three kinds of mission, which are namely:

1. Advising the U.S. President and the experts team related to the appropriate scientific and technical issues;
2. Contributing scientifically to the policies of the Executive Office;
3. Coordinating the scientific and technical work of the Executive Office in order to provide the maximum benefit to the society.

[195] www.ostp.gov/cs/about_ostp/leadership_staff.

Strategic Goals and Objectives of the OSTP [196]

- Sustaining maximum contribution of the federal science and technology investments into economic welfare, public health, environmental quality and national security
- Maintaining synergy between funding, evaluation and coordination of the science and technology programs of the government
- Developing professional and scientific cooperation between the representatives of government, academy and industry who are responsible for understanding and defining the expertise, scientific developments and potential policy proposals of the U.S. in the area of science and technology
- Generating a workforce with a world class level expertise in order to inform and advise the President of USA and expert team of the President in the areas related to scientific and technological dimensions of the main programs and policies of the federal government

4.3.5 The American Association for the Advancement of Science (AAAS) and the Center for Science Diplomacy [197]

The Center for Science Diplomacy of the AAAS was established on 15 July 2008 in order to increase the bridging role of science and scientists among countries as well as to increase the role of scientific cooperation in foreign policy. Its main aim is to use scientific cooperation for international understanding and welfare. To this end, the Center provides a forum opportunity that brings together scientists, policy analysts and policy makers for knowledge-sharing and cooperation opportunities. They aim to encourage scientific cooperation through science diplomacy, especially between the countries whose political relations are limited.

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[196] http://www.whitehouse.gov/administration/eop/ostp/about/ op.cit.

[197] http://www.aaas.org/page/about-0 Retrieved in November 2013.

International scientific cooperation contributes to the advancement of both science and relations among the cooperating countries. Such a relation helps to start inter-state relations, sustain confidence among states and inter-state understanding. For example, during the Cold War years, the effective scientific cooperation among the scientists from the U.S. and the Soviet Union or beginning of the scientific cooperation between the China and the U.S. even before the formal diplomatic relations start are good examples of the success of the science diplomacy activities in the past. Today the scientific and technological cooperation agreements are essential tools for integrating science into wider diplomatic relations. Other than that the cross-border scientific cooperation activities are at the center of scientific expertise.
In this regard, AAAS Center for Science Diplomacy has three approaches in its main activities:

- **Inspirational Approach:** Raising the profile of science diplomacy through organizing activities and making a science community of stakeholders of science diplomacy activities
- **Operational Approach:** Organizing exchange programs, visits and bilateral activities in order to activate science diplomacy
- **Intellectual Approach:** Forming a platform for the identification of the main subjects of science diplomacy and sharing the best practices in implementation of the science diplomacy strategies

AAAS Center for Science Diplomacy: Science Diplomacy Awards[198]

Today many scientists and engineers dedicate their time and effort to various research, education and publication activities in order to find answers to key scientific questions and to develop important societal ties. AAAS Science Diplomacy Awards are given to a limited number of individuals that contribute to the development of science diplomacy in various fields of science and engineering.

[198] http://www.aaas.org/page/aaas-award-science-diplomacy Retrieved in November 2013.

This award is presented at the AAAS Annual Meeting and the scientists, who are awarded would receive 5000 USD, as well as a plaquette, complimentary registration and reimbursement of their travel for the participation to the AAAS Annual Meeting. The award is open to all countries. Individuals or small groups, who have contributed to the activities of science diplomacy with the aim of developing stronger societal ties would be appropriate for this award.

The Science Diplomacy Award is given since 1992. For instance, in 2010 Prof. Dr. Glenn E. Schweitzer was given this award, who previously worked in the U.S. Embassy and many high level positions and contributed to especially building diplomatic ties between USA, Russia and Iran. Prof. Schweitzer works as the Director of the Central Europe and Eurasia Office at the U.S. National Academies of Science.

In 2012, "Nancy B. Jackson is recognized for her ongoing commitment to international science cooperation to prevent the theft and diversion of chemicals through the establishment of the Chemical Security Engagement Program and for developing, nurturing, and advancing careers of scientists worldwide, with a special emphasis on women scientists in the Middle East and Southeast Asia".

4.3.6 National Science and Technology Council (NSTC)

One of the main duties of NSTC is to define clear national targets towards the science and technology investments of USA, which has a broad coverage. In this regard, the Council defines the R&D strategies, which are coordinated by the Federal agencies. NSTC is comprised of five main committees: Environment, Natural Resources and Sustainability; Homeland and National Security; Science, Technology, Engineering, and Math (STEM) Education; Science; and Technology.

Under these five main committees, different sub-committees cover different aspects of science and technology. [199]

4.3.7 US Agency for International Development (USAID)

USAID is an independent federal government agency that supports developmental and U.S. strategic interests with guidance from the DOS.[200]

Main aim of the USAID is to assist the other countries in terms of natural hazards, poverty and transition to democracy in line with the national interests of USA and is very active in many parts of the world, such as Africa, Asia, Latin America, Eurasia and the Middle East. It also has an advisory duty in science and technology and in this sense it can be considered as part of the US science diplomacy system.

The science and technology advisor of the USAID is Dr. Alex Dehgan (as of 2013), who is also the Director of Science and Technology Office under the USA Policy, Planning and Learning Bureau. In this sense, their main aim is to make USAID a world leader in terms of bringing science and technology based solutions to development.[201]

4.3.8 National Science Foundation (NSF)

"The National Science Foundation (NSF) is an independent federal agency created by Congress in 1950 to promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense…".[202]

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[199] http://www.whitehouse.gov/administration/eop/ostp/nstc Retrieved in November 2013.

[200] Deborah D. Stine, op.cit., p.4.

[201] http://www.usaid.gov/ Retrieved in November 2013.

[202] http://www.nsf.gov/ Retrieved in November 2013.

NSF has Europe (since 1980s) Regional Office, China Office (recent) and Japan Office (since 1960s).

Based on the interview with Dr. Carmen Huber[203], who is the Director of NSF Europe in Paris, NSF has mainly two types of international partnerships, namely a) NSF-wide and; b) Materials World Network (MWN) or International Call for Chemistry (ICC) type of calls with an international scope. There is no single model for international scientific cooperation in NSF, it is quite flexible. Main obstacle on the way of international S&T cooperation with the developing countries is to find "matching research funds" there.

In terms of the "Diplomacy for Science" type of activities of NSF, PEER and BREAD programs have a special place.

PEER program:[204]

The Partnerships for Enhanced Engagement in Research (PEER) Science is a program based on a Memorandum of Understanding (MOU) between NSF and the United States Agency for International Development (USAID). Accordingly this program provides an opportunity for the scientists in the developing countries to benefit from the competitive grants of the USAID in cooperation with the NSF-funded scientists at U.S. institutions. It aims to support the scientific capacity of the researchers in developing countries "to use science and technology to address local and global development challenges". The funding provided by the PEER Science program can be used for training, equipment, field study, research and building

[203] Interview with Dr. Carmen Huber, Director of NSF Europe Office, Paris, 04.09.2013.

[204] http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=504726 Retrieved in October 2013.

scientific networks. The proposals are received and reviewed by the National Academies.

BREAD program:[205]

BREAD program is supported in partnership with the National Science Foundation (NSF) and the Bill & Melinda Gates Foundation (BMGF). "The objective of the BREAD Program is to support innovative basic scientific research designed to address key constraints to smallholder agriculture in the developing world". The emphasis on the "relevance and potential application to agriculture in the developing world" is very important in BREAD proposals. The activities of the Plant Genome Research Program (PGRP) are taken to the next level by supporting a larger level of scientific research and international collaborations by the BREAD Program. It focuses on novel and transformative basic research rather than application of it.

4.3.9 US Civilian Research and Development Foundation (CRDF)

CRDF Global is an independent and non-profit organization that supports international scientific and technological cooperation through grants, technical resources and education. Its headquarters is at Arlington, Virginia (USA) and has offices at Moscow (Russia), Kiev (Ukraine), Almaty (Kazakhstan) and Amman (Jordan). Its main objective is to support peace and welfare through international scientific cooperation.

CRDF Global was established in 1990s in the post-Cold War era with the NSF funding. Now it focuses not only Russia, but "Global" in its nature. In September 2012, CRDF Global and NSF organized together a Workshop on Merit Review in the USA.[206]

[205] http://www.nsf.gov/funding/pgm_summ.jsp?pims_id=503285 Retrieved in October 2013.

[206] http://www.crdfglobal.org/about-us Retrieved in October 2013.

Mission of the CRDF[207]

- Enable R&D opportunities for the scientists and engineers in order to cooperate for the solution of critical security, economic, education and other societal needs
- Develop peace and welfare through funding civil R&D projects that contribute to the objectives of global disarmament
- Encourage the use of science and technology through international cooperation and education for economic growth with the aim of encouraging commercialization of scientific discovery, innovation, entrepreneurship and technology
- Strengthen the university research and education in the areas of science and engineering

CRDF Global is helping to promote science diplomacy through its activities, services, resources and events. More specifically, CRDF Global specializes in:[208]

- Advancing Nonproliferation and Security
- Advancing Global Prosperity
- Addressing Global Challenges
- Building Global Capacity
- Advancing Access to Information
- Establishing Critical Partnerships

[207] Ibid.

[208] http://www.crdfglobal.org/program-areas/science-engagement/science-diplomacy/about-science-diplomacy

4.3.10 National Academy of Sciences (NAS) and Jefferson Science Fellowships

It is hard to develop meaningful governmental policies that meet the needs of the modern societies effectively without fully understanding the fast-developing Science, Technology and Engineering (STE) issues. In this sense, providing policymakers the information on the "appropriate science for government" issues have become a necessity in the 21st century international relations, which implies the "Science in Diplomacy" activities.

In this regard, the U.S. Secretary of State initiated the Jefferson Science Fellowships (JSF) program on 8 October 2003, which presents a new model for the American academic Science, Technology and Engineering (STE) society to take part in the U.S. foreign policy making and implementation process. JSF program is run by the U.S. National Academy of Sciences and is supported by the partnership of the U.S. STE society, professional science societies, U.S. Department of State and U.S. International Development Agency.

Jefferson Science Fellows are appointed to the U.S. Department of State or U.S. International Development Agency for one year as scientific advisors in foreign policy issues. JSF program is open to U.S. citizen scientists at the distinguished U.S. universities. Applications are accepted every year in autumn until mid-January. Science fellows work at Washington D.C. [209]

4.3.11 Global Innovation through Science and Technology-GIST Initiative

Global Innovation through Science and Technology (GIST) initiative was established in 2010 through U.S. governmental funding in order to encourage science and technology-based innovation and economic development in the countries in Middle East, North Africa and Asia.

[209] http://sites.nationalacademies.org/pga/jefferson/ Retrieved in November 2013.

GIST was initiated at its annual advisory meeting that took place in Egypt on 14-15 December 2010 with the participation of more than 100 experts on innovation that came from 23 countries in Middle East, North Africa and Asia.

The aim of this initiative is to contribute to the economic growth through the development of scientific, technological and innovation capacity in the critical sectors, such as agriculture, health, energy, information and communication technologies.

GIST is based on the entrepreneurial system of 54 countries from the Middle East, Turkey, Asia as well as Africa. It identifies, coaches and funds the most promising entrepreneurs in the technology by its competition programs, startup services, and interactive mentoring programs as well as through its online social media platform. GIST initiative encourages local and global partnerships in order to "foster human progress and prosperity".[210]

4.4 Obama Period in the U.S. Science Diplomacy Activities and U.S. Science Envoys

U.S. President Barack Obama mentioned that science has gained an even more important role and became necessary in the issues such as welfare, security, health and environment during his speech made at the U.S. National Academy of Sciences on 27 April 2009.

In the 4 June 2009 dated speech in Cairo, the President stated the Administration will take the following actions regarding international science and technology cooperation:[211]

[210] http://gist.crdfglobal.org/about-gist Retrieved in November 2013.

[211] Deborah D. Stine, op.cit.

> On science and technology, we will launch a new fund to support technological development in Muslim-majority countries, and to help transfer ideas to the marketplace so they can create more jobs. We'll open centers of scientific excellence in Africa, the Middle East and Southeast Asia, and appoint new science envoys to collaborate on programs that develop new sources of energy, create green jobs, digitize records, clean water, grow new crops. Today I'm announcing a new global effort with the Organization of the Islamic Conference to eradicate polio. And we will also expand partnerships with Muslim communities to promote child and maternal health.

According to Holdren, major aim of President Obama in initiating this program was to develop the relations between the United States and Muslim countries through science and technology with a focus on economic development, education as well as innovation. It made sense to call the science and technology community in the frame of this diplomatic effort in this regard since scientists and engineers have been pioneers of international cooperation for a long period of time.[212]

Following the Obama's famous speech in June 2009 in Cairo about the new science diplomacy initiatives of the U.S., in November 2009 U.S. Secretary of State of that time Hillary Clinton appointed three science envoys to Middle East, North Africa and Southeast Asia in order to develop scientific and technological collaborations with certain countries in these regions.

The first science envoys of the U.S. were Prof. Ahmed Zewail from the California Institute of Technology; Prof. Elias Zerhouni from the John Hopkins Medical School and Prof. Bruce Alberts from the University of California San Francisco. Three other science envoys were appointed to Muslim-majority countries by September 2010 following this initiative. They were: Prof. Rita Colwell from the Maryland University; Prof. Gebisa Ejeta from the Purdue University and Prof. Alice Gast, who is the President of the Lehigh University. They aimed to develop scientific and

[212] Remarks of John P. Holdren Keck Building of the National Academies Tuesday, June 8, 2010.

technological collaborations with the countries such as Bangladesh, Malaysia and Vietnam.

"In November, 2012, Secretary Clinton announced three new Envoys, representing the third cohort of the Envoys program: Professor Bernard Amadei, Professor Susan Hockfield, and Professor Barbara Schaal. Previous Envoys have visited 19 countries, including Egypt, Morocco, Tunisia, South Africa, Ethiopia, Tanzania, Indonesia, Bangladesh, Malaysia, Kazakhstan, Uzbekistan, and Azerbaijan".[213]

U.S. Science Envoys program is one of the newest science diplomacy initiatives of the USA. It is aware of the fact that international scientific cooperation also have advantages for the foreign policy and in this regard it tries to develop long-term partnerships with the target countries based on scientific cooperation and trust.

USA, especially after the "A New Beginning" speech of Obama, aims to develop a long-term and positive dialogue with the countries, which they have tense political relations or the countries that are newly transformed from isolation by using these new science diplomacy initiatives in which science is used as a policy tool. This was in fact a good example of the "Science for Diplomacy" efforts of the U.S. towards the Muslim-majority countries.

In this regard, the advantages of U.S. science diplomacy activities can be grouped under three main categories:[214]

First of all, today's global problems in the areas such as water, food, energy, climate and health require working together as well as benefiting from the knowledge and

[213] Cathy Campbell, Send in the Scientists: Why Mobilizing America's Researchers Makes Sense for Diplomacy, 27.10.2010, http://scienceprogress.org/2010/10/send_scientists/

[214] Ibid.

solution suggestions of the scientists at the technical level. This can only be achieved through international scientific cooperation.

Secondly, the science and technology activities of the U.S. are appreciated all over the world, especially in the Muslim-majority countries and this gives a cooperation opportunity in these areas with those countries. Therefore U.S. can make advantage of it in terms of developing its political and diplomatic relations with them.

Last but not least, all of the scientists and engineers speak the same language all over the world and this language transcends beyond political, cultural and economic borders. They can be based in the USA, Russia, Egypt or Indonesia, but they work with the same scientific formulas and principles. These scientific collaborations are also very valuable tools for diplomacy. Another important aspect is that the scientific and technological advances in the world also bring together economic development and growth.

There are three important success factors for the U.S. to be successful in its science diplomacy activities:[215]

First of all, it is important that the international research society, policymakers and the public is informed and educated about the science diplomacy. In this respect, the Civilian Research Development Foundation (CRDF Global), Partnership for a Secure America and the American Association for the Advancement of Science (AAAS) are working together to inform related stakeholders about the science diplomacy.

Second, it is important to provide concrete opportunities for the scientists and engineers in order for them to get involved in global activities and science & technology should become an important aspect of the foreign policy agenda. Therefore the support of the U.S. government and academy as well as private sector

[215] Ibid.

is crucial. U.S. universities should promote and provide opportunities for their researchers and students to make research in developing countries.

Another success factor is to develop a system that enables periodic review of the science diplomacy activities. For instance, a system that reviews the cooperation activities of scientific delegations in third countries or the cooperation agreements as a result of these activities could be established.

Nobel laureate Prof. Ahmed Zewail[216], who is one of the first Science Envoys of the U.S. in the frame of the 2009 initiative and who visited Turkey, Egypt and Qatar, has stated that the U.S. can develop better and more intense cooperation with Muslim and other countries and can share the good aspects of its cultural heritage with these countries by using the soft power of science.

According to a survey that was conducted in 2010 and in 43 different countries, 79% of the participants to the survey stated that they appreciate the leadership of the U.S. mostly in the area of science and technology. This is one of the most important reasons that the U.S. uses science diplomacy as a soft power tool.[217]

In some of the Muslim-majority countries, there are serious problems of education and their educational systems are far beyond the international standards. On the other hand, in the countries such as Turkey, Malaysia and Qatar there are important educational and scientific developments. Likewise, countries like Egypt, Iraq, Syria, Lebanon, Morocco and Indonesia also have the potential of talented youth population. This potential should be considered in terms of the science diplomacy activities.

[216] Ahmed Zewail, The Soft Power of Science, *Vacation*, July/August 2010, p.118.

[217] Ibid., p.117.

Zewail underlines three important points in the U.S. science diplomacy activities:[218]

First of all, the U.S. should define a detailed and consistent policy in its science diplomacy activities towards the Muslim countries.

Second, it should be targeted to develop the educational as well as scientific and technological infrastructure in these countries. By this way, both a socioeconomic and political progress could be achieved.

Last but not least, all these scientific efforts should be coordinated in synergy with the U.S. activities of human rights and democratic governance towards these countries as Obama has also stated.

In the frame of this U.S. initiative on Science Envoys Program, Dr. Ahmed Zewail and his delegation visited TÜBİTAK on 14 January 2010 in order to develop scientific and technological cooperation with Turkey. Apart from this visit, Prof. Semahat Demir, who was at that time a Program Director at NSF conducted studies in Turkey between June-August 2010 in order to develop scientific and technological cooperation between Turkey and the USA.

Continuing these visits, many other delegations from the U.S. visited Turkey and TÜBİTAK between May-June 2010. Namely on 18 May 2010, Assist. Prof. Dr. Margaret Kosal from the Sam Nunn School of International Affairs, on 11 June 2010, Prof. Dr. Lenore G. Martin, who is Louise Doherty Wyant Professor and Professor of Political Science, Emmanuel College Associate, Weatherhead Center for International Affairs, Harvard University Associate, Center for Middle Eastern Studies, Harvard University visited TÜBİTAK.

[218] Ibid., pp.118-9.

Moreover in the frame of these "science diplomacy" activities of the U.S., NSF Program Director Dr. Almadena Chtchelkanova also visited Turkey and TÜBİTAK between June-August 2010 period and got information about the duties and activities of TÜBİTAK.[219]

New U.S. Science Envoy and former President of the MIT (Massachusetts Institute of Technology) Dr. Susan Hockfield and her delegation visited TÜBİTAK Headquarters and the TÜBİTAK Marmara Research Center in May 2013. They met Prof. Dr. Yücel Altunbaşak, the President of TÜBİTAK and talked about cooperation opportunities between two countries in the area of science and technology. Prof. Altunbaşak also informed the delegation about the Turkey-USA Science and Technology Cooperation Meeting that took place in Ankara on 3-4 April 2013, its implications as well as possible cooperation opportunities in the areas such as energy, education…etc.

President's science advisor John Holdren listed the major accomplishments achieved one year after the Cairo speech as follows:[220]

o "The Department of State, the Department of Energy, the Emirates Nuclear Energy Corporation, Sandia National Laboratory, the Texas A&M University Nuclear Security Science and Policy Institute, the UAE Federal Authority for Nuclear Regulation and the Khalifa University of Science, Technology, and Research" all unified their forces to create a Gulf Nuclear Energy Infrastructure Institute, which would function through bilateral meetings and regional workshops in order to guide the Gulf States that would pursue nuclear energy in a safe and secure way.

[219] TÜBİTAK Country Reports, USA, 2010.

[220] Holdren speech, op.cit.

o Former Secretary of State Hillary Clinton has committed to increase the number of Environment, Science, Technology, and Health (ESTH) officers at the U.S. embassies in the Middle East and North Africa.

o "A new science and technology agreement was concluded with Indonesia and the United States has doubled its financial support for S&T agreements with Egypt and Pakistan".

o The U.S. National Academy of Science extended its Frontiers of Science Program to support young scientists in the United States and Southeast Asia.

Alex Dehgan, who is the science adviser to the USAID and also served in AAAS and Department of State beforehand, mentioned in an interview that "Iranian scientists publish more papers with Americans than with any other country in the world".[221]

That is why the U.S. uses science as an effective diplomacy tool with its relations with the Middle East, especially after 9/11 and it is using all of the tools of international scientific cooperation towards the region, be it the science envoys, or scholarship programs, or joint scientific projects, especially accelerated under the Obama administration.

Because in this way U.S. could strengthen its power and influence in the Middle East region by soft power tools this time, which also serves the basic national interests of US in the region. Moreover, it could have an influence on global level through the use of Science Diplomacy and preserves its national security in the region as a result of its science diplomacy activities in the region. "Long-term security for the U.S. will not come from building more walls around America, but from building a global,

[221] Alex Dehgan, "Engaging Through Science: A Tool for U.S. Foreign Policy." March 2011. Council on Foreign Relations. January 2015. http://www.cfr.org/technology-and-foreign-policy/engaging-through-science-tool-us-foreign-policy/p24360

stable series of relationships"[222]. This is how realism is the dominant approach in the U.S. Science Diplomacy activities.

4.5 Conclusion

Science and technology system in the USA is very diversified and decentralized in a sense even though the U.S. has a long tradition of Science Diplomacy. Its advantage is in its flexibility and many funding opportunities. Its disadvantage is a lack of unique national S&T policy, except the White House's OSTP.[223] The White House Office of Science and Technology Policy is mainly responsible for the coordination of the science and technology activities.

Science diplomacy in terms of advancing international S&T partnerships (namely "Diplomacy for Science") is practiced for a relatively long period of time with different policy tools, such as bilateral agreements, visits, fellowship programs…etc. by the U.S. government.

Although the U.S. Science Envoys program, which aimed to develop the relations between the U.S. and Muslim majority countries in the Middle East through S&T, started as a very brilliant idea by 2009 and an excellent example of Science Diplomacy, it did not bear the expected results yet in a sense, since it was not backed up with necessary funding.

It is quite obvious from the abovementioned reports and the individual interviews that are made that the U.S. needs to advance its Science Diplomacy activities in the third countries and use the power of science in order to maintain its relatively strong position at the global level.

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[222] "Science and Technology in U.S. Policy Towards the Islamic World," *Saban Center for Middle East Policy, The Brookings Institution* (January 2005), p.13.

[223] Dr. Carmen Huber, op.cit.

It has used effectively the power of science in diplomacy, especially after the World War II, be it in the case of the Soviet Union in the Cold War period or in the cases such as the diplomatic relations with China or North Korea.

This importance given to the Science Diplomacy activities of the U.S. was also reflected in the changes or reforms in the S&T ecosystem of the U.S. such as the formation of the position of Assistant Secretary of State for Oceans, International and Environmental Affairs (OES) in 1974 by the U.S. Congress or the establishment of the STAS position in the beginning of the 21st century.

They also have some good examples of programs to develop their system of Science Diplomacy. "U.S. embassy science attaché program" (U.S. Department of State's Embassy Science Fellows program) is one of these good examples, where the U.S. diplomatic system could benefit from the experience of the scientists and experts in different fields of science. This could also be taken into consideration for other countries, such as Turkey that is in the beginning phase of establishing its Science Diplomacy system.

There are also some other programs, such as the White House's Science Envoy Program of 2009. The Science and Technology Policy Fellowships, the American Association for the Advancement of Science (AAAS) could also be counted among them.

The U.S. agencies responsible for the S&T policy structure and structuring of its Science Diplomacy system make use of different tools effectively, such as formal bilateral S&T cooperation agreements; promotion and support of S&T entrepreneurs and innovators; exchange of scientists and students; organization of various workshops, conferences, and meetings; public-private partnerships and so on.

They also cooperate with some non-governmental organizations, such as the AAAS or CRDF in this process.

As a result, Science Diplomacy activities of the U.S. are mostly tools of strengthening U.S. presence in the world and developing its diplomatic relations through science, so it is mainly "Science for Diplomacy". It has a long history of Science Diplomacy and leading many discussions on this topic today. However the S&T expertise among the DoS personnel as well as their coverage worldwide needs to be developed further. It is an important example for Turkey since the U.S. is one of the priority countries that Turkey is planning to send its first science attachés.

CHAPTER 5

SCIENCE DIPLOMACY SYSTEM AND ACTIVITIES OF GERMANY

5.1 Introduction

Germany has a long and established system of science diplomacy that dates back to the end of the World War II when its first science diplomats were sent to Israel some years after the War even before the political relations among them have started.

It has been the engine of Europe in the second half of the twentieth century and high-tech products are integral part of Germany's exports. In this regard, science and technology have a crucial role in the international political power of Germany.

It has a network of science diplomats all over the world. In the recent years, it gained a new impetus with the two important strategies of the Federal Government of Germany. One of them is the "Strategy of the Federal Government for the Internationalization of Science and Research" (would be mentioned as the Internalization Strategy hereinafter), which was published by the German Federal Ministry of Education and Research (BMBF) in 2008 and the other one is the so-called "Connecting Worlds of Knowledge" (would be mentioned also as the *Aussenwissenschaftspolitik-AWP*), which was published by the German Federal Foreign Office (AA) in 2009.

Although sometimes being rivals or criticized, these two strategies definitely added a new momentum for the Science Diplomacy of Germany worldwide for sure.

In this frame, first the historical background of the science diplomacy activities of Germany would be summarized in this chapter. Then information on the general structure and main actors of this system would be provided. It would be followed by the analysis of the two abovementioned strategies of Germany in terms of their

contribution to the Science Diplomacy activities of Germany. Then examples from the science diplomacy activities of certain German research institutions and their roles in this system would be explained.

In terms of the methodology, besides the written and internet resources available, many individual interviews were conducted not only with the German Embassy in France and Science Counsellors of Germany, but also with the directors of the international cooperation departments of the important German research institutions. A field trip to Germany/Bonn was realized in February 2014 for this purpose and interviews with the institutions such as the German Academic Exchange Service (DAAD), German Federal Ministry of Education and Research (BMBF), Project Management Agency of the German Aerospace Center (PT-DLR), German Research Foundation (DFG) and Alexander von Humboldt Foundation (AvH) were conducted. Also interview with the officials in the German Federal Foreign Office in Berlin was made in September 2014.

These research institutions were chosen based on the recommendations from the German Embassy, their active role in the Science Diplomacy System of Germany and their locations. During the interviews, the following points were asked primarily:

- Their role in the "Diplomacy for Science" (international scientific and technological cooperation) activities of Germany and their relation with other related German research institutions
- International cooperation activities/types/mechanisms of the related institutions
- Role of them in the *Aussenwissenschaftspolitik* and the Internationalization Strategies of Germany
- Place and activities of them in the frame of German House for Science and Innovation (Deutsches Wissenschafts und Innovationshaus-DWIH)
- Science diplomacy relations between Turkey and Germany, especially in the recent years and in the frame of the Turkish-German Year of Science 2014
- Assessment and evaluation of their international cooperation activities

The chapter ends with a general evaluation of the German Science Diplomacy system.

5.2 Historical Background of the Science Diplomacy Activities of Germany

Science played an important role in German foreign policy after the Second World War. It served as a pathfinder for the diplomatic relations between West-Germany and Israel after the holocaust. In the late fifties first scientific cooperation between the Max Planck Society and the Weizmann Institute started even before both countries exchanged ambassadors. .

Early scientific and technological cooperation activities of Germany started with France and the USA. The key research institutions in Germany's science diplomacy activities were the European Organization for Nuclear Research (CERN) and the European Atomic Energy Community (EURATOM), which was established in 1957, then followed by. EURATOM's Joint Research Center (JRC) was established in Institute for Environmental Protection and Research (ISPRA) and as a fourth institute, transuranium research center was established in Germany/Karlsruhe.[224]

Then non-nuclear research in European programs started in the 1960s. The German Federal Ministry of Education and Research (BMBF) of today was established in 1957.

There has always been a close cooperation between the BMBF and the German Federal Foreign Office. In those years, nuclear or specific scientific issues were at stake. Today they would like to cooperate in more active areas of scientific cooperation.

[224] Meeting with Mr. Stefan Kern & Mr. David Musial, Science Counsellors, German Embassy in France, Paris, 27.11.2013.

German Science Counsellors were appointed since the late 1960s. It has started with USA, France and Israel as indicated in the beginning, after then they were appointed to the countries or organizations like the EC, UK, Japan, India and Brazil. The responsibility was mixed between the BMBF and the Federal Foreign Office.

For Germany, science and technology policies have been related to economic developments. In the beginning, cooperation in nuclear science and nuclear energy played an important role. Later on other topics like biotechnology, materials research, environmental and climate research became more important.[225]

In the Single European Act (SEA) of 1987, research policy was mentioned as an instrument to increase European industrial competitiveness. It is also the aim of the German science strategy as also mentioned in the 2008 high-tech strategy, to attract the best scientists in the world.

Germany also plays an active role in certain international organizations dealing with research, such as the Organization for Economic Cooperation and Development (OECD): The OECD's Committee for Scientific and Technological Policy (CSTP), which is the only Committee dealing with such topics at the theoretical level in order to increase the awareness for the need of scientific and technological policies in the OECD member states. Also the headquarters of the European Molecular Biology Organization (EMBO) is located at the Germany/Heidelberg.

Science diplomacy is also a topic for economic research institutes. There is the Center for Economic Research (ZEW) in Germany/Mannheim and the German Institute for Economic Research (DIW) in Berlin for instance.

[225] Ibid.

The Gross Domestic Expenditure on Research and Development (GERD) of Germany was 2,9 % before the unification. It went down to 2,3 % after the unification. By 2013, it is about 2,89 %. Thus there was a need to boost the R&D capacity of Germany in order to reach the Lisbon goals.[226]

5.3 General Structure and Main Actors of Science Diplomacy System in Germany

BMBF sees the access to the resources and promotion issues as one of the most important objectives of the global German scientific policy. BMBF is responsible for nearly all of the funds that are spent for R&D and science diplomacy in Germany and in this sense it would like to be active in this area politically. In this respect, sometimes they conflict intellectually with the German Federal Foreign Office, which is another important institution in Germany for the execution of the science diplomacy activities, since they have different institutional cultures and interests.[227]

During the meeting with Mr. Alexander Puk from the German Federal Foreign Office[228], he mentioned that his division oversees several institutions of student and academic exchange, such as the DAAD (German Academic Exchange Service) or the Alexander von Humboldt Foundation. His division operates with an overall budget of around 300 million Euros, exercising budget control as well as coordinating activities of those several organizations.

His responsibility is also supervising the "German Archeological Institute" (DAI), which exists since 1829 and is also active in Turkey. It carries out archaeological

[226] Ibid.

[227] Tim Flink and Ulrich Schreiterer, Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches, *Science and Public Policy*, 37(9), November 2010, p.672.

[228] Meeting with Mr. Alexander Puk, German Federal Foreign Office, Berlin, 02.09.2014.

research in around 40 countries. The DAI belongs directly to the AA with a staff of around 300 persons is under direct authority of the AA. Their central office is in Berlin and they also have branches as well as libraries worldwide.[229]

In terms of the other institutions related to S&T, the division for economic affairs of the AA deals with other German institutions such as Max Planck, DFG, Fraunhofer. The primary responsibility lies with BMBF which deals with and funds these research institutes.

In the current science and technology system of Germany, there are certain problems of coordination. Especially the coordination problems that BMBF and the German Federal Foreign Office cause difficulties in the execution of the science diplomacy activities and implementation of the abovementioned strategies.

On the other hand, bilateral science and technology agreements are the main building stones of the international science and technology activities of Germany. These agreements include 14 areas of importance in terms of technological development and some projects that aim economic development in the target areas.[230]

The countries of appointment are selected on the basis of such following criteria:

- To work with the best researchers in the world
- To solve the problems and grand challenges at the global level (in energy, health...etc.)

Apart from the ministries, national research institutes in Germany (such as the DFG, Max-Planck Society, Helmholtz Association, Fraunhofer Society...etc.) are also active players in determining the international science and technology policies of

[229] Ibid.

[230] Tim Flink and Ulrich Schreiterer, op.cit., p.672.

Germany, rather than being passive stakeholders. Most of them have offices as well as labs abroad. German Academic Exchange Service and Alexander von Humboldt Foundation increased their support to the international mobility of the young researchers. These researchers work as science diplomats of Germany in a sense and they have a bridging role between the civil society and academia especially in the BRICS (Brazil, Russia, India, China, South Africa) countries as well as the developing countries in Asia and Latin America. Details would be provided in the following parts.

These research institutes in Germany are rather independent. They may have representatives of the German Parliament in the Advisory Board. Representatives of the government are often members of steering committees of public financed research institutions.[231]

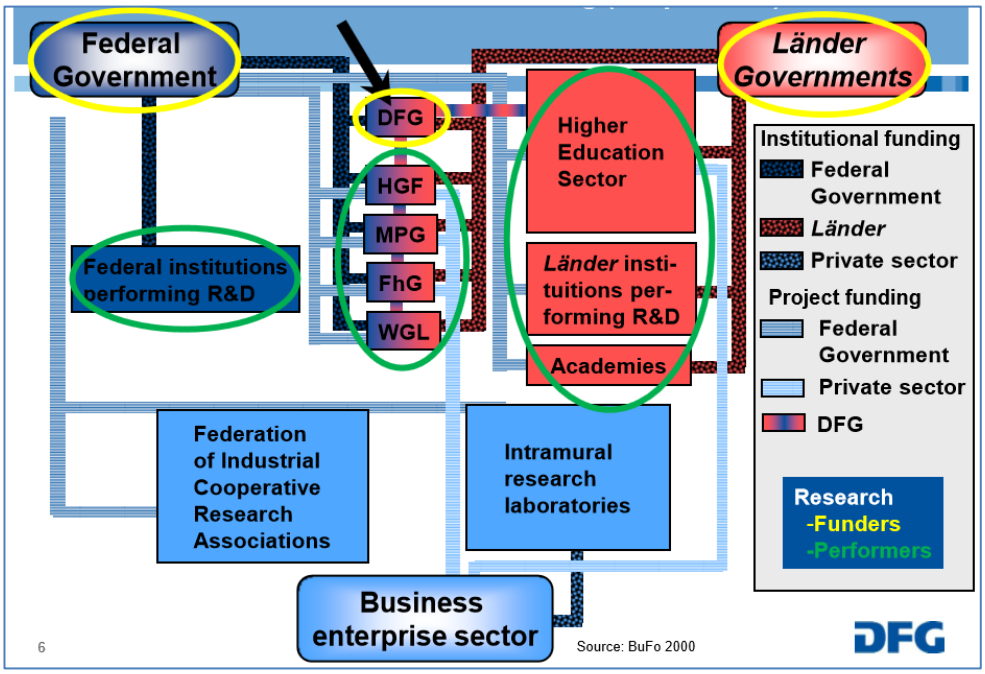

Figure 4 Simplified Structure of German Research Funding System[232]

[231] Meeting with Mr. Stefan Kern & Mr. David Musial, German Embassy in Paris, 27.11.2013

[232] http://www.dfg.de/jp/zentralablage_jp/pdf/aktuelles/berichte/130612_researchmanagement/schneider_session_I.pdf Retrieved in December 2014.

Even though the so-called "*Aussenwissenschaftspolitik*" strategy promises new funds and programs in terms of global science and technology cooperation, it did not contribute to the rising importance of science diplomacy in German foreign policy. In this strategy, mostly there is a focus on innovation, increasing of the global competitiveness as well as the promotion of German higher education and science abroad.

Four federal ministries in Germany, namely the Ministry for Economic Cooperation and Development, Ministry for Education and Research, Ministry for the Environment, Nature Conservation and Nuclear Safety, plus the Federal Foreign Office have made initiatives to form new programs that deal with global issues in the framework of the AvH. The AvH becomes an agent for public diplomacy with this policy.[233]

There are around 20 German science diplomats in the world all together as of September 2014. They are appointed in the places where S&T is an important issue and where they have potential partners. Their responsibilities differ from country to country. For example, in Egypt they deal with the higher education issues as well. On the other hand, in London they deal with technological and economic cooperation and there is additionally a cultural attaché. The decision of science attachés is a joint decision of the BMBF and the AA. Final decision is made by the AA and financed by the BMBF. There is also one in Ankara since the start of the German-Turkish Year of Science and Innovation.[234]

[233] Flink ve Schreiterer, op.cit., p.673.

[234] Meeting with Mr. Alexander Puk, op.cit.

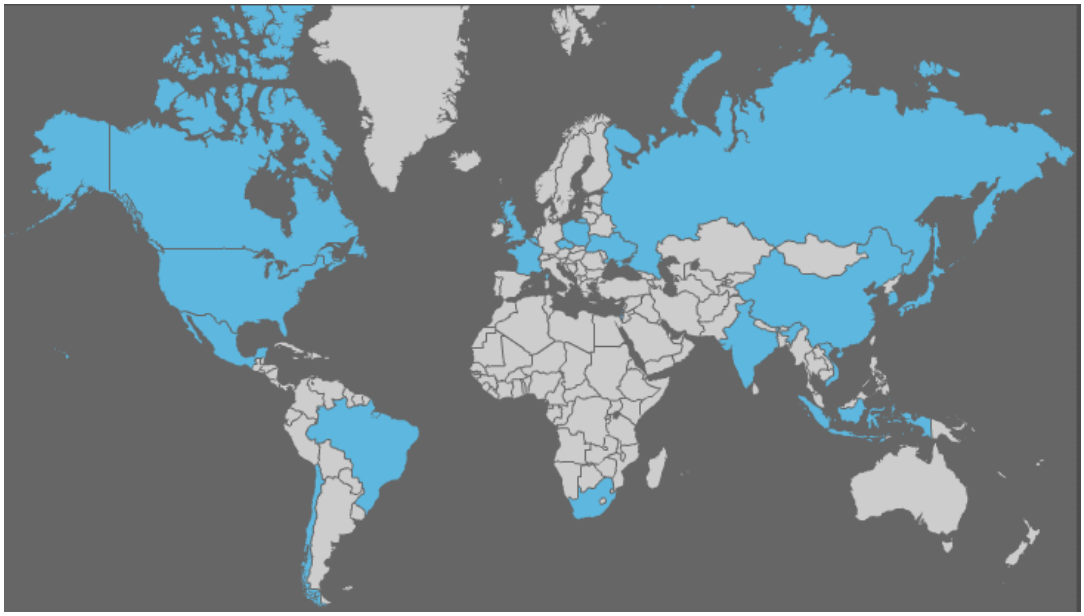

Figure 5 German Network of Science Diplomats (DLR, 2011)

German House for Research and Innovation (DWIH)

German Federal Foreign Office established a structure like the "Swissnex" network of Switzerland abroad in New York, Moscow, New Delhi, Sao Paulo and Tokyo and they are named as the "German House for Science and Innovation" (Deutsches Wissenschafts und Innovationshaus-DWIH). The details of this structure are presented below as an important actor of the German science diplomacy system.

The science diplomats of Germany have a crucial place in terms of communication and reporting between Germany and its partner countries. In this regard, the German Houses for Research and Innovation are jointly established by BMBF, heads of German research and funding organizations and German Chamber of Commerce and Industry with the aim of single and consistent representation of science, technology and innovation-related all German institutions abroad.[235]

[235] Excerpt from the Report of the Federal Government on Research and Innovation 2010, p.38.

DWIHs are located in New York, Sao Paolo, Tokyo, Moscow, New Delhi and recently in Cairo. They act like embassies in holding different German institutions inside. It can be considered as a success according to Mr. Puk. It was under review recently, whether to continue financing them and how to do it.[236]

German Houses of Research and Innovation[237]

Figure 6 German Houses of Research and Innovation

DWIH was an outcome of the *Aussenwissenschaftspolitik* with the aim of gathering offices of German research institutes under a common roof and they are supposed to be so-called "windows" of the German research around the world. The USA office of the DWIH is one of the best working among them.[238]

[236] Meeting with Mr. Alexander Puk, op.cit.

[237] http://www.auswaertiges-amt.de/sid_6E99FE033C8A3D5F34B4868696FE7558/DE/Aussenpolitik/Aussenwirtschaft/ForschungTechnologie/DWIH_node.html

[238] Meeting with Mr. Stefan Kern & Mr. David Musial, op.cit.

Examples to the DWIH Activities

DWIH Sao Paulo, Brazil[239]

German House of Science and Innovation in Sao Paulo was opened by the then German Federal Minister of Research and Education Prof. Annette Schavan in March 2009. DWIH Sao Paulo is coordinated by the German-Brazilian Chamber of Commerce and Industry together with the DAAD in Brazil. In this sense, the innovation potential of Brazil could be opened to German research institutes and firms. Brazil is one of the most important business centers of Germany outside its own country.

"The German House of Science and Innovation in Sao Paulo with its eight institutional offices and a conference room was inaugurated by the Federal Foreign Minister Guido Westerwelle on the 14 February 2012".

The activities of DWIH Sao Paulo in summary are:

- Dissemination of information regarding the funding opportunities and research institutions in Germany
- Organisation of the delegation visits
- Organisation of symposiums, workshops and brokerage events
- Building networks between the Brazilian and German researchers

DWIH, New Delhi, India[240]

The aim of DWIH New Delhi is to become "one-stop shop" for knowledge-sharing about the German higher education sector, research system and funding opportunities and for related students, researchers and potential partners. In this regard, it is aimed

[239] http://dwih.com.br/ Retrieved in March 2014.

[240] http://www.dwih.in/ Retrived in March 2014.

to support bilateral cooperation projects of education, language, science, research and innovation.

DWIH New Delhi is coordinated by the German Research Foundation and German Academic Exchange Service. In this regard, joint lectures, symposiums, exchange programs are held by two countries.

DWIH, New York, USA[241]

DWIH New York was opened by then German Federal Minister of Research and Education Prof. Annette Schavan and then German Ambassador to the USA Dr. Klaus Scharioth on 19 February 2010. Its main aims are as such:

- Representation of Germany to the North America market as a country of research and innovation
- Building dialogue between academy and industry
- Building a forum for the initiation and development of transatlantic projects
- Sustaining a knowledge platform for German research and innovation environment

DWIH, Tokyo, Japan[242]

DWIH Tokyo has an umbrella organization role for protecting German science and research interests in Japan. Its aim is the presentation of German research institutions and innovative firms there and development of scientific and economic cooperation with Japanese partners.

The DWIH Tokyo is "the central point of contact for Japanese and German research organizations, universities, and businesses or the interested public in general". It was opened officially on 6 October 2010 at the German-Japanese Science and Innovation

[241] http://www.germaninnovation.org/ Retrived in March 2014.

[242] http://www.dwih-tokyo.jp/ Retrieved in March 2014.

Forum 2010 by the German Rectors' Conference and the German Chamber of Commerce and Industry in Japan following the initiative of the Federal Foreign Office of Germany and the BMBF.

DWIH, Moscow, Russia[243]

DWIH Russia brings together all related German academic and trade organizations and works closely with the German-Russian Chamber of Commerce and Industry. Russian partners are mainly from the Academy of Sciences, universities and other research organizations.

The construction of the DWIH Moscow started in June 2009 by the joint initiative of the German Ministry of Foreign Affairs Frank Walter Steinmeier and his Russian colleague S. Lawrow, financed by the BMBF and the Federal Foreign Office of Germany.

DWIH Russia works as a Forum for bringing together German and Russian counterparts in Science, Research and Technology in order to make them work together so that the scientific cooperation between Germany and Russia deepens. It also serves as a network for scientists in Germany and Russia, bringing together experts from academic institutions, researchers as well as representatives from Industry and Government.

[243] http://www.dwih.ru/ Retrieved in March 2014.

Table 1 DWIH Activities Summary

DWIH Offices	**Activity Types**
Brazil	Presentation of the German R&D potential, delegation visits, joint workshops, symposiums, networking between researchers
India	Presentation of the German R&D potential, bilateral cooperation projects, networking between researchers
USA	Presentation of the German R&D potential, industry-academy partnership, funding joint projects
Japan	Presentation of the German R&D potential, development of bilateral scientific and economic cooperation
Russia	Presentation of the German R&D potential, development of bilateral scientific and economic cooperation, networking between researchers

5.4 Science Diplomacy Strategies of Germany

Internationalization Strategy (*Internationalisierungsstrategie*) was initiated by the German government in 2008. Following this strategy, *Aussenwissenschaftspolitik* was launched by the German Federal Foreign Office in 2009.

Both of these strategies are still in progress and open to development. They need to have more concrete steps and results. Internationalization Strategy was initiated in the period of Mr. Frank-Walter Steinmeier, who was the Former Head of Chancellor's Office. As being a social democrat, he knew the needs of Germany and gave importance to the strategy of internationalization of R&D in Germany. But also for the Christian Democrat Party *Aussenwissenschaftspolitik* was an important policy topic. One kick for the current strategy based on an newspaper article of Mr. Georg Schütte, who was Former Secretary General of the Alexander von Humboldt (AvH)

Foundation and is now Secretary of State with the Federal Ministry of Higher Education and Science.

Internationalization Strategy was overall a very general strategy and needs to be concretized. A draft program of the strategy was prepared, but not yet got into action. The positive outcome of this strategy was that all related German research institutions started their internationalization strategies following that. Their active participation in this process increased.[244]

In terms of the Internationalization Strategy, they are complementary with the *Aussenwissenschaftspolitik.* AA is responsible for all the foreign activities abroad. BMBF also provides funding and is a player abroad. Both strategies aim the internationalisation of German institutions, opening of the academic sector and research. They aim to intensify research and to attract good researchers and students. In practice, however, cooperation and coordination between the BMBF and the AA could be improved.[245]

For instance, the French Ministry of Foreign Affairs manages a lot of exchange programs by itself, whereas the German Ministry of Foreign Affairs outsources some important strategies to certain agencies, such as the AvH Foundation or the DAAD.

[244] Meeting with Mr. Stefan Kern & Mr. David Musial, op.cit.

[245] Meeting with Mr. Alexander Puk, op.cit.

5.4.1 Strategy of the Federal Government of Germany for the Internationalization of Science and Research

German Federal Ministry of Education and Research presented the "Germany's Internationalization of Science and Research Strategy" with the title of "Strengthening Germany's role in global knowledge society" in 2008. Its main aim is to solve global problems by international scientific cooperation and to have a leading role for Germany in Europe's research and innovation policies.

This strategy has four main targets or so-called pillars:[246]

1. To ensure that the German researchers engage in scientific cooperation with the best research teams in the world and that Germany becomes the first choice for the best researchers in the world;
2. To ensure that German companies have a good place in the world's leading and newly emerging high-tech markets in the world and to cooperate with the best R&D centers in the world;
3. To increase long term cooperation with the developing countries in Africa, Latin America and Asia in the areas of education, research and development;
4. To assign Germany international responsibility in combating global challenges in the areas of climate, health, security and migration.

In order to reach these targets, first of all the international mobility and knowledge sharing of the young researchers in Germany shall be encouraged. In this regard, the national, regional as well as international funding programs shall be better coordinated.

Moreover it would be useful to strategically combine the developmental cooperation tools with the scientific and technological cooperation tools.

[246] Strengthening Germany's role in the global knowledge society: Strategy of the Federal Government for the Internationalization of Science and Research , BMBF, February 2008, p.4.

In order to develop an international research agenda regarding the global challenges, Federal Government of Germany is expanding its zone of influence with the international organisations.

This strategy comprises of the international research institutions and activities of Germany abroad. This strategy is supposed to be evaluated by independent panels composed of both German and international experts every 3-5 years in order to evaluate its impacts to Germany.

In the following sections, 1) the national interests and global challenges; 2) investments, cooperation and mobility; 3) internationalization of science and R&D dimensions of this strategy; and 4) the generic measures in this regard would be analyzed.[247]

National Interests and Global Challenges[248]

In today's world, borders between the academic disciplines are diminishing and both bilateral and multilateral scientific cooperation are becoming more and more interdisciplinary. It is necessary to find scientific solutions at the international level to the global problems that humanity faces and where national scientific systems are inadequate to solve them.

These changes and internationalization of R&D also affect the workload between the public and private sector stakeholders in R&D. Now multinational companies also add an international focus to their R&D activities. The research institutes, which are probable host institutions for the researchers also compete with each other to attract the best researchers.

[247] Ibid., pp.5-6.

[248] Ibid., pp.7-9.

In today's world the researchers and students are mobile than ever before. Following the international dynamic changes in science and research, it is not enough to have an input-oriented management. In spite of this, an output-oriented management that encourages research and new ideas gained importance.

On the other hand, majority of the world is apart from these scientific developments and could not be involved truly in international innovation processes. It is in the responsibility of the economically and scientifically developed countries to include developing countries in these processes. This requires the existence of diplomacy for science activities.

The objective of Germany is to lead the European Union (EU) in political, economic and scientific terms in the frame of this Internationalization Strategy. This strategy at the same time also aims increasing the coordination among the Ministries in Germany that are effective in Science and Research areas for future cooperation activities.

Investments, Cooperation, Mobility[249]

Germany is continuing to increase its R&D investments in the EU in line with its aim of leading in higher education and research as well as Lisbon goals. In this regard, it tries to develop scientific cooperation with not only USA and China, but also increasing powers such as China, India and South Korea.

It is important that young researchers choose the EU for their research. There are about 16 million students in the EU that are registered to higher education as of 2008. This number is 13.6 million in the USA in the same years. At the same time, about 90 000 students complete their PhD every year in the EU member countries. This number is 53 000 in the USA and 24 000 in China.

[249] Ibid., pp.10-14.

Germany is the most preferred destination for study after the USA and the UK and 80 % of the international students prefer Germany to study at some point of their education lives.

It is foreseen that the number of internationally mobile students rises from 1.8 million to 7.2 million from 2000 to 2025.

Germany promotes "brain circulation" instead of "brain drain", since half of the German researchers that receive PhD from the US universities would like to stay in the USA and by 2008, around 5 000 German researchers work at the universities located in the USA and around 20 000 German researchers work at the research centers located in the USA. On the other hand every year around 20 000 international researchers (from Europe and Asia) prefer Germany for their research. This international network could be transformed to advantage in terms of scientific collaborations with the correct policies. ("Diplomacy for Science")

Conservatives and Social Democrats in Germany made an "Agreement of Coalition" in order to raise foreign students up to three-fold. Now it is 200.000 foreign students (by 2014), in 2018 it is aimed to increase the number of foreign students up to 350.000.[250]

In this regard, the rising powers should not be underestimated. For instance, according to the OECD data, only the number of R&D personnel in China has exceeded the total number of researchers that worked in Germany between the years 1997-2004. The Chinese Academy of Sciences tries to attract its researchers that work abroad by promising high salaries and good research infrastructures. In India there is also a similar trend.

[250] Meeting with Mr. Alexander Puk, op.cit.

Germany has become an attractive center for international R&D investments. Foreign companies make around 11 billion Euro investment in Germany every year and this amount is about the same with the annual R&D investment of the German companies abroad.

Germany's policy towards the developing countries is in line with the UN Millennium Development Goals by developing long term cooperation with the developing countries in the areas of education and science as well as acting together against the global challenges. These cooperations could contribute to improve the working and living conditions in the developing countries and to reduce the brain drain in those countries. This policy has also a defining role in terms of the science diplomacy activities of Germany in third countries.

In the frame of the EU 7th Framework Programme (FP7), Germany consists of 28 % of the all research capacity in the European Research Area. German researchers take place in 80 % of the EU cooperation projects and take almost 20 % of the funds. On the other hand, they wish to increase their success rate of 24 %. In this regard, they aim to benefit most from both national and the EU funds.

The reorientation of measures for internationalizing science, research and development[251]

In the frame of this strategy, Germany aims to train its researchers in international standards and to avoid brain drain from Germany.

In this regard, it supports international mobility of its researchers and tries to make Germany as a center of attraction for international researchers. Within this aim, it uses both national scholarships provided by institutions, such as the Alexander von

[251] Internationalisation Strategy, op.cit., pp.15-24.

Humboldt Foundation and international funding opportunities, such as the EU FP7 Marie Curie Actions program.

German universities and research centers also have a wide network abroad. Many of the leading research centers of Germany have labs and centers abroad. This network also contributes to the internationalization strategy and the science diplomacy activities of Germany in those countries.

In the policies of Germany towards developing countries, it is important to have coordination among the tools for developmental cooperation and scientific-technological cooperation.

Germany's priorities in scientific, technological and developmental cooperation with the developing countries, which are coordinated by the Federal Ministry of Education and Research and Federal Ministry of Economic Cooperation and Development can be summarized as such:

- To provide opportunities to German universities and research centers in order for them to develop innovative cooperation models for overcoming the deficiencies in the education and research systems of the developing countries;
- To give enough importance to the subjects related to the problems as a result of globalization and challenges that developing countries face in German universities and scientific institutions;
- To encourage research not only in basic and engineering sciences; but also in socio-economic sciences and humanities;
- To support the top researchers in the developing countries;
- To benefit from the EU or other multilateral cooperation instruments in order to develop cooperation with the developing countries in the areas of science and education (for ex. World Bank, Asian Development Bank and EU FP7 funds);
- To sustain the access of the developing countries to scientific and technological information resources.

Generic measures[252]

1. To be present abroad

Through external representation, which is required as the science policy is becoming increasingly internationalized, Germany could:

• gain access to global centers of excellence and high-tech markets;

• promote itself as a land for research in a more effective manner and could recruit more qualified staff;

• create networks and develop strategic partnerships with institutions abroad.

2. To make international monitoring

In order to develop successful national strategies, international trends in research and innovation and relevant political strategies as well as measures shall be analyzed carefully.

3. To promote Germany as location for higher education, research and innovation

This Strategy promotes Germany as a center of attraction for research, development and innovation in the crucial target countries.

5.4.2 Germany's "Connecting Worlds of Knowledge" Strategy ("Aussenwissenschaftspolitik")

The aim of this strategy, which was developed by the German Federal Foreign Office with the slogan of "more education, science and research", is to find common solutions to the global problems in the areas, such as the finance, energy and climate change through international cooperation. Traditional methods of diplomacy is insufficient in the solution of these problems, support of science is necessary. In

[252] Ibid., pp.25-26.

short, peaceful solutions could be realized through international scientific cooperation.[253]

German Federal Foreign Office strengthens its support to academic exchange at the global level with this initiative and aims to attract the best brains to Germany.

One of the most important components of this strategy is providing graduate fellowships to the studies related to the neighboring regions of Europe that are politically unstable, such as Southern Caucasus, Central Asia and Middle East. These are the partner countries to Germany that are important in political and economic terms. As a result, it is aimed to stabilize and democratize these regions towards scientific foreign policy.[254]

Important changes happened in the Foreign Culture and Education Policy of Germany between the years 2006-2009. The share of this policy was increased by 20 % with the support of the German Parliament.[255]

There were 25 000 open positions in Germany as of 2009 and appropriate employees could not be found for these positions. For this reason, it is necessary to use the potential of German citizens and immigrants in Germany and to attract the best brains to Germany. Germany is third in this sense following the USA and the UK. Increasing the English education programs in the universities and colleges could also be beneficial in this regard.[256]

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[253] *Wissenswelten verbinden. Deutsche Außenpolitik für mehr Bildung, Wissenschaft und Forschung*, Berlin, Auswärtiges Amt, 19. - 20. 01.2009, Konferenzdokumentation, p.17.

[254] Ibid.

[255] Ibid., p.17.

[256] Ibid., p.18.

Germany has joint universities with countries such as Egypt, Kazakhstan, Vietnam and Turkey.

This Strategy also aims to transform crisis times into unification times and to have a say in the solution of global problems. In this regard, it is aimed to have an active role in the geography from Berlin to Beijing to Brazil.

There is a certain funding by the German Parliament for the science diplomacy activities. However this is not enough and it is necessary to make scientific cooperation. For example, there is the German House of Research and Innovation established to bring together Science, Research and Education.[257]

They have three main objectives:

- to make Germany an Innovation Center
- to build a network with the researchers abroad
- to develop a service function for the foreign researchers

In the essence of this policy, there is the current scientific potential of Germany. There were 250 000 foreign students in the German universities as of 2009. This number increased 100 000 by 66 %. As mentioned before, Germany is the most preferred country for foreign students following the USA and the UK.

On the other hand, education and research society can become more international in the following years. There are around 2,7 million students abroad and it is expected to be more than 7 million by 2025.

Aussenwissenschaftspolitik (AwP) strategy was initiated by Germany considering these factors. This strategy aims to strengthen the role of Germany in developing

[257] Ibid., p.20.

international science and research network and its objectives can be summarized as such:

- Promotion of academic exchange and formation of long term cooperation networks between researchers and academics;
- Presentation of Germany as an education and research center and attracting the best brains to Germany with attractive scholarships;
- Promotion of cooperation between universities and research centers;
- Active presence in key countries of the world and strengthening the "science house" profile of Germany.[258]

Key Figures[259]

• German Federal Foreign Office spent around 250 million Euro in 2010 for the Science, Research and Development activities in Germany and worldwide.
• In this scope, more than 140 million Euros was disposed for foreign students and scientists as scholarships.
• The Federal Foreign Office works together with around 25 partners, such as the DAAD, AvH Foundation or the German Archeological Institute for developing international scientific exchanges.

Instruments of the *Aussenwissenschaftspolitik*[260]

Mobility and Exchange: Transfer of science face-to-face; having young graduates all around the world; short-term or long-term scholarships opportunities for education and research in Germany

[258] Globale Bildungspartnerschaften Die Initiative Außenwissenschaftspolitik, Auswartiges Amt, 2010, p.1.

[259] Ibid., p.2.

[260] Ibid., p.2.

Structure of Cooperation: Stable partnership between the German and foreign scientific institutions or German high schools abroad with the aim of know-how concentration and stable exchanges

Worldwide Representation: Informing and giving advice to the international partners in the key places worldwide that are interested in Germany and its education and research opportunities

Alumni Network: Strengthening of the contact and partnership with the German Alumni worldwide

German as a Foreign and Scientific Language: The basis of mutual exchanges and understanding is a common language. Therefore the aim here is to develop German language worldwide.

AwP was developed:

- To coordinate activities of agencies, universities, private education institutions, BMBF and so on. They all have their own foreign policies. AwP has a coordinating role;
- To find an objective;
- To attract excellent researchers, "best of the best".

Germany is an important economic power, but BRICS countries are as well. The capital of Germany for the 21st century is knowledge, research and innovation in this respect. On the other hand, population is decreasing and getting old. Therefore the influx of foreign brains is needed. This is one of the main reasons for the AwP. German government had a campaign to promote education and research and the AwP is part of it.[261]

[261] Meeting with Mr. Alexander Puk, op.cit.

5.5 Science Diplomacy Activities of the BMBF and the German Research Institutions: Some Examples

In this section, examples from the recent science diplomacy activities of German research institutions, such as the Fraunhofer, Helmholtz, DFG, DAAD, Max Planck, AvH Foundation which have a defining role in the two abovementioned strategies of Germany would be presented:[262]

As of January 2009, the funds for certain German academic exchange institutions, such as the German Academic Exchange Service and the Alexander von Humboldt Foundation were raised by the German Federal Foreign Office, the Federal Ministry for Education and Research and the Federal Ministry for Economic Cooperation and Development (BMZ) in order to contribute the integration of German research system with the global research infrastructure. The Alexander von Humboldt Professorship, with 5 million Euros the best international research award in Germany, is also a good example of successful integration of international researchers with the German ones.

One of the main goals of the Internationalization of Science and Research Strategy of Germany is strengthening S&T cooperation with the Sub-Saharan African and Arab countries. In this regard, for example the BMBF funds regional competence centers in Sub-Saharan Africa in cooperation with the African partners in the themes like climate change or land management to improve the infrastructure there. DAAD similarly funds African scholars.

BMBF also leads certain global initiatives in the areas such as health, aging population or loss of biodiversity in the international research frameworks, such as the EU or the OECD in order to tackle the global challenges.

[262] Federal Report on Research and Innovation 2012: Abstract, BMBF, p.44.

Since 2006, German research is presented under the brand of "Research in Germany: Land of Ideas". In doing so, the bilateral science years organized by the BMBF on the German side play also an important role, such as the 2010-11 German-Brazilian Year of Science, Technology Innovation or the 2011-12 German-Russian Year of Education, Science and Innovation. 2013-14 was the year of German-Turkish Year of Research, Education and Innovation.

The science advisors at the German embassies also have a special role in presenting German science and innovation potential abroad. They collect information, build cooperation and report to all related institutions in Germany, like the Federal Foreign Office, BMBF, German Chambers of Industry and Commerce as well as the German House for Research and Innovation.

Cooperation with European States:

It is one of the top priorities of Germany to cooperate with the European countries in order to identify and implement the joint interests of the European Research Area. This also serves the aim of cooperation with the best researchers in the world and tapping the innovation potential, which are targeted by the Internationalization of Science and Research Strategy of the Federal Government.[263]

In the recent years, Germany is involved in the multilateral research cooperation initiatives towards the regions, such as the Baltic Sea region or the Danube region.

Cooperation with the Community of Independent States:

Cooperation with the Community of Independent States (CIS) also has an important role in terms of the Internationalization of Science and Research Strategy of the Federal Government.

[263] Ibid., p.46.

German research organizations, universities as well as firms have a long history of cooperation with the countries in the region, especially with Russia, with whom bilateral scientific and technological cooperation agreement entered into force by 1987.[264]

There are a number of program and project initiatives by the German science and research institutions towards the region with the support of the Federal Government in the frame of the strategic partnership.

For example, German Research Foundation has bilateral funding with Russia, including the Research Education Groups; there are Helmholtz-Russia Joint Research Groups; AvH and DAAD have bilateral researcher exchange programs with Russia. In 2011-12, German-Russian Year of Education, Science and Innovation was also organized.

Moreover the related German research institutions, such as Helmholtz, DFG, DAAD have offices in Moscow that contribute to the development of bilateral cooperation.[265]

There is an increasing cooperation in the fields of science and education with the CIS countries, not only with Russia and Ukraine, but also with the countries in the Central Asia and Southern Caucasus region.

Cooperation with the Asia-Pacific Region:

From both a scientific as well as a socio-political point of view, Asia-Pacific region is highly dynamic and becoming crucial. For Germany, countries like China, Korea,

[264] Ibid., p.47.

[265] Federal Report on Research and Innovation 2010, op.cit., p.33.

Japan and India are of special importance in the region in this sense with their universities, scientific outputs and patents. BMBF has a record of successful cooperation with countries such as China, India, Vietnam, Indonesia, New Zealand and Australia and in the recent years it also has increased cooperation with countries such as Singapore and Thailand.[266]

Lots of workshops, conferences and delegation visits were organized between the German and Chinese researchers from March 2009 until June 2010 in the frame of the German-China Year of Science.

The main aim in this regard was to increase the number of Germany-China joint diploma programs; to develop related bilateral S&T projects; and in the long term to develop joint research centers, such as the Shanghai Cognitive Biology Joint Institute, which was established by the joint efforts of Max Planck and Chinese Academy of Sciences.

China is one the most important partners of Germany in the area of agricultural research with many bilateral research projects in the areas such as the animal health, bioenergy, food security and climate change.

BMBF has started a new DAAD program with the name of "A New Passage to India" in order to promote more students from Germany to make their research in India and to know India better. This program covers the educational and research expenses as well as the internship expenses that are made in private firms in India. They also aim the Indian students that would like to pursue their studies in Germany.

In the frame of the bilateral governmental cooperation between Germany and India, Federal Ministry of Food and Agriculture (BMELV) gives priority to the education

[266] Federal Report on Research and Innovation 2012, op.cit., p.47.

in rural areas and with this aim, they cooperate together with the Indian Ministry of Agriculture.[267]

Cooperation with the USA and Canada:

Cooperation with the North American countries, namely the USA and Canada has also an important role in the Internationalization of Science and Research Strategy of Germany. Most of the leading research institutions in the world are located in these countries.

Germany and the USA cooperate in nearly all areas of science. In recent years Canada has made big investments in R&D, which makes Canada an interesting and vital country to cooperate.

Max Planck opened its first institute in the USA in July 2008 at Florida. Fraunhofer is actively working in the USA for more than 15 years.

Moreover Germany and the USA have many student and researcher exchange programs by DAAD, AvH, DFG and Fulbright programs.

Since 2007, German universities, research and research-funding institutions present themselves at the MIT Science and Technology Career Exhibition in Boston since 2007 with the slogan of "Research in Germany-Land of Ideas".

German Aerospace Center is cooperating with the Canada Space Agency in the areas such as robotic research, joint use of radar data and sharing of the surface stations.

[267] Federal Report on Research and Innovation 2010, op.cit., pp.333-6.

Helmholtz Research Centers (HFG) and Canada National Research Council (NRC) signed a bilateral scientific cooperation treaty in June 2007 in the areas of energy, life sciences and environmental research with the aim of funding joint research projects.

Moreover with the treaty signed between Helmholtz and Alberta institutions in September 2009, cooperation opportunity is provided between two countries for the sustainable use of petrolium and coal resources.[268]

Cooperation with Central and South America:

In August 2010, Federal Government of Germany published the Concept on "Germany, Latin America and the Caribbean" and it was one of the targets of it to intensify cooperation with this region.

In this respect, bilateral innovation forums as well as researchers exchanges are organized between countries in the region and Germany.

Since 2009, some Latin American countries celebrate the 200th anniversary of their independence. In the frame of these celebrations, for instance Max Planck had the opportunity to present its "Science Tunnel" activity in Chile, Argentine, Mexico, Brazil and Colombia during the exhibitions in those countries. BMBF gives support to these activities in order to increase the attractiveness of Germany as a center of research.

In March 2009, DAAD and Inwent Germany- Capacity Building International have signed agreements with the Chile Ministry of Education seperately. They aim to promote Master, PhD and Post-Doc studies with these agreements.

[268] Ibid., pp.337-8.

In May 2009, the first international research education group of DFG in the Latin America was accepted in Mexico. The German coordinator was Freie Universitat Berlin and the Mexican coordinator was Colegio de Mexico.

It is important to mention the activities of Max Planck (MPG) at this point. By the end of 2007, MPG established its second joint institute in the world in the area of biomedical research in Buenos Aires. The first one was in Shanghai. This new institute began its activities in the end of 2010. Moreover in 2008, the "International Masters Program in Biomedical Research" started as a joint work of DAAD, Albert-Ludwig-Universität Freiburg and the Buenos Aires University.[269]

Cooperation with the Mediterranean Region and Africa:

Scientific and technological cooperation with the Mediterranean region as well as African countries is becoming more important given the latest socio-political developments in the region and given the fact that African countries are very much affected by the results of the global challenges, such as climate change, demographic changes and migration.

In the recent years, German institutions have increased their cooperation with the Sub-Saharan African countries. For instance, AvH and DFG started an initiative towards Africa in the area of infectious diseases. Many of the German and African universities have thematic cooperation. The focus is especially on the southern and eastern Africa.

Germany is involved in the bilateral and multilateral cooperation initiatives towards the North African region. In the Mediterranean region, it has active bilateral cooperation with the countries like Turkey, Israel, Jordan and Egypt.[270]

[269] Ibid., pp.338-41.

[270] Federal Report on Research and Innovation 2012, op.cit., p.47.

Science Diplomacy Activities of the DAAD[271]

Place and Role of the DAAD in the German Science Diplomacy System

According to Mrs. Schmeken, who is the Director of the DAAD Paris Office, Higher Education should be an end itself taken into consideration the usage of Cultural/Science Diplomacy for political aims. In this sense, political interests should not be considered at the first place regarding this issue.

The demographic situation in Germany and in the world in general has changed in the recent years, which resulted in a need to attract the best researchers and experts to their country in this regard.

DAAD is an independent Association, but gets the funding from certain governmental institutions. Its members are the German universities and the student bodies, which choose the President and Council of the DAAD on a regular basis. DAAD is funded by the Federal Foreign Office, BMBF and the BMZ. Federal Foreign Office funds scholarships for students and researchers from abroad with the aim of winning partners and friends for Germans wishing to study or do research abroad. BMBF funds scholarships for Germans wishing to study or do research abroad. BMBF is also involved with marketing the German Higher Education system, with the aim of attracting the best researchers to Germany. BMZ gives money for students and researchers from and projects in the developing countries with developmental aims.

They have a "bottom-up" approach in the sense that policies of science should be driven by the own mechanisms of science not by political means so that they have

[271] Meeting with Mrs. Christiana Schmeken, Director of DAAD Paris, 28.01.2014.

good scientific results and industrial productivity in Germany. Research institutes should have certain autonomy in this respect.
This in fact causes a tension between the traditional German scientific system and the European (Commission) system, which adapts a more "top-down" approach. This was also reflected in the German High-Tech Strategy.

In the 2020 Strategy of the DAAD, it is aimed the three main ways of action, namely:[272]

I. Scholarships for the Best: Giving scholarships to the best German as well as international researchers and students

II. Structures of Internationality: Opening international structures of higher education, such as international degree programs, bilateral founded universities and so on

III. Expertise for Academic Collaborations: Developing and providing expertise in educational cultures and higher learning systems

Place of the DAAD in the *Aussenwissenschaftspolitik*

In terms of the place of the DAAD in the *Aussenwissenschaftspolitik* of German government, traditional DAAD approach is based on the idea of making friends and finding partners worldwide. The idea is that these students later become the so-called "Ambassadors of Germany" in their respective countries. This international network may also serve the economic relations of Germany with those countries. With regard to the underdeveloped countries, the aim has been traditionally to attract young PhD students to Germany for a qualification phase, thus enabling them to further develop their countries of origin upon return.

[272] https://www.daad.de/der-daad/unsere-mission/en/29146-strategy/ Retrieved in January 2014.

On the other hand, a new demographic situation emerged in Germany around fifteen years ago also with the competition resulted from the globalization. There was need for qualified labor from different countries. International graduates from German universities have rapidly become a very attractive resource of qualified labor in German companies. They turn out to be more adapted to the economic system in Germany than graduates who are recruited after they have completed their studies in their own countries.

The vision of the DAAD is to respect the individual person's vision of their own choices and their own career. So the driver for mobility is that where people can lead a decent life. They can return back to their own countries once they are done with their studies. If they choose to work in Germany to gain additional international competence, that is also fine. DAAD is in favor of making Germany an open country.

There was even a recent change in the German legislation so that following the graduation, foreign students could stay up to one more year in Germany to search for a job. In that period, they can also work full-time with reasonable salaries. The aim is to develop qualified labor force.

International S&T Cooperation Strategy and the Activities of the DAAD

In terms of the international cooperation strategy of the DAAD, DAAD has lots of joint funding programs with the foreign governments. It is based on cost-sharing mechanism in the sense that the DAAD covers 20-30 % of the expenses, such as the language training.

DAAD has 15 regional offices and 50 information centers worldwide. Paris office was opened in 1963 in the aftermath of the Elysees Treaty between France and Germany. London office was established even before. They were mainly opened for political reasons in the capitals of major political parties, such as London, Paris, New

York, Moscow, Warsaw…etc. Though exchange numbers may decrease, the regional offices are likely to be maintained for political reasons.
Information centers are mainly located in Eastern Europe and Southeastern Asia for marketing the German Higher Education system primarily.

In Turkey, there are also information centers of the DAAD, but not yet a regional office due to the fact that the Turkish-German University project is given a priority and it becomes functioning after many years of diplomatic efforts.

The functions of the DAAD Paris Office:

1) Scholarships/Language Courses:

They provide scholarships to both students and researchers for both the students/researchers in France that would like to study in Germany and the German students/researchers that would like to study in France.

They also give grants for German language courses, maintain a network of fifty lecturers of German at French universities. DAAD also co-finances a "Center of German Studies" in Paris, which functions as a network of 12 French partner Universities.

2) Political Scale:

On the political scale, they organize Info days or similar information campaigns to work in favor of the German language and of Germany as a destination for study and research. DAAD is also present on more than ten professional education fairs throughout France per year.

DAAD has the role of enhancing cooperation between Universities in Germany and in France. Besides the awarding of scholarships, this aim is reached by offering

counselling for University representatives and organizing conferences in various disciplines which bring students and researchers of both countries together.

3) German-French Universities Network:

A specific activity which has proved very useful, is the organization of information tours on research topics which are of interest in both countries. Recently, there have been two journeys on sustainable development, one to Germany, one to France. In 2015, there will be a trip plus conference on climate change and mega-cities. These activities are often realized with partner organizations, such as the German Embassy, the French Rectors Conference or Campus France.

Science Diplomacy Activities of the DFG[273]

Place and Role of the DFG in the German Science Diplomacy System

"DFG is a self-governing body of the German publically-funded research." It is co-funded by the Federal Government and the Local Governments (Lander) of Germany. It adopts a bottom-up approach in terms of research funding. DFG supports "science-driven" or "bottom-up" research based on project-funding. In short, it is "organized by German publically-financed research, not by politics". Therefore they do not have any political, thematic or regional priorities in terms of research funding.

[273] Meeting with Dr. Jörg Schneider, DFG, Bonn, 25.02.2014.

Place of the DFG in the *Aussenwissenschaftspolitik*

In terms of the place of the DFG in the German science diplomacy system, since it is independent, it is not officially part of the *Aussenwissenschaftspolitik.* DFG has its own Internationalization Strategy. Of course, DFG provides input to Governmental strategies if appropriate and if advice from the government is wanted (politic advice is one of DFGs tasks according to its statutes).

Regarding the place and role of the DFG in the DWIHs, its offices abroad are participating in the five DWIHs. In Delhi DFG is the leader of the DWIH consortium, co-leaders in New York and it co-chairs the DWIH-Boards in Sao Paolo and Moscow. Wherever there is the DFG presence, there is also a DWIH.

International S&T Cooperation Activities of the DFG

DFG has offices abroad in the USA, Japan, the BRIC countries as well as in Belgium because of the presence of the EU.

How are the bilateral cooperation and target countries decided?

First of all, in all cases, there is a high demand from German scientists to cooperate with their peers in the respective countries. Since DFG can only fund science and research within Germany, its international strategy is aiming at improving framework conditions for bilateral cooperation. In countries, which are in high demand of German research, it makes sense to establish DFG offices (Europe and the Middle East, however, are covered by the head office in Bonn directly).

However, in each of these countries, there are additional reasons for setting up a DFG office.

First one was established in China as a joint venture between Germany and China in 2000. China was opening-up and science was one of the first areas in this sense. The others were much easier to open, mainly as liaison offices. As a joint venture, the Sino-German Centre has its own budget for funding small Chinese-German projects to initiate mutual cooperation.

The other offices are mainly working as liaison offices with the following side-effects:

In the USA (Washington D.C. and the New York City), since there are several thousands of German post-docs and only part of them (around 85 %) come back, it was opened for networking, brain circulation purposes and to be close to other partners as well the fact that the USA is the biggest research partner of Germany.

Germany has traditionally very close relations with Russia and they would like to keep these close relations with the Russian scientists. They felt the necessity to do something there after the fall of the Iron Curtain. Long before setting up the Moscow Office, special programs for Russian scientists were designed to sustain good relations with the very good scientists there and to establish new areas of scientific cooperation.

In India, there are very young, talented and educated people that want to go abroad, whereas in Germany there is a lack of young talents, so this office was opened to select the best scientists.

In Japan, it was opened mainly for political reasons, especially to support Japanese organizations to internationalize Japanese sciences – and to turn its attention towards Germany.

The Brazil office is to cover the whole of Latin America with some wonderfully developing innovative systems and they would like to get into contact with these

systems. The office was opened in cooperation with the DWIH there, while at other locations DFG was present prior to the establishment of DWIHs.

Figure 7 DFG Offices Worldwide[274]

In terms of the S&T relations between the DFG and Turkey, a new Memorandum was signed between the TÜBİTAK and DFG in 2014 within the Turkish-German Year of Science. They are also planning two big conferences with double events both in Turkey and Germany in the frame of this special year and would like to use the opportunity to foster cooperation with Turkey and TÜBİTAK.

How does the DFG make assessment of their activities?
They do not actually make a special assessment, since for them success is the project-funding itself. Whatever is funded by the DFG, it is peer-reviewed, so it should be good.

[274] www.dfg.de Retrieved in December 2014.

They have bilateral cooperation agreements with around 85 countries in the world, but with some countries they cooperate without a necessity of an agreement, like Canada or Australia.

Science Diplomacy Activities of the PT-DLR[275]

Place and Role of the PT-DLR in the German Science Diplomacy System

"The Projektträger im Deutschen Zentrum für Luft- und Raumfahrt (PT-DLR, Project Management Agency – part of the German Aerospace Center) provides a wide range of services related to research, innovation and education management supporting mainly the Federal Ministry of Education and Research (BMBF) and the Federal Ministry of Economics and Energy (BMWi), along with other Federal Ministries and other public and private institutions. A core activity concerns the development and implementation of programme-related project funding".

Within PT-DLR and on behalf of BMBF, there are around 80 people (full-time equivalents) implementing the service contract "International Bureau". Along with other services related to the planning, implementation and assessment of international relations in research, innovation and education of the Ministry; it is responsible for the launching of calls for proposals, the evaluation of proposals, the monitoring of the implementation of projects as well as related public relations and reporting, when necessary.

[275] Meeting with Dr. Jörn Sonnenburg, PT-DLR, Bonn, 25.02.2014.

In terms of the perspective of PT-DLR on the DWIHs, it is an excellent joint effort and it is good that all related German research institutions work closer together. However the joint structure of the BMBF and the Federal Foreign Office does not work very well, yet. For the time being, he Federal Foreign Office takes the lead in the initiatives. The new approach is to make the best use of this structure and to organize events or research marketing campaigns.

The role of the PT-DLR in *Aussenwissenschaftspolitik* and Internationalization Strategy:

For them the official strategy is the Internationalization Strategy in Science, Research and Innovation of the German Federal Government, which was launched in 2008. The strategy is mainly implemented and monitored by BMBF, assisted by PT-DLR. The emphasis on the "collaboration with the developing countries" is new. There are new mechanisms developed for this purpose and all related German institutions were invited to look at those countries and find target subjects of collaboration in this regard, which might be based on dedicated "calls for proposals" to be launched by the Government. In addition, any initiatives by the institutions themselves complementing governmental activities are welcome.

Now 6 years after this strategy was published, they are looking for a new momentum so a Draft Action Plan had been prepared and published in Fall 2014 along with a national conference on International Cooperation held on 2 October 2014. Being part of the program of the present government, a renewed Internationalization Strategy will be prepared with a much stronger emphasis on the educational aspects becoming integral part of the strategy. In addition, the role of the European dimension in the internationalization of Germany will be strengthened with emphasis on SFIC (Strategic Forum for International S&T Cooperation) and high-level bi-regional meetings (Senior Officials Meetings-SOMs, Group of Senior Officials-GSOs…etc.). Afterwards a new Action Plan for the whole Federal Government of Germany might be envisaged.

How the partner countries are selected by the BMBF?

There are some countries with traditional relations. The first modes of cooperation accompanied the export of German nuclear power stations in the 1960s. Then bilateral S&T cooperation was developed with countries like Brazil, Egypt, Mexico, India and Indonesia. These were priority countries of Germany in economic terms as well.

Cooperation with Russia has historical reasons, like the opening of Germany to the East in Gorbachev period and the Ostpolitik.

On the other hand, there are some countries with cooperation without a formal agreement, such as Colombia, which they decided to cooperate upon Chancellor Merkel's visit to Colombia recently and her meeting with the Minister of Science of Colombia.

Objective criteria for the selection of these countries are hard. There can be political, economic and/or scientific reasons behind.

Africa is also mentioned in the Internationalization Strategy, for which they took a regional approach rather than selecting individual partner countries. There are a few cases for calls for proposals launched in Africa together with African partner organizations (Egypt, Morocco, South Africa). Another major initiative concerns the establishment of regional centers for climate related research based on multinational agreements. They cooperate with 9 countries in the West Africa in the frame of the West African Science Service Center on Climate Change and Adapted Land Use (WASCAL) and 5 countries in the South of Africa in the frame of the Southern African Science Service Centre for Climate Change and Adaptive Land Management (SASSCAL). A third major activity is considered the funding of "Scientific Networks of Health Research in Africa". They are focusing on the recent scientific situation and needs in Africa as well as training the local staff and the transfer of new knowledge in better medical services. Up to now, 12 concept studies were selected

for funding and there would be a final selection of the Centers in early 2015, which would get substantial funding for the following time period. They aim to have a self-sustainable structure there after some point.

BRICS countries are of course high priority for Germany in terms of the scientific and technological cooperation.

What about the cooperation with Turkey and the recent situation?

Turkey has a high priority for them as well and they are in favor of a stronger cooperation with Turkey since the governmental R&D funding was also raised significantly in the past 10 years. It is a large, attractive partner country with a huge intellectual and market potential.

It is one of the dynamic countries for advancing S&T cooperation of Germany. They appreciate the Year of Science between Turkey and Germany, which means a new policy momentum. There is mostly S&T cooperation between the Turkish and German universities and other academic partners, traditionally. There is a need for new mechanisms of cooperation. Here, the involvement of the industry is crucial. It is expected that at the end of the Year of Science, new tools of S&T cooperation between Turkey and Germany would be established.

International cooperation tools are mainly governmental agreements; EU projects; bilateral working groups in the priority areas and informal mechanisms of cooperation. Those instruments provide the frame for activities of PT-DLR. They could be summarized in four sub-categories:

1) Mobility tools (light schemes)
2) Research projects funding (targeted calls)
3) Cooperation on the institutional level (bilateral cooperation, EU projects…etc.)

4) Special cases of cooperation (science years, research marketing campaigns, thematic campaigns, country or region-oriented campaigns…etc.)

How is the assessment of their activities made?

Every single project is followed-up as an obligation requested by BMBF.
Evaluation could be made on a call level or at country level by independent external experts as well. Also there are systems evaluations of the research marketing campaigns for instance**.**

Science Diplomacy Activities of the Alexander von Humboldt Foundation

Place and the Role of the AvH in the German Science Diplomacy System

In terms of the place and role of the AvH in the German science diplomacy system, it took 50-55 years for Germany to be successful in this system. They have a rather regional perspective, also for the European countries.

The AvH's first foundation was established after Humboldt's death in 1860. The second AvH foundation was established in 1925. In 1953, today's Alexander von Humboldt Foundation was established based in Bonn Bad-Godesberg.[276]

The difference between the AvH and DAAD is that the AvH focuses on the "academic excellence" starting at the post-doc level. DAAD majorly funds students, not experienced researchers.[277]

AvH is a private foundation and there are 4 main funding institutions: Federal Foreign Office, German Federal Ministry for Education and Research, German

[276] Meeting with Dr. Judith Schildt and Gülay Sağırlı, AvH, Bonn, 26.02.2014.

[277] Mr. Puk, op.cit.

Federal Ministry for Economic Development and German Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety. Since 1953, the AvH provides linkages between German and international researchers. They fund mainly international researchers after the PhD level without an age limit. Their main goal is to foster international collaborations after the PhD. This is their main difference with the DAAD, since DAAD funds also students and PhD candidates (young researchers).[278]

They believe that top research can only be achieved through international collaboration so they have various fellowship programs for researchers from Germany and abroad.

International Cooperation Activities of the AvH

They have an Alumni Network of 26 000 people in more than 130 countries as of February 2014. They also have the "Ambassador Scientist" concept, which is selected from the AvH alumni and can be extended up to 6 years. "The Alexander von Humboldt Foundation's Ambassador Scientists disseminate information about Germany as a research location at universities and research institutions at home and abroad, focusing particularly on the Foundation's sponsorship programmes and international network. They work for the Foundation in an honorary capacity as alumni, hosts or reviewers".[279] There are around 53 such ambassador scientists of the AvH worldwide and some of them are very famous scientists. For instance, in India they took place in the DWIH Roadshow in 2013 as representing the AvH. In fact, for them every alumni member is an ambassador in terms of their linkages between Germany and their home country.[280]

[278] Dr. Schildt and Ms. Sağırlı, op.cit.

[279] http://www.humboldt-foundation.de/web/ambassador-scientists.html Retrieved in March 2015.

[280] Dr. Schildt and Ms. Sağırlı, op.cit.

Since the share of most universities own funds provided by the "Bundesländer" of Germany (the federal states) has been decreasing continuously within the last decades, universities are forced to acquire more third-party funds, such as the DAAD, AvH, DFG…etc. both in basic and applied research as well as educational purposes. Also collaboration with non-university research institutions has become important.[281]

AvH funds people, not projects. Since AvH represents science and scientific progress in Germany, they take an active role in the DWIHs' activities, also with their Alumni and Ambassador Scientists. It can support a good relationship between two countries when the relationship between people from those countries is good (e.g. relations between researchers from these countries). Furthermore researchers usually share views and communicate with each other regarding their scientific fields of interests even if different countries might have difficulties on the political level. Avh seeks to foster long-term links between researchers from Germany and international researchers worldwide. That helps to enhance cultural diplomacy abroad. [282]

It could be at the "post-doc" or "professor" levels. They are selected among the "best of the world", they have more than 50 Nobel prize laureates in their network. A Humboldt scholar could stay up to 2 years in Germany.

They also have a very well-established Alumni network. Every 2-3 years, they could have short-term scholarships in Germany. There are many other funding possibilities for research in Germany provided by the AvH. They call them as the "Ambassadors of AvH" and they can organize academic conferences in their region through AvH. The so-called "Humboldt Kollegs" are funded by the Federal Foreign Office. Mr.

[281] Ibid.

[282] Ibid.

Alexander Puk from the German Federal Foreign Office gave an example from Jordan, a Jordanian AvH Ambassador.[283]

Political foundations, such as the Konrad Adenauer have political activities abroad and they also provide scholarships for foreign students, which are partly funded by the AA. They have their own political profile.[284]

In terms of the relations with Turkey in the framework of the Year of Science, there are many events and conferences planned in this frame. Since 2012, Turkey is one of the focus countries of marketing for Germany. In the last 20 years, research landscape and funding has changed a lot in Turkey, but still there are not many joint projects on basic sciences. 8 top universities are selected in Turkey by the AvH focus initiative in order to intensify the cooperation with them since the AvH is not well-known in Turkey. There are 430 Turkish AvH Alumni.[285]

Evaluation of Their Activities[286]

In terms of the evaluation of their activities, Alexander von Humboldt Foundation was evaluated by the German Council of Science and Humanities (Wissenschaftsrat) in 2013.

Both DAAD and the AvH work independently. DAAD makes exchange on both sides. DAAD finances the "foreign" side and the "foreign" students whereas BMBF finances German students.

[283] Mr. Puk, op.cit.

[284] Ibid.

[285] Dr. Schildt and Ms. Sağırlı, op.cit.

[286] Ibid.

DAAD and AvH both get funds from the Federal Ministries like the BMBF. With that money both organisations follow up their goals (which is funding student exchange in both directions as DAAD does, and mainly funding international researchers as AvH does. By the way, AvH also gets funds from BMBF in order to send researchers from Germany to go abroad and do research together with a member of the Humboldt network abroad. This is the so-called Feodor Lynen Fellowship programme.[287]

Science Diplomacy Activities of the German Federal Ministry of Education and Research (BMBF) [288]

Place and the Role of the BMBF in the German Science Diplomacy System

The Internationalization Strategy is the official governmental strategy and it has four main pillars, namely on global leadership; innovation potential, global challenges; and strengthening cooperation with developing countries. The last here named dimension is important; it is also linked to the tackling global challenges pillar.

International cooperation in the area of S&T has a long tradition, but in 2008 it has been set as a Strategy for the first time. Before 2008, the cooperation with developing countries was less structured. The approach is, usually, demand-driven and bottom-up.; Existing science infrastructure is taken into account. Usually the BMBF ensures quality by "Calls for proposals" and asks its partner countries to contribute to the project costs. They decide on the bilateral cooperation priorities based on the research landscape in the respective country, In Africa a regional approach. The cooperation volume of the BMBF has grown over the years.

[287] For more info please see here: http://www.humboldt-foundation.de/web/lynen-fellowship.html. Retrieved in March 2015.

[288] Meeting with Mr.Peter Webers & Mrs. Isabel Vogler, BMBF, Bonn, 26.02.2014.

One example is the climate change cooperation with West and South African countries.

In the Action Plan of the Internationalization Strategy that was published in 2014, it analyzed which initiatives could serve as best practice for the future and what measures are to be taken in the following years.

S&T Cooperation between the BMBF and Turkey

In terms of the scientific relations with Turkey and also in the frame of the Year of Science, BMBF has experience with "Years of Science". Since 2007 it has organized Science years with Egypt, Israel, Brazil, South Africa, Russia and China. The Turkish-German Year of Science had its kick-off in early 2014. BMBF sets the umbrella structure and all the other institutions cooperate. The Turkish-German University was officially opened in 2014.

There has always been a good cooperation between the BMBF and Turkey as well as TÜBİTAK. It would be a special Year of Science. Germany and Turkey have a close relationship also because of more than 3 Million people with Turkish background living in Germany. However, science policy has special opportunities. Science Diplomacy is focused on common scientific interests, not on political problems. All the activities will be evaluated at the end of the year, and maybe new forms of bilateral cooperation would emerge.

In terms of the lessons learnt for Turkey from the Science Diplomacy experience of Germany, scientists can communicate separately from the actual political problems. After World War II, Germany sent its first science attaché to Israel. Three years after the WWII, relations between the scientists of both countries started unexpectedly. They try to use this effect to build special relations between countries to address special problems among them. Also the Arab Spring in Egypt and other countries showed the effect of well-educated, Western-educated class of young people.

Germany has around 10 science counsellors of the Federal Ministry of Education and Research, only dealing with scientific issues in its embassies around the world. There are located in Washington D.C. (2 posts), Paris, Brasilia, Warsaw, Tokyo, Beijing, Seoul, Tel Aviv and Jakarta. Furthermore, in 2014, they have two local staff in Pretoria und Ankara. All other science counsellor positions are held by the Foreign Office. BMBF is interested to send more staff as science counsellors. Turkey is one of the very important countries.

Evaluation

Assessment of their international cooperation activities is done by the PT-DLR, the administrative agency of the BMBF, mainly in the midterm and at the end of their usually three-year projects.

5.6 Conclusion

The science diplomacy activities in Germany are coordinated mainly by the BMBF and the Federal Foreign Office together. In this system, worldwide famous research institutions of Germany, such as the Fraunhofer, Max Planck, DAAD, DFG…etc. play a significant role with their research network worldwide, especially for the "diplomacy for science" activities of Germany.

Apart from that Germany has an active network of science diplomats in the countries of critical importance in terms of the scientific and technological cooperation and their resources.

In the current science and technology system of Germany, there are certain problems of coordination, especially between the BMBF and the German Federal Foreign Office.

In the Internationalization Strategy of 2008, topics such as the brain circulation; attracting the best brains to Germany; starting joint research and education programs;

as well as cooperation with the developing countries in order to tackle the global challenges gain importance. Also all the research alumni of Germany are seen as the scientific representatives of Germany in their own countries. Taken all these factors together, the contribution of this Strategy to the "science for diplomacy" and "diplomacy of science" activities of Germany is clear. Of course, the Action Plan that is expected to be published soon would be an important document in terms of what has been achieved in concrete terms during the past 4-5 years of the Strategy and what is expected to be achieved during the following years.

In terms of the so-called *Aussenwissenschaftspolitik* Strategy of Germany, its contribution to the Science Diplomacy activities of Germany and its concrete implications seem to be rather unclear for now although the German House for Science and Innovation (DWIH) like structures are good results of this strategy. It needs to be clarified and explained more precisely to the public.

Both of these strategies are still in progress as of 2014 and open to further development. They need to have more concrete steps and results.

Apart from that German Federal Foreign Office established a structure like the "Swissnex" network of Switzerland abroad in New York, Moscow, New Delhi, Sao Paulo and Tokyo and they are named as the "German House for Science and Innovation" **(**Deutsches Wissenschafts und Innovationshaus-DWIH**)**. DWIH is a very interesting and unique structure and could be a good example for Turkey. They host different German research institutions in the country they are present.

German Academic Exchange Service and Alexander von Humboldt Foundation have an increased support to the international mobility of the young researchers, which is an important component of the Science Diplomacy activities of Germany. These researchers work as science diplomats of Germany in a sense and they have a bridging role between the civil society and academia.

Conservatives and Social Democrats in Germany made an "Agreement of Coalition" in order to raise foreign students up to three-fold. Now it is 200.000 foreign students (by 2014), in 2018 it is aimed to increase the number of foreign students up to 350.000.

The science diplomacy policies of Germany are very much related to the internal politics and political conjuncture in Germany. It is also in line with the research policies of Germany in the frame of the European Union (EU) and European Research Area (ERA). It has also been related to the economic developments worldwide as it is understood from the interviews made.
Germany's main instruments of German Science Diplomacy activities are:

- Mobility and exchange of students and researchers through either short-term or long-term scholarships
- Stable STI cooperation between German and foreign research institutes and universities
- Representation of German education and research landscape worldwide
- Use of German Alumni network worldwide
- Development of German as a foreign as well as scientific language

In the interviews with the individual German research institutions, it was also stated that:

A new demographic situation emerged in Germany around five years ago also with the competition resulted from the globalization. There is a need for qualified labor from different countries.

The countries of international S&T cooperation of the German research institutions as well as science attachés are selected generally on the basis of:

- Working with the best researchers in the world
- Solving the problems and grand challenges at the global level (in energy, health...etc.)

All in all, scientific and technological relations between Turkey and Germany have gained importance in the recent years, especially with the Turkish-German Year of Science 2014, which would be analyzed more deeply in the Turkey Chapter.

It could also be argued that the science diplomacy policies of Germany are in line with the realist paradigm since both of the strategies of the German government, namely the Internationalization Strategy and the *Aussenwissenschaftspolitik* are state-led initiatives and the main actors of the German Science Diplomacy system are state institutions or state-funded research centers.

Moreover one of the main motives behind the German science diplomacy strategies is strengthening its leading role within the EU in line with its national interests as it has always been an important actor in Europe since the beginning of the 20th century.

CHAPTER 6

SCIENCE DIPLOMACY IN TURKEY: EVOLUTION AND FUTURE PROSPECTS

6.1 Introduction and Historical Background

We should ask in this chapter why Turkey needs Science Diplomacy. What would Turkey like to achieve with it? What is the potential of it for Turkey?

The main research question would be the place and role of Science Diplomacy in the future international role of Turkey as an emerging economy. Would a science diplomacy model from the Western world, such as the USA or Germany be more appropriate where the main aim is influence and control? What are the goals of Science Diplomacy for Turkey?

In this respect, first of all short background information on the Turkish Science, Technology and Innovation system would be provided. It would be followed by the current Science Diplomacy activities of Turkey as well as the information on the first science attaches of Turkey that are planned to be appointed. Then examples from Turkey's science diplomacy activities towards developing as well as developed countries would be given. The chapter ends with some recommendations on this issue based on the interviews with experts from Turkey and abroad.

There are two case studies within the chapter. First one is about the increased scientific and technological cooperation between Turkey and the USA in the recent years, especially following the famous "Cairo speech" of Obama and the launch of the US Science Envoys program in 2009-10. The second is about the recent Turkish-German Year of Science 2014.

The final analysis and recommendations for Turkey's future science diplomacy activities and lessons learnt from the USA and Germany case studies would be made at the end of the whole thesis in the "Conclusion" section.

6.2 Turkish Science, Technology and Innovation System and Its Actors

According to the 2005 UNESCO Science Report[289], three main policy documents are mentioned in terms of the development of science and technology policies of Turkey in the last 20 years or so, namely: Turkish Science Policy 1983-2003, Turkish Science and Technology Policy 1993-2003 and Impetus in Science and Technology Project (1995).

The Supreme Council for Science and Technology (BTYK), which was set up in 1983 and chaired by the Prime Minister of Turkey, assists in the development of long term science and technology policies. The Council is composed of cabinet ministers concerned with Science and Technology; the presidents of the Scientific and Technological Council of Turkey (TÜBİTAK) and the Higher Education Council (YÖK); Undersecretaries of the State Planning Organization (now the Ministry of Development), Foreign Trade and the Treasury; the president of the Turkish Atomic Energy Council (TAEK); the Director-General of the Turkish Radio and Television Supreme Council (RTÜK); and, lastly, the chairman of the Union of Chambers and Commodity Exchanges of Turkey (TOBB).

"In total, over one hundred different actors from the governmental bodies, higher education and business enterprise sectors are represented in BTYK meetings. Hence, BTYK is the culmination of governmental and non-governmental stakeholders from across Turkey in the STI fields. The inclusion of such a broad base of stakeholders in BTYK not only serves as an effective medium for systematic consultation and

[289] UNESCO Science Report, UNESCO Publishing: Paris, 2005, p.9.

dialogue, but also sustains robust interactions among the stakeholders, which enables a more participatory policy-making process."[290]

In 2002, the Vision 2023: Science and Technology Strategies were prepared by the Supreme Council for Science and Technology and it was aimed to formulate the science and technology policies of Turkey for the period of 2003-2023. This project includes four sub-projects, namely: National Technology Foresight Project, Technological Capabilities Project, Researchers' Inventory Project and National R&D Infrastructure Project.

TÜBİTAK was established in 1963. It is given authorization "to perform, encourage, organize and coordinate basic and applied R&D; to act as a funding agency for R&D activities; to support promising researchers through scholarships; and to organize international collaboration".[291]

[290] http://www.tubitak.gov.tr/en/about-us/content-scst Retrieved in March 2014.

[291] Ibid.

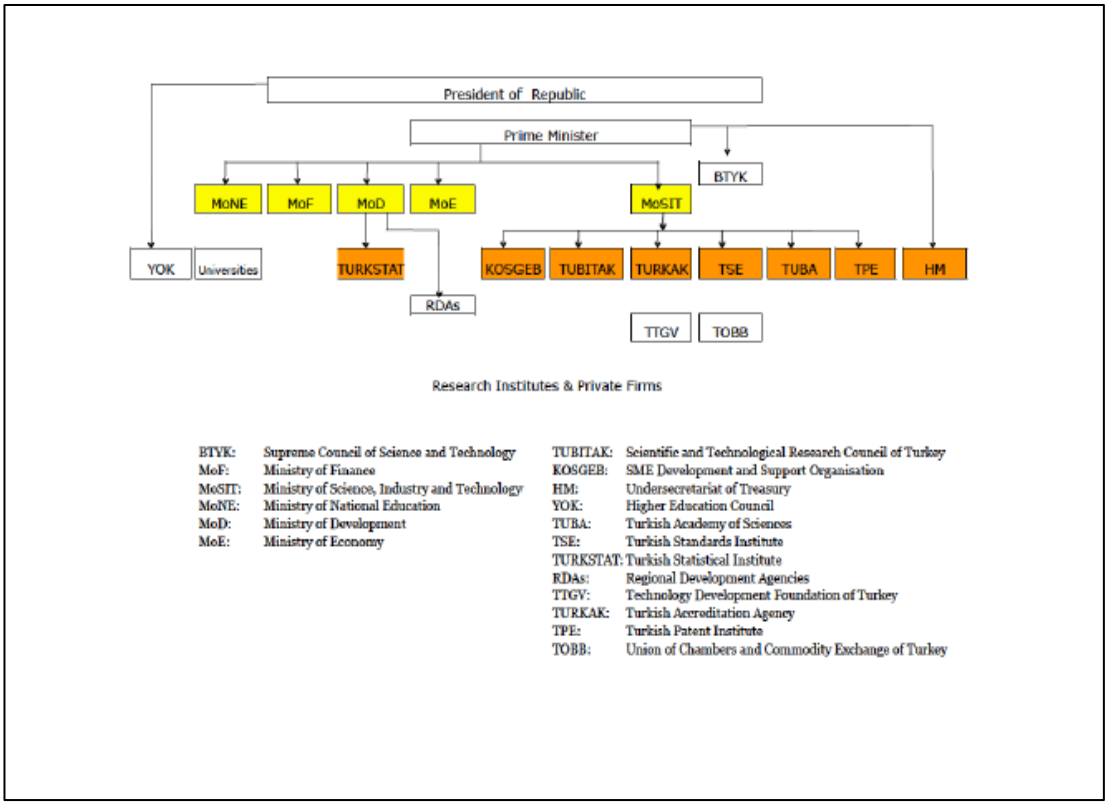

Figure 8 Overview of the Turkey's national R&D system (http://erawatch.jrc.ec.europa.eu/erawatch/export/sites/default/galleries/generic_files/file_0539.pdf)

According to the OECD 2012 Science, Technology and Industry Outlook[292], Turkey is an emerging big market economy. It has gone through the economic crises of 2001 and 2009 and fast economic growth periods over the last decade. It has shifted from an agricultural economy (which is still 24 % of total employment) and an economy based on an low-skilled labour force ("which supported the growth of traditional labour-intensive industries such as textiles") to an industrial economy. Turkey is an important automotive producer in Europe, leader in shipbuilding in the world, and a crucial manufacturer of electronics as well as home appliances (such as TV, white goods). On the other hand, its Science, Technology and Innovation (STI) system remains relatively small.

[292] OECD Science, Technology and Industry Outlook, 2012, OECD Publishing, pp.396-99.

The aim of the National Science, Technology and Innovation Strategy (2011-16) (UBTYS) is to strengthen the capacities of national R&D and innovation with the objective of upgrading the industrial structure to the high-tech industries. In this respect, it is aimed that the Gross Domestic Expenditure on R&D (GERD) should reach 3% of the Gross Domestic Product (GDP) by 2023.

The new Ministry of Science, Industry and Technology (MoSIT) is in charge of the STI policy design as well as implementation and coordination of R&D and innovation activities in Turkey since 2011. Moreover the Scientific and Technological Research Council of Turkey (TÜBİTAK) and the Turkish Academy of Science (TÜBA) are affiliated to the Ministry.

TÜBA, which is an important actor in the Turkish R&D system, is a member of the international scientific institutions community and has bilateral and multilateral relations with the academies of science in the world. The bilateral relations are facilitated through bilateral cooperation agreements signed with the respective science academies and these agreements provide a basis for the "Bilateral Exchange Program" between TÜBA and the respective academies of science. It has bilateral agreements with 23 academies in the world.[293]

Public research system in Turkey is small (0.48% of GDP in 2010) and universities account for 80% of total expenditures.

In the OECD 2014 Science, Technology and Industry Outlook[294], it was stated that:

[293] http://www.tuba.gov.tr/content/bilateral-relations/id/1132/pid/27/mid/170/ Retrieved in March 2015.

[294] *OECD Science, Technology and Industry Outlook: STI Country Profiles: Assessing STI Performance*, 2014, OECD Publishing, pp.20-25.

"Turkey's National Science, Technology and Innovation Strategy (UBTYS) (2011-16) has a sectoral focus, with nine national priority sectors: automotive, machinery and manufacturing technologies, energy, ICT, water, food, defense, aerospace, and health". A high-level meeting of prioritization meeting was realized for each of these sectors to decide the technological needs by consultation. Then technology roadmaps were prepared under the sub-topics of these nine sectors. Nearly 100 calls were launched in these priority fields since 2012 through the call-based programme of the Scientific and Technological Research Council of Turkey.

The Ministry of Science, Innovation and Technology (MoSIT) has set a special department to make the impact assessment of Turkey's R&D and innovation support programme. TÜBİTAK has also made an evaluation of the priority programmes from the supply-side perspective, by using indicators in order to define strengths and weaknesses of priority sectors.

"Turkey's BERD was 0.42% of GDP in 2012, well below the OECD median. BERD has increasingly concentrated on knowledge services at the expense of high-technology manufacturing".[295]

One of the priorities of the Supreme Council for Science and Technology is to support entrepreneurship and SMEs and in this regard many policy initiatives were started.

"The National Climate Change Action Plan (NCCAP) 2011-23 is Turkey's first green growth strategy. The goal of the Ministry of Energy is to reduce energy consumption by 20% per unit of GDP by 2023 (base 2011)".

The Energy Efficiency Technology Roadmap was prepared under the coordination of TÜBİTAK, as one of the priority areas of the UBTYS (2011-2016).

[295] Ibid.

TÜBİTAK introduced three new programmes with the aim of improving the efficiency of public research in universities in 2013. These are the Support Programme for Research, Technological Development and Innovation Projects in Priority Areas (1003), the Support Programme for Beginning Researchers (3001), and the Support Programme for National New Ideas and Products (1005).

Moreover "the National Graduate Scholarship Programme supported 5 054 PhD students between 2000 and 2013, with 3 366 supported in 2013 alone, while the National Postdoctoral Research Fellowship Programme supported over 300 researchers over 2000-13" with the support of TÜBİTAK.

Some existing programmes were revised, and new programmes, such as TÜBİTAK's Technology Transfer Office Support Programme, were launched in 2012 in order to facilitate the commercialisation of university R&D results and increase their impact and benefit for the society.

"The government is committed to sustained investment in STI and sets the targets for GERD and BERD at 3% and 2% of GDP, respectively, by 2023".[296]

There is a tremendous increase in the GERD (Gross Domestic spending on Research and Development)/GDP (Gross Domestic Product) and the total R&D expenditure of Turkey in the last 10 years as shown in the graphs below:

[296] Ibid.

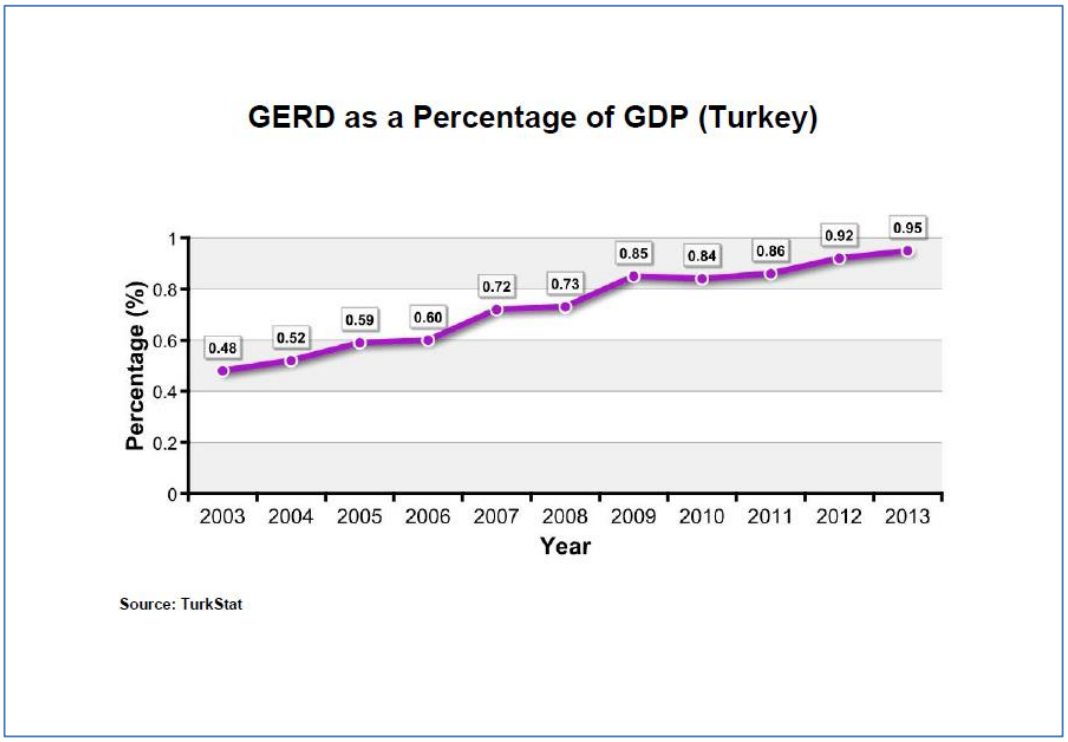

Figure 9: http://www.tubitak.gov.tr/sites/default/files/tr_sti01.pdf Retrieved in April 2015.

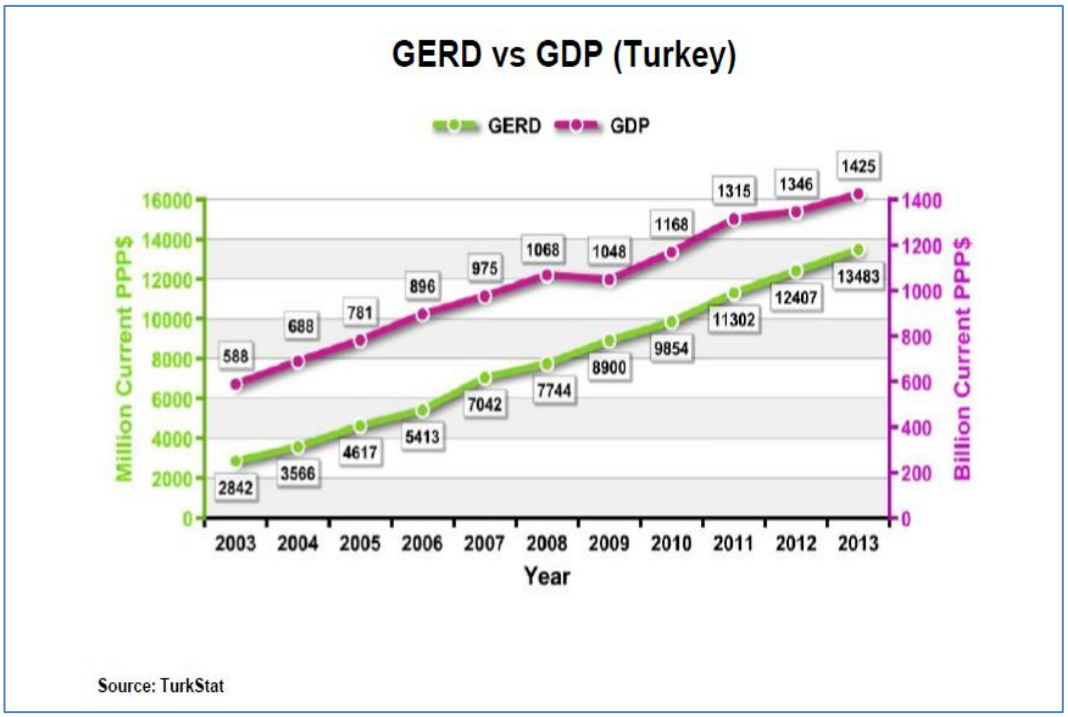

Figure 10: http://www.tubitak.gov.tr/sites/default/files/tr_sti05.pdf Retrieved in April 2015.

National R&D targets of Turkey for 2023 were agreed by the BTYK which took place on 27 December 2011. These are as follows as stated in the ERAWATCH Turkey Country Report 2013:[297]

- Achieving an R&D intensity of 3% (from 0.84% in 2010)

- Increasing business R&D expenditure as a percentage of GDP to 2% (from 0.36% in 2010)

- Increasing the number of Full-time Equivalent (FTE) researchers to 300,000 (from 64,341 in 2010)

- Increasing the number of FTE researchers in the private sector to 180,000 (from 25,342 in 2010).

There is a shift from a horizontal focus to a sectoral focus in the Turkish R&D and innovation policy according to the experts. There is also a major shift from research to innovation. There is also more commitment to develop and implement strategic, coherent and integrated policy framework.[298]

Prof. Dr. Orhan Güvenen[299], who is the Director of the Institute of World Systems, Economies and Strategic Research (DSEE) at the Bilkent University and who has also served as high-level administrator at various governmental bodies, including the UNESCO Executive Board member, Ambassador to the Permanent Representative of Turkey to the OECD and the President of the State Institute of Statistics, argued that in order to find the optimal scientific strategy for Turkey, the examples from the world should be studied carefully.

[297] Dilek Çetin and Erkan Erdil, *ERAWATCH Country Reports 2013: Turkey*, JRC Science and Policy Reports, EU, 2014, p.3.

[298] Ibid., p.4.

[299] Meeting with Prof. Dr. Orhan Güvenen, Director of the Institute of World Systems, Economies and Strategic Research (DSEE), Bilkent University, Ankara, 28.03.2014.

He further argued that scientific areas such as the "infrastructures" and "nanotechnologies" are the areas where Turkey has good potential and they could bring value-added to Turkey in terms of its science policies and strategies. For instance, the National Nanotechnology Research Center (UNAM) at the Bilkent University has an important place in this respect; they have 62 labs and have developed many research projects at the international level.

According to Prof. Güvenen, there are many qualified personnel in Turkey. However their impact on the decision-making structures is rather limited according to him. Decision-making systems are very important for the Science Diplomacy activities of Turkey. Turkey needs more institutionalized structures. It is a necessary condition for Turkey to develop medium, long-term scientific strategies at the international level and these strategies should converge to decision systems and realization.

During the interview with Prof. Dr. Ömer Demir[300], who is the Rector of the Ankara Social Sciences University and member of the TÜBİTAK Science Council, he argued that the Science Policy in Turkey could be called as "semi-structured": Different ministries in Turkey have different science policies, not fully-structured.

There is the Supreme Council for Science and Technology in Turkey, where the decisions of S&T are taken at the highest level of Prime Ministry. The structure and participation level of the SCST has been developed a lot in the past ten years, all ministries in Turkey are represented. Priority areas of S&T and budget allocation are decided there. Still it is "semi-structured" according to Prof. Demir since higher education is not directly included although the Higher Education Council (YÖK) is represented at the BTYK. The main priority is R&D at the BTYK.

[300] Meeting with Prof. Dr. Ömer Demir, Rector of the Ankara Social Sciences University and member of the TÜBİTAK Science Council, Ankara, 19.09.2014.

Prof. Demir, who has also served as the Vice President of YÖK between the years 2008-2011 underlined that YÖK does not have a function to direct universities in certain areas of specialization. It is inadequate in terms of producing knowledge. It has a bottom-up approach, not necessarily based on a strategy. It has the necessary legal and constitutional structure as well as the capacity to direct the universities in Turkey for specialization in certain technological areas. There is a lack of coordination and direction of an authority that knows the capabilities of the national actors. His recommendations are as follows:

- The main reason behind the Internationalization Strategy of YÖK is to develop international S&T cooperation with the aim of monitoring the developments in the world closely.
- Universities should be universal; graduates from these universities should be able to work anywhere. The diplomas should be valid everywhere and at the standards of the developed countries.
- YÖK should act proactively in terms of the applications that would pave the way for the universities. It could be done through international cooperation or through the contributions of foreign researchers.
- Turkey is a center of attraction for the countries on its East, such as Azerbaijan, Russia, Middle Eastern or Central Asian countries. However it is less of a center of attraction for the countries on its West. How to make our higher education system and opportunities more attractive? How can we convince them?

Right now there are no barriers on the way of employing foreign researchers, but still their numbers are very limited. Prof. Demir continued that some younger students or researchers come to Turkey for educational purposes. We also need more experienced or post-doc researchers. Turkey should be more attractive for them. We need additional policies in this regard. There are certain regulations made for it, also by TÜBİTAK, such as scientific visa…etc. More is needed. Activities on "Brain

Gain" are very useful in this sense. There should be such activities for attracting the foreigners as well.

There is also the legitimacy problem with regard to the making conditions more attractive for the foreign researchers in the sense that the gap between the salaries of Turkish researchers and foreign researchers is very high. This causes a legitimacy problem according to Prof. Demir. This is also valid for the acceptance of foreign students since they have additional quotas. This causes tension among the Turkish students, where competition is very high and acceptance ratio to the good Turkish universities is rather low. This affects the working conditions of the researchers in the universities.

Another problem is about the tuition fees. When the tuition fees of the foreign students are high, this causes difficulty for the foreign students from the regions like Central Asia or Balkans, who cope with economic difficulties. These problems can be mitigated when there are less people outside the higher education system.

In terms of the increasing number of universities in Turkey (opening universities in each 81 cities), Prof. Demir argues that it is useful, but there could be problems in the first years. It may not be done with plan, such as educating the researchers and then opening universities afterwards. It could go hand-in-hand. Demir says it as such, "if you do not plant a tree, there cannot be a forest."

For example, Kırıkkale (a city in the central Anatolia) has developed a lot in the last 22 years after the establishment of a university there. This is a good example.

The risk of it is the "localization of higher education", meaning that there is the risk of only the students/researchers from these local universities give education at their own universities in the meantime and do not interact with other higher education institutions.

6.3 Current Science Diplomacy Activities of Turkey

In April 2012, a Protocol between the Turkish Ministry of Foreign Affairs and the Ministry of Science, Industry and Technology was signed in order to develop the science diplomacy activities of Turkey. In this context, the first appointments would be made to US/San Francisco and Boston and then Japan/Tokyo, Germany/Berlin would follow. It is also planned to send science diplomats to Los Angeles, London, Beijing, Seoul, Moscow and India to extend the science diplomacy activities of Turkey all over the world.[301] The first places of appointment would be Germany and the USA.

Turkish Ministry of Foreign Affairs attaches importance to developing close cooperation between the scientific society, policymakers and diplomats. They signed this protocol with the aim of building a cadre of people who would follow up the developments in the area of science and technology in the world.
Some of their duties would be[302]:

- Promotion of Turkey's assets in science, technology and industry to the public in the countries of their appointment through using certain media channels and promotion activities;
- Info gathering, evaluation and reporting of the scientific, technological and industrial activities and policies of the countries of appointment through related governmental as well as private organizations of that country;
- Implementation of the preparation activities and negotiations of the bilateral and multilateral scientific and technological cooperation agreements; presentation of views and proposals to the government regarding them; taking place in the implementation of these agreements;

[301] http://www.sabah.com.tr/Ekonomi/2012/04/04/bilim-ataselikleri-geliyor Retrieved in March 2014.

[302] https://anahtar.sanayi.gov.tr/tr/news/bilim-diplomasisi-ve-bakanlik-yurt-disi-teskilatinin-tasarlanmasi/665 Retrieved in March 2014.

- Representation of Turkey in scientific and technical academies, in the industrial and governmental institutions in the area of science and technology;
- Building all kinds of scientific and technical cooperation in their duty areas with the related local and foreign research institutions and researchers

As stated in the Official Gazette of Turkey dated 07/02/2013 with 28552 number; diplomatic representations were allocated at these five priority countries, namely the USA, Germany, China, South Korea and Japan under the Science and Technology Counsellor cadre of the foreign representation of the Ministry of Science, Industry and Technology of Turkey.

Accordingly, the following duties were assigned to the Science and Technology Counsellors of Turkey:[303]

- Execution of the science diplomacy activities of the foreign representation of the Ministry of Science, Industry and Technology;
- Follow-up, reporting and evaluation of the scientific, technological and industrial activities of the country of appointment and informing the Ministry about their results;
- Follow-up of the scientific, technological and industrial policies in foreign scientific and technical academies, at industrial and governmental institutions and representation of Turkey in the areas of science and technology;
- Advising the Ambassador in scientific and technical subjects;
- Analysis of the university-industry partnership and technology transfer mechanisms of that countries and their applicability to our country as well as developing appropriate projects for our country;
- Suggestion of new cooperation models for our country in the priority areas and playing an active role in the implementation phase;

[303] Ibid.

- Providing service as an information center in the form of one-stop office in the areas of scientific, technological and industrial activities, investment opportunities and incentives in our country;
- Informing the Turkish scientists, researchers and entrepreneurs abroad about the entrepreneurship, innovation, R&D and scientific support programs of our country and assisting them for the applications to be made to the Ministry;
- Building cooperation and communication opportunities among the technologically leading and market leader firms of that countries and the institutions and firms of the same sector in our country;
- Assisting the exchange of scientific knowledge and scientists;
- Informing the counterpart organizations at our country about the scientific programs and activities of that country and ensuring their participation;
- Organization of events that bring together foreign and Turkish scientists in common thematic areas with the aim of developing joint project development culture;
- Monitoring and evaluation of the decisions taken at the meetings of permanent joint commission, memorandums of understanding, protocols and bilateral agreements that are signed between two countries in the areas of science, industry and technology;
- Follow-up of those countries' relations with other countries and making proposals in terms of the opportunities provided in the areas of science, industry and technology;
- Fulfilling other duties given by the affiliated foreign mission (representative) and execution of their duties in this regard in an effective, fast and efficient way.

6.4 First Science Attachés of Turkey

Science diplomacy activities are realized with the aim of contributing to the decision-making procedures with timely and accurate information by following the international scientific and technological developments; boosting the scientific appearance and activities of Turkey and increasing the contributions of the Turkish researchers abroad to Turkey.

In this regard, in the Official Gazette (Resmi Gazete) of Turkey dated 07/02/2013, diplomatic representation was given under the Science and Technology Counsellor cadre to be appointed to the foreign representatives of the Ministry of Science, Industry and Technology in the countries, such as the USA, Germany, China, Korea and Japan where new and intense academic research is pursued[304].

Following this development, the former Minister of Science, Industry and Technology Ergün stated that it is necessary to give importance to science, produce science, commercialize it, Gross Domestic Expenditure on R&D (GERD) should reach 3% of the Gross Domestic Product (GDP) and to have global brands in order to reach the objective of 500 billion USD export and to be one of the top 10 economies of world by 2023.

According to Prof. Dr. Semahat Demir[305], a Turkish science diplomat should have the following qualifications:

- Should be expert in his/her field.
- Short term appointments would be more effective.
- US Embassy Science Envoys program is a good model.

[304] Ibid.

[305] Meeting with Prof. Dr. Semahat Demir, Rector of the İstanbul Kültür University, İstanbul, 17.06.2014.

- They should stay interconnected and active in their field of expertise.
- Integration of education and research are important.

In terms of her personal experience in this program, Prof. Demir is accepted as a best practice example in the US Embassy Science Envoys program since she went beyond her proposal, worked efficiently and she was committed to her job. She transferred what she has learnt from this experience to both U.S. and Turkish officials and especially the U.S. Department of State. She believes that TÜBİTAK and the U.S. National Science Foundation (NSF) models are similar and there are certain similarities between the Turkish and the U.S. research mentality.
High-level people can be effective in the long term in terms of developing scientific diplomatic relations among two countries, if they can commit "on-time dedication" which is very crucial for this job.

In terms of the appointment of science diplomats from Turkey, Prof. Dr. Ömer Demir[306] also attaches very high importance to this issue. It is very urgent for Turkey. The Ministry of Education in Turkey has a goal of sending 1000 Turkish students abroad each year. There are many Turkish students in the USA, Japan and the UK. They need guidance there. This is missing for now.

How to integrate these Turkish students to the ST systems of these foreign countries?

There is not such expertise in Turkey right now, neither in the Higher Education Council, nor in TÜBİTAK. The education attaches of Turkey abroad also do not have such expertise. Prof. Dr. Ömer Demir advises that:

[306] Meeting with Prof. Dr. Ömer Demir, Rector of the Ankara Social Sciences University and member of the TÜBİTAK Science Council, Ankara, 19.09.2014.

- The science diplomats of Turkey could focus on these issues, also which topics to be studied in those countries. They can negotiate about the tuition fees or accommodation opportunities for the Turkish students there.
- They should have at least PhD degree and an academic background/competence.
- They should work on the priority scientific areas for Turkey in line with the needs of Turkey. The scholarships should also be given on a more qualified basis and selectively.

When it comes to the mission of the Ankara Social Sciences University, it is a targeted university in certain areas of social science. It is first of its kind in Turkey in this regard. This can be both advantageous and risky. They focus on research and graduate level. They are now a state-university and they still need some time to develop. Like a plant, it needs time and patience to grow up.

6.5 Science Diplomacy Strategies of Turkey Towards Developed vs Developing Countries

6.5.1 Introduction

For Turkey, science diplomacy is relatively a new phenomenon. Although there have been many examples of science diplomacy activities conducted by mainly the governmental institutions in Turkey, such as the Scientific and Technological Research Council of Turkey, the Ministry of Science, Industry and Technology and many other institutions as well as the universities, the usage of the term "Science Diplomacy" and the appointment of the science diplomats or attachés in Turkey are rather recent developments. Science diplomacy activities are also one of the strategies under the "National Science, Technology and Innovation Strategy (2011-2016)".[307]

[307]For more information on National Science, Technology and Innovation Strategy (2011-2016)", http://tubitak.gov.tr/sid/1007/pid/547/index.htm Retrieved in March 2014.

Before that Turkey had certain activities of S&T that could be considered as science diplomacy activities. One of them is Turkey's success in the European Union Framework Programmes (EU FP7), as Science and Research was the first chapter which was opened and provisionally closed successfully in 2006 within the negotiation process of the Turkey's EU membership in line with the EU acquis. In this sense, Turkey is seen as an important actor in Europe in the area of Science and Technology.

During the meeting with Prof. Adam Szirmai from the UNU-MERIT [308](The United Nations University-Maastricht Economic and social Research institute on Innovation and Technology) he stated that Chapter 25, negotiations with the EU is a good example of Science Diplomacy activities of Turkey. Access to funds is a very important factor for Science Diplomacy.

Another important area in Turkey's science diplomacy activities is the Destination Turkey events organized mainly in the USA, which aim to create "awareness on recent developments in Turkish Research Area, national and international research funding mechanisms for reintegration to Turkey as well as TÜBİTAK research institutes"[309]. In this regard, the objective is to contribute to brain circulation by making Turkey as a center of attraction both for the Turkish and foreign researchers abroad.

In this Chapter, examples from Turkey's Science Diplomacy activities towards both developed and developing countries would be provided.

[308] Meeting with Prof. Dr. Adam Szirmai, UNU-MERIT, Maastricht, 24.04.2014.

[309] http://www.tubitak.gov.tr/sid/0/pid/0/cid/26507/index.htm

6.5.2 Science Diplomacy Activities of Turkey towards Developing World

Another important science diplomacy activity as the Preparatory Event for the 4th UN Conference on the Least Developed Countries (LDCs) entitled "Science, Technology and Innovation: Setting Priorities, Shaping and Implementing Policies for LDCs" was organized by TÜBİTAK and UNIDO (United Nations Industrial Development Organisation) on 7-8 February 2011 in Istanbul in order to provide an input to the 4th UN Least Developed Countries Conference organized by Turkey on 9-13 May 2011 in Istanbul.[310]

Experts from international organizations such as World Bank, UNESCO, European Commission and European Investment Bank as well as the international researchers specialized on the development studies, the representatives from the related institutions and ministries of LDCs have attended the event and discussed the science, technology and innovation policies of the 48 LDCs.

As stated by Prof. Saeed Parto from the Maastricht University[311], Turkey has a bridging role between what is known in Europe and what is not known in East-South (like the LDCs). There are leverages to be used for Turkey. It is not very receptive to social networks.

When asked if there is anything in terms of Science Diplomacy with the LDCs for Turkey? Prof Parto said, "Yes, for instance production technologies, maybe not high-tech".

[310] www.tubitak.gov.tr/ldcs

[311] Meeting with Prof. Saeed Parto, Maastricht University, 23.04.2014.

Science diplomats of Turkey could facilitate this process also among the private sector in the future for instance.

Following that, Turkey is committed to the cause of Least Developed Countries (LDCs) in the international arena and is ready to do its role in assisting in their development process as a member of the United Nations and an emerging economy. As a part of these responsibilities, Turkey has initiated an international aid programme for LDCs (The Economic and Technical Cooperation Package of Turkish Government for LDCs). One of the important aspects of the programme is related to science and education fields. In this context, The Scientific and Technological Research Council of Turkey (TÜBİTAK) gives master and doctorate scholarships for citizens of LDCs under the 2235 Graduate Scholarship Program for the Least Developed Countries. Turkey and TÜBİTAK aims to promote closer scientific as well as educational relations between Turkey and LDCs[312].

Recently the United Nations (UN) High Level Experts Panel, which was announced by the Secretary General of the UN, Mr. Ban Ki-moon, was convened in TÜBİTAK TÜSSİDE (Turkish Institute of Management Sciences) on 16-17 February 2015 in order to establish a Technology Bank towards the LDCs. On this occasion, representatives from the LDCs as well as Turkey, USA, Denmark and China participated in this event, which was led by the Deputy Secretary General of the UN and the High Representative for the LDCs. The second meeting of the Panel is planned to be organized in İstanbul in July 2015.[313]

A similar event towards the Western Balkan countries was co-organized by the Scientific and Technological Research Council of Turkey (TÜBİTAK) and the

[312] http://www.tubitak.gov.tr/en/scholarship/undergraduates-graduates/international-programmes/content-2235-graduate-scholarship-prog-for-the-least-developed-countries Retrieved in March 2014.

[313] http://www.tubitak.gov.tr/tr/haber/bm-yuksek-duzeyli-uzmanlar-paneli-teknoloji-bankasi-icin-toplandi Retrieved in March 2015.

Regional Cooperation Council (RCC) under the name of South Eastern Europe Regional Workshop on the "Role of Public Research Institutes in Development of Countries" in Istanbul on 8-9 March 2010 under the auspices of the Turkish Chairmanship-in-Office of the South-East European Cooperation Process (SEECP). This event aimed to contribute to the enhancement of the science and technology competitiveness of Western Balkan countries with regard to the impact of public research institutes in technological development of these countries and their integration into the European Research Area (ERA) by sharing Turkish experience.

6.5.3 Science Diplomacy Activities of Turkey towards Developed Countries

In addition to these, Turkey is represented by TÜBİTAK as a partner (and coordinator in one project towards Japan) in 25 EU FP7 International Cooperation (INCO) projects together with its European and other country partners during the whole FP7 and with these projects Turkey represents its scientific potential in a wide geography from Balkans to Africa; from Central Asia to South East Asia to Far East by organizing and participating to various international scientific collaboration events and trainings[314].

Moreover Turkey has bilateral and active bilateral scientific cooperation on the basis of a bilateral S&T agreement with 36 leading countries (40 active programs) in S&T, such as USA, Russia, Germany, France and Republic of Korea, which also contributes to its "diplomacy for science" and "science for diplomacy" activities in a sense[315].

Of course, the Brussels-based R&D liaison office of TÜBİTAK, which is TUR&BO (Turkish Research and Business Organizations), contributes to the science diplomacy

[314] For more information, please visit http://www.fp7.org.tr/home.do?ot=1&sid=3406 Retrieved in March 2014.

[315] http://www.tubitak.gov.tr/tr/kurumsal/icerik-uluslararasi Retrieved in March 2015.

efforts of Turkey by facilitating cooperation with the counterpart organizations in the center of Europe and promoting Turkish R&D in every occasion in Brussels.[316]

The first Congress of the Turkish Scientists Abroad[317] was convened on 12-13 July 2012 in İstanbul in order to make Turkey an international center of attraction in the areas of science, technology and innovation by bringing together Turkish scientists abroad that have made important contributions in their fields of expertise with the R&D stakeholders in Turkey; transferring the methods and models for the commercialization of knowledge to Turkey; making evaluations towards building permanent and multilateral cooperation with the Turkish scientists abroad.

There were 177 participants to the Congress from the universities, public and private sector administrators in Turkey and 87 Turkish scientists from abroad. There were five panels, namely "Enterprising, Competitive Mental Transformation based on Technology", "Transformation to Knowledge Based Economy", "Turkey as a Center of Attraction", "Permanent International Cooperation with the Scientists and Research Institutions" and "Open Forum".

As a result of the discussions in the panels, the five main priority themes for Turkey's science, technology and innovation agenda are as such:

- Development of qualified human resources
- Making Turkey a center of attraction
- Brain gain and brain circulation
- Technology transfer and entrepreneurship
- Systematic and sustainable partnerships

[316] www.turboppp.org Retrieved in March 2014.

[317] http://www.tubitak.gov.tr/tr/kurumsal/uluslararasi/icerik-ytbik-2012 Retrieved in March 2014.

The second Congress was organized on 4-5 July 2013 in İstanbul.[318] Around 100 Turkish researchers from abroad as well as researchers, representatives from academy, industry and government participated to this event. All together there were 220 participants.

There were 4 panels and brainstorming was made under these 4 scientific areas:

- Health
- Energy
- Technology Transfer
- Education

Around 300 representatives from academy, government and industry came together to discuss 12 sub-topics under these 4 areas.

This second Congress of the Turkish Scientists Abroad has constituted a platform in the name of bringing Turkish scientists abroad together with the STI stakeholders in Turkey and allowing them to evaluate the following subjects:

- Identification of appropriate models and mechanisms for the transfer of information and technology abroad;
- Definition of the programs and policies for development of the qualified human resources;
- Definition of priority areas/technologies under the thematic areas of health and energy, which are also priority areas of Turkey; identification of critical subject areas in these themes through investigating the tendencies in the world; formation of concrete cooperation and action proposals;
- Identification of methods of cooperation with the Turkish scientists abroad under all these themes.

[318] *Yurt Dışındaki Türk Bilim İnsanları 2. Kurultayı Raporu*, 4-5 Temmuz 2013, İstanbul, Bilim, Sanayi ve Teknoloji Bakanlığı ve Türkiye Bilimsel ve Teknolojik Araştırma Kurumu (TÜBİTAK).

TÜBİTAK has organized several workshops on "Destination Turkey: European and National Funding Opportunities for Brain Circulation, R&D Cooperation and Research Career" in cooperation with the European Commission, U.S. National Science Foundation and Turkish Research and Business Organizations first in 2010, in the USA. Based on the experiences of the first workshop series, TÜBİTAK organized the second workshop series in 2012. These workshops aimed at increasing awareness on the researchers' mobility funds of TÜBİTAK and Marie Curie Actions under the EU FP7 as well as research collaboration between Europe and the USA.

During the workshops, researchers with any nationality were informed about national and European support mechanisms as well as the recent developments in Turkish research Area to carry out research in Europe. Besides the funding opportunities, the workshops provided a good opportunity where the researchers could contact with their future hosts with the attendance of the representatives from the hosting institutions in Turkey. Boston, Ann Arbor, New York, Los Angeles and San Francisco are the locations, the workshops covered till today. In April 2012, it was organized in the Washington D.C., New York and Chicago in the USA to reach the same goal.[319]

More than 1000 people participated in these workshops up to 2014. In 2014, these workshops were organized in Berlin, Germany on 24 January 2014 after the Opening Ceremony of the Turkish German Science Year: 2014. It was the first time in Europe. A total of 250 researchers participated in these workshops. "Science, Industry and Technology Minister Fikri Işık, welcomed the participants with the opening speech and he was very welcomed by the Turkish researchers living in Europe as well".[320]

[319] http://www.fp7.org.tr/home.do?ot=5&rt=&sid=0&pid=&cid=19872 Retrieved in March 2014.

[320] Ibid.

The latest Destination Turkey 2015 events were organized in the USA (University of California-Los Angeles and Stanford University) in March 2015 with the participation of the Turkish Minister for Science, Industry and Technology, Mr. Fikri Işık at the events. [321]

6.6 Case Study: Turkey-USA Science Diplomacy Activities

6.6.1 Introduction

There is an ongoing bilateral S&T cooperation between TÜBİTAK and the US National Science Foundation (NSF). Many successful joint projects (more than 60) were supported between TÜBİTAK and NSF in the previous years based on the Letter of Intent signed between the Presidents of TÜBİTAK and NSF in 1996, especially in the areas of material sciences, energy, environment, nanotechnologies, food and engineering.

Also another Letter of Intent was signed between TÜBİTAK and the US National Institutes of Health (NIH) in May 2013. As a result, it is expected to increase scientific cooperation between the Turkish and US researchers in the areas of rare diseases, cancer research, genetics, diabetes, stem cell research and infectious diseases, which are in the joint interest of both sides.

TÜBİTAK is also a partner and Work Package leader in the EU FP7 INCO bilateral cooperation (BILAT) project towards the USA, named as the "Bilateral coordination for the enhancement and development of S&T partnerships between the European Union and the United States of America" (BILAT USA 2.0) project and which started at the kick-off meeting in the Washington DC on 7-8 November 2012.

[321] http://www.tubitak.gov.tr/tr/haber/hedef-turkiye-2015-konferanslar-serisi-los-angelesta-basladi Retrieved in March 2015.

6.6.2 High-Level Delegation Visits

Apart from these bilateral institutional cooperation arrangements, many high-level scientific visits to/from the USA were organized by TÜBİTAK and other related governmental institutions especially in the last 5-7 years.

For example in the recent years,
A high-level TÜBİTAK delegation visit to the USA was organized on March 2006 headed by the former President of TÜBİTAK, Prof. Dr. Nüket Yetiş. They attended the Annual Conferences of the TASSA (Turkish American Scientists & Scholars Association) and the American-Turkish Council. Meetings with the National Science Foundation (NSF), Council for International Exchange of Scholars, National Institute of Standards and Technology (NIST), Office of Science and Technology Policy (OSTP), American Council on Education (ACE), Council of Graduate Schools (CGS) and National Institutes of Health (NIH) were realized.

On 13-14 April 2008, a special session was organized by TÜBİTAK in the frame of the American-Turkish Council (ATC) 2008 Conference in the Washington D.C., which was named as "Encouraging R&D Cooperation between the USA and Turkey". In this session, issues such as the R&D and scientific cooperation between Turkey and USA; human potential in the R&D; R&D investment climate in Turkey were discussed. In this 27th meeting of the ATC, for the first time a special session on R&D was organized.[322]

The US Delegation of the House of Representatives headed by the US Congress member Brad Miller visited TÜBİTAK Headquarters in the frame of a program prepared by the ATC on 30 May 2011.

Taken into consideration the increased scientific and technological cooperation with the USA in the recent years, a High Level TÜBİTAK Delegation visit was organized

[322] TUBITAK USA Country Report, 2008.

to the US (namely Washington DC, New York and Chicago) on 9-14 April 2012. The visits had mainly two aims: The first aim was the organization of the Destination Turkey events, which aimed to create "awareness on recent developments in Turkish Research Area, national and international research funding mechanisms for collaboration with scientists in Turkish universities, private sector, and TÜBİTAK research institutes".

The second component was the TÜBİTAK delegation visits to the key US institutes and governmental agencies on science and technology, such as NSF, NIH, Department of Energy, Department of State in order to increase the collaboration opportunities with TÜBİTAK.

The aim of these visits was to get concrete results and to crown them with specific success stories and the visit has already provided certain cooperation opportunities.

In the frame of these visits, meetings were organized in the priority areas like energy and health with the US funding institutions, such as the National Science Foundation (NSF), National Institutes of Health (NIH), Department of Energy (DoE) and the Department of State with the aim of increasing cooperation opportunities with TÜBİTAK; developing joint funding programs and researcher exchanges.

Apart from that in the Washington DC, meetings were made with the Turkish American Scientists and Scholars Association (TASSA); American Association for the Advancement of Science (AAAS); Air Force Office of Scientific Research (AFOSR) and the Maryland University with the aim of bilateral cooperation.

During the visits in New York, meetings were made with the New York Academy of Sciences (NYAS); the Turkish Consulate General in New York and the Technology Transfer Office of the Columbia University. In Chicago, a visit was organized to the Argonne National Lab of the US Department of Energy and the Illinois Institute of Technology.

These visits are expected to contribute to the increase of funding opportunities for Turkish researchers with the USA and to the science diplomacy activities of Turkey that have accelerated in the recent years.[323]

US Assistant Secretary of State Mr. Jose W. Fernandez visited TÜBİTAK on 9 May 2012.

Deputy Assistant Secretary for Eurasia, Africa and Middle East at the US Department of Energy Mrs. Andrea Waldman Lockwood and her delegation visited TÜBİTAK on 28 September 2012 to discuss cooperation opportunities in the areas of clean energy and energy efficiency.

6.6.3 Cooperation with the USA in the frame of the US Science Envoys Program

Moreover In the frame of this U.S. initiative on Science Envoys Program, Dr. Ahmed Zewail and his delegation visited TÜBİTAK on 14 January 2010 in order to develop scientific and technological cooperation with Turkey. Apart from this visit, Prof. Semahat Demir, who was at that time a Program Director at NSF conducted studies in Turkey between June-August 2010 in order to develop scientific and technological cooperation between Turkey and the USA.

Continuing these visits, many other delegations from the U.S. visited Turkey and TÜBİTAK between May-June 2010. Namely on 18 May 2010, Assist. Prof. Dr. Margaret Kosal from the Sam Nunn School of International Affairs, on 11 June 2010, Prof. Dr. Lenore G. Martin, who is Louise Doherty Wyant Professor and Professor of Political Science, Emmanuel College Associate, Weatherhead Center for International Affairs, Harvard University Associate, Center for Middle Eastern Studies, Harvard University visited TÜBİTAK.

[323] TÜBİTAK Bulletin, May 2012, pp.30-31.

Moreover in the frame of these science diplomacy activities of the U.S., NSF Program Director Dr. Almadena Chtchelkanova also visited Turkey and TÜBİTAK between June-August 2010 period and got information about the duties and activities of TÜBİTAK.[324]

New U.S. Science Envoy and former President of the MIT (Massachusetts Institute of Technology) Dr. Susan Hockfield and her delegation visited TÜBİTAK Headquarters and the TÜBİTAK Marmara Research Center in May 2013. They met Prof. Dr. Yücel Altunbaşak, the President of TÜBİTAK and talked about cooperation opportunities between two countries in the area of science and technology. Prof. Altunbaşak also informed the delegation about the Turkey-USA Science and Technology Cooperation Meeting that took place in Ankara on 3-4th April 2013, its implications as well as possible cooperation opportunities in the areas such as energy, education…etc.[325]

During the interview with Prof. Dr. Semahat Demir[326], who is the Rector of the İstanbul Kültür University and former US Embassy Science Fellow, who was appointed to Turkey for a period of six weeks in May-July 2010, she defined "Science Diplomacy" as a holistic approach taking natural, applied, social sciences as well as fine arts together with the education aspect at all levels, from preschool to post-doc level.

Her distinguished academic background, achievements as well as her familiarity with both cultures contributed for Prof. Demir's selection as the U.S. Embassy Science Fellow in Ankara.

[324] TÜBİTAK USA Country Report, 2010.

[325] http://www.tubitak.gov.tr/tr/haber/abd-bilim-elcisi-dr-hockfield-tubitaki-ziyaret-etti Retrieved in March 2014.

[326] Meeting with Prof. Dr. Semahat Demir, Rector of the İstanbul Kültür University, İstanbul, 17.06.2014.

Her missions as the Science Fellow included mainly:

- Re-signing the Turkey-USA Scientific and Technological Cooperation Agreement, this was then signed on 20 October 2010.
- Defining the priority areas of S&T cooperation between two countries. This then constituted an important legal basis and justification for the priority areas in the abovementioned Turkey-USA S&T agreement as well as the thematic working groups of the Turkey-USA Science and Technology Cooperation Meeting of April 2013.

In this regard, Prof. Demir conducted brainstorming meetings with the representatives of the focus groups from academy, industry and public institutions all over Turkey in six weeks' time, which was ideal timing as she told, not too long and not too short.

It is very crucial to publicize the works of science diplomats through different social media channels, from which Prof. Demir benefited a lot. For her, "Science Diplomacy" cannot be thought apart from the "Public Diplomacy".

Public education and sharing the scientific education at all levels is very important in this respect, including the NGOs, universities, government…etc.

Prof. Demir implemented this very well in terms of educating the US Congress about the Science, Technology, Education and Math (STEM) issues as well as in the "Women in Science" theme. She has given briefings to the US Congress on these themes since Innovation and Competitiveness increase with the involvement of more Women in Science and STEM education.

For instance, in the United States the ratio of women engineering degree recipients is 19%, whereas the ratio of women in engineering workforce is 9%. This means that more women are needed in the workforce and in the high-level positions.

Following her efforts as the Society of Women Engineers (SWE) Vice President, in the U.S. Congress (House of Representatives), a new focus group named as "Diverse & Innovation Caucus" was formed and they led this group in 2007. They contributed drafting a bill on women in engineering education and workforce issues and federal scholarships. This was a good example of "Science in (Public) Diplomacy" overall.

She was then appointed to Argentine as Science Envoy and implemented studies on nanotechnologies there.

6.6.4 Joint Scientific Events with the USA

The workshop on "Synergy with and Learning from Nature" was organized in Istanbul on 20-22 October 2011 by TÜBİTAK, Bilkent University, NSF and ESF (European Science Foundation) with the contributions of the JST (Japan Science and Technology Agency) and the National Science Council (NSC) of Taiwan as a good example of Science Diplomacy.

In this workshop, it was aimed to bring scientists and engineers from different disciplines and different countries, such as the USA, Turkey, Europe, Japan, Korea, Taiwan and to decide the research inclinations that were inspired from the nature. As a result of this workshop and the brainstorming during the event, important steps were taken towards determining recommendations and needs for the research and international scientific cooperation that paves the way towards new perspectives at the global level in the areas of engineering for a better life that are inspired from nature.

In the first day of the workshop, an open session was organized with the participation of all invited researchers. In the second day of the event, four parallel sessions were organized, named as "Energy Plant (Animal) Perspective", "Sensing & Self-X (Adapting) Materials", "Bio-inspired Design, Innovation & Architecture" and "Health Engineering-Inspired Physiology" and the final report of the workshop was

prepared on the third and last day of the workshop. More than 40 scientists from USA, Turkey, Taiwan, Korea, Japan, Switzerland, UK, Denmark, Italy and Germany participated to the event.[327]

Apart from that Prof. Dr. Nasir Memon from the New York University Polytechnic Institute gave a seminar on the "Cybersecurity" as an invitee of the TÜBİTAK President on 28-29th March 2012, in Ankara and Gebze (TÜBİTAK BİLGEM) subsequently.

On 27 March 2012, a high-level meeting was organized at the Turkish Ministry of Science, Industry and Technology with the participation of U.S. Department of State Deputy Assistant Secretary for Science and Technology and high-level representation from TÜBİTAK and related R&D units of it in order to determine the priority areas of S&T cooperation between Turkey and USA as well as to discuss the joint activities to be executed under these priority areas of S&T.

6.6.5 The First High-Level S&T Cooperation Meeting with the USA

Following all those efforts and high-level visits for developing scientific and technological relations between Turkey and the USA in the frame of the Turkey-US "Diplomacy for Science" activities, on 3-4 April 2013, the United States and Turkey held their first high-level meeting in Ankara, Turkey to develop a roadmap to enhance bilateral science, technology, and innovation cooperation under the 2010 U.S.-Turkey Science and Technology Agreement.

Over 100 American and Turkish representatives from government, the private sector, universities, and non-governmental organizations met to develop mechanisms to increase cooperation in the areas of energy, biomedical research, agriculture, natural hazards, educational technologies, material sciences, and engineering for a sustainable future. In addition, participants explored ways to strengthen both

[327] http://me.bilkent.edu.tr/?page_id=2289 Retrieved in March 2014.

countries' innovation ecosystems to support technology commercialization, as well as to put into place effective policies and regulations that support economic development. They also discussed methods to utilize science to make more informed policy decisions, build networks of universities and researchers, and leverage diaspora groups to sustain cooperation.

Dr. Kerri-Ann Jones, Assistant Secretary for Oceans and International Environmental and Scientific Affairs, and Professor Dr. Yücel Altunbaşak, President of the Scientific and Technological Research Council of Turkey (TÜBİTAK), led their countries' delegations. Minister of Science, Technology, and Innovation Nihat Ergün and U.S. Ambassador to Turkey Francis J. Ricciardone both participated in the meeting, which was hosted by the Ministry of Science, Technology and Innovation and TÜBİTAK.[328]

6.6.6 Recent Developments and Conclusion

The scientific relations between Turkey and the USA were developed positively following the visits of the U.S. Science Envoy and former President of the MIT (Massachusetts Institute of Technology) Dr. Susan Hockfield and her delegation to Turkey during 2013.

The Action Plan, which was adopted after the first high-level S&T meeting between Turkey and USA in April 2013, also contributed to increase concrete cooperation between two countries. Following the adoption of the Action Plan, joint workshops between two countries were organized, researcher exchanges were realized and the number of joint projects increased with the pilot joint program.

USA Minister of Energy, Mr. Ernest MONIZ has visited Turkey last year and organized a meeting with the TÜBİTAK President Prof. Dr. Yücel ALTUNBAŞAK

[328] TUBITAK Bulletin, May 2013, pp.12-15.

in this frame. Afterwards energy as a priority area of bilateral cooperation among two countries has gained importance. In this frame, a researcher exchange program is ongoing between the U.S. universities and research centers that are supported by the US Department of Energy and the TÜBİTAK Marmara Research Center Energy Institute.[329]

Moreover cooperation with the U.S. National Institutes of Health (NIH) towards joint activities are ongoing and a joint call is opened with the NIH in March 2015.

A joint workshop on the "*Genetically-Based Immune Disorders*" was organized between TÜBİTAK and the NIH National Institute of Allergy and Infectious Diseases (NIAID) between 15-16 October 2014 in Ankara.[330] More than 60 researchers from both countries participated.

6.7 Case Study: Turkish-German Year of Science

The 2014 Turkish-German Year of Science was kicked-off with the participation of the Minister of Science, Industry and Technology, Mr. Fikri Işık, and the Federal Minister of Education and Research, Mrs. Johanna Wanka, on the 23rd of January in Berlin.

A Memorandum of Understanding was signed by the two ministers that aims to encourage cooperation in the fields of Science, Technology and Education between the two countries during the event. In addition, two more agreements were signed between The Scientific and Technological Research Council of Turkey (TÜBİTAK) and the German Research Foundation (DFG) and between the Higher Education

[329] TUBITAK USA Country Report, 2014.

[330] http://www.tubitak.gov.tr/tr/haber/tubitak-ve-abd-ulusal-saglik-enstitusu-ortak-arastirmalar-calistayi

Retrieved in December 2014.

Council of Turkey (YÖK) and the German Academic Exchange Service (DAAD) to increase the scientific and educational cooperation between the institutions.

At the press conference, Minister Işık expressed the importance of the strong historical bonds, which forms the basis of the relations between the two countries. Işık said that "The strong relations will bring significant advantages and significant connections. Therefore, the Year of Science is of utmost important to us. The advantages of the Year of Science will not only be beneficial to Turkey and Germany, but also to the region and the world."[331]

TÜBİTAK has active cooperation with Federal Ministry of Education and Research (BMBF) and German Research Foundation meaning that providing support for researchers in the forms of research projects, exchange of scientists and participating to scientific meetings. TÜBİTAK has 4 different cooperation programs and 40 bilateral research projects (as of June 2014) are ongoing. This number is expected to increase with the calls that will be opened.

Within the framework of the Science Year, TÜBİTAK has an active role. First of all, it organized the Destination Turkey event in Berlin with the aim of reaching to the Turkish scientists working abroad and informing them on the research opportunities in Turkey. With this workshop, they informed approximately 250 researchers on bilateral cooperation and on the opportunities in Turkey. The event focused on brain circulation and funding programmes, with the Turkish Minister for Science, Industry and Technology (MoSIT), Mr. Fikri Işık, discussing the future of R&D.

Secondly, TÜBİTAK has opened a new program for supporting workshops and seminars aiming to increase the bilateral cooperation and develop research projects within the framework of the Science Year. They opened this call twice this year and

[331] http://www.tubitak.gov.tr/en/news/the-opening-ceremony-of-the-2014-turkish-german-year-of-science-was-held-in-berlin Retrieved in March 2014.

in the first call, we received 90 applications and decided to support 50 of them. In the second call, 107 applications were received.

Lastly there is 2+2 Programme which is a significant program for both sides. The 2+2 call was opened in June 2014 and aims to support universities and industry within Turkey and Germany. They encourage, one university and industry partner from Turkey, and one university and industry partner from Germany to form a consortium and apply to BMBF and TÜBİTAK with their research projects.[332]

The first Turkish-German university was established in İstanbul in 2014.

As also discussed during the interviews in Germany, Turkey is one of the number one countries of S&T cooperation for Germany. They are in favor of the Year of Science between Turkey and Germany, which means a new Policy Momentum. There is mostly S&T cooperation between the Turkish and German universities traditionally. There is a need for new mechanisms of cooperation. Also involvement of the industry is crucial. It is expected that at the end of the Year of Science, new tools of S&T cooperation between Turkey and Germany would be established.[333]

In terms of the relations with Turkey in the framework of the Year of Science, there are many events and conferences planned in this frame. Since 2012, Turkey is one of the focus countries of marketing for Germany. In the last 20 years, research landscape and funding has changed a lot in Turkey, but still there are not many joint projects on basic sciences. 8 top universities are selected in Turkey by the AvH focus initiative in order to intensify the cooperation with them since the AvH is not well-known in Turkey. There are 430 Turkish AvH Alumni.[334]

[332] TÜBiTAK Germany Country Report, 2014.

[333] Meeting with Dr. Jörg Sonnenburg, Director, PT-DLR, Bonn, 25.02.2014.

[334] Dr. Schildt and Ms. Sağırlı, op.cit.

On the other hand, there has always been a good cooperation between the BMBF and Turkey as well as TÜBİTAK as stated by the officials at the BMBF[335]. It would be a special Year of Science, separated from the political or migration-immigration related problems. This is what Science Diplomacy is in fact, there is politics, but it is not focused on problems. All the activities would be evaluated at the end of the year, and maybe new forms of bilateral cooperation would emerge. Also a new science attaché of Germany was appointed to Turkey in this frame.

The closing event of the Turkish-German Year of Science was organized on 12 March 2015 in Ankara/Turkey with the participation of the Turkish Minister of Science, Industry and Technology, Mr. Fikri Işık, and the German Federal Minister of Education and Research, Mrs. Johanna Wanka.

During the event, it was stated that 74 joint events between Turkey and Germany were supported as a result of two calls opened by TÜBİTAK. As a result, 1000 Turkish and 800 German researchers came together. The 2+2 call was opened in order to promote the academy-industry cooperation as stated above. Moreover the EUREKA call for Germany was also opened in order to continue the sustainability of this cooperation between Turkey and Germany that started with the Turkish-German Year of Science.[336]

[335] Meeting with Peter Webers and Isabel Vogler, BMBF, Bonn, 26.02.2014.

[336] http://www.tubitak.gov.tr/tr/haber/turk-alman-bilim-yili-basari-ile-tamamlandi Retrieved in March 2015.

6.8 Recommendations and Future Prospects for Turkey

During the interview with Prof. Luc Soete[337], who is the Rector of the Maastricht University, he stated that in the frame of the new developments in Science and Technology, Turkey could choose either to have an open, transparent research culture based on the OECD rules, reciprocity and public awareness or to have a less transparent and more nationalistic system like China or Russia. Can Turkey fully follow this line? What about the freedom of scientists? How do we make this scientific assessment in Turkey?

Economic openness is in contrast with the military closeness. This is at odds with the international dynamics. In Turkey, military progress is far more nationalistic as compared to other countries, somewhat similar to Russian military progress in areas such as space or aircraft technologies.[338] Here too though Russia pays a heavy prize in terms of loosing out in international competitiveness in some of those sectors (civilian aircraft).

Turkey is a building block between Europe and Asia. It is surrounded by an unstable region unfortunately. So Turkey's regional role in terms of Science Diplomacy is difficult to develop, no in the least because there is no interlocutor in the failed states surroundings. It prevents Turkey to become a real co-player in Science Diplomacy. Imagine what would have happened if not?

Stability between nations is essential and very important for an effective Science Diplomacy. This is the "Drama of Science Diplomacy" as stated by Prof. Soete. Science Diplomacy does not have a power in this sense to avoid conflicts or wars. It is pure "soft power".

[337] Meeting with Prof. Luc Soete, Rector of the Maastricht University, 23.04.2014.

[338] Ibid.

During the meeting with Prof. Adam Szirmai from the UNU-MERIT [339], he stated that Turkey has probably achieved to "catch-up" between the "catch-up" and the "middle-income trap"[340] and has acceleration in the past 10 years, but still has a long way to go. For overcoming the middle-income trap, openness to international ST cooperation is crucial. All successful cases of economically developed countries are integrated as such. Science Diplomacy is part of this. Its aim should be to increase connectedness with the international research system as well as international research flows.

He also argued that TÜBİTAK has a monopoly position in Turkey in terms of funding R&D. It may be good for coordination, but what if there are mistakes? There are not many funding opportunities other than that, unlike the Netherlands.

In this sense, it should be questioned if Turkey has a more national STI system, like China or Russia, but for sure there is technological upgrading in Turkey, especially in the recent decade. Turkey is heavily investing in this sense in education and outward exchange. Turkish scientists are already international. Success in the Chapter 25 is not a surprise. Network is already there.

What should be the aim of Turkish Science Diplomacy? It needs international cooperation in order to continue its economic development. It is more of recipient in this respect. Turkey still has to work on being a country like Korea for instance.

[339] Meeting with Prof. Dr. Adam Szirmai, UNU-MERIT, Maastricht, 24.04.2014.

[340] "The middle income trap is a theorized economic development situation, where a country which attains a certain income (due to given advantages) will get stuck at that level". (wikipedia.org)

Prof. Szirmai also argued that Turkey could have an intermediary or donor role for the Least Developed Countries (LDCs) or the Middle East, African region on the other hand.

We should also ask why Turkey needs Science Diplomacy? What would Turkey like to achieve with it? According to Prof. Szirmai, researchers should create this network. This should exist. The success with the EU Chapter 25 negotiations is obvious, as EU has given formal access to open up with the European Research Area.

In the meeting with Permanent Representative of Turkey to the UNESCO Ambassador Mr. Hüseyin Avni Botsalı [341], he mentioned that there is "scientific espionage" rather than "science diplomacy" in the 20th century until the 21st century, meaning that there is competition as well as hiding of sensitive knowledge and so on.

Afterwards it is the "cyber age" or "information age" now, where knowledge is commercialized, there is industrial competition and rise of countries, such as Japan and South Korea.

The US has become an undisputable super power by being developed in Science and Technology.

After the end of the Cold War, the capital has also become globalized, the world has witnessed the rise of powers such as the USA, the EU and China and multinational companies became widespread.

Then there was a trend from competition towards cooperation, also in S&T cooperation. Of course, there are not tailor-made receipts for it. The role of S&T has also increased in the international law and diplomacy as well.

[341] Permanent Representative of Turkey to the UNESCO Ambassador Mr. Hüseyin Avni Botsalı, Paris, 30.05.2014.

In terms of the role of UNESCO, after the Second World War, for the first time an international organization was established with the aim of education and science for peace.

However there are not sufficient financial resources at the UNESCO for science and science diplomacy. This should be solved so that the UNESCO could become an efficient actor in science diplomacy.

In terms of the advices for Turkey in its science diplomacy activities, Mr. Botsalı stated those points:

1. Turkish domestic and foreign researchers who have PhD are not sufficient. China has higher numbers of PhD researchers. Also the PhD scholarships of Turkey abroad are insufficient. In order to avoid the brain drain, there should be necessary research infrastructure and authority provided for these people and their life standards in Turkey should be compatible with their standards abroad.

2. Turkey should leap forward towards developing or export-based industrial infrastructure, such as high-tech war planes, cyber technologies…etc. These could be realized with the contribution from national budget or through multinational projects. Target technology areas should be defined.

3. Some of the EU member countries, such as the UK prefer Turkey for investment since the R&D budget of some firms in Turkey is very high. How can Turkey benefit from the traditional infrastructures in Europe? What can be brought to Turkey from abroad in terms of technology transfer? There should be "innovative industrial research", meaning that rising of the technologies in parallel levels with the leading countries' technologies in the world. This could be realized through education. The qualified brain power should be increased.

Another best practice example from Turkey is Dr. Gülser Corat, who is the Director for Gender Equality at UNESCO and who is the only woman director at UNESCO with Turkish origin. During the interview[342], she mentioned the importance of UNESCO in the global Science Diplomacy activities since it is the oldest UN organization in Natural and Social Sciences. UNESCO is considered to be the "intellectual body" of the UN system and it is a knowledge-producing institution although there is an enhanced focus on the implementation of policies since the 1990s.

Science Diplomacy at UNESCO could also be considered at the frame of Cultural Diplomacy according to Dr. Corat, meaning the cooperation in the areas out of politics and a learning process through mutual exchange of knowledge.

As a good example of Science Diplomacy, Dr. Corat mentioned the UNESCO National Committee of Turkey and the international meetings related to the subjects, such as "Ethics of Science" or "Education"…etc. Her opinion is that in these kinds of international meetings, foreign scientists learn not only about their own fields of expertise, but also about Turkey and their prejudices are gone.

For her, the aim of diplomacy is to increase the capacity of human beings in terms of understanding each other through knowing each other. Science diplomacy or cultural diplomacy also serves this purpose.

These are some of the by-products or unintended consequences of the Science Diplomacy.

There is a common language among scientists. For instance, Dr. Corat got her PhD in Canada and lived there for 22 years. In those years, there were not many Turkish students at her university in Canada. Afterwards, at least 2 Turkish students at the

[342] Dr. Gülser Corat, Director for Gender Equality at UNESCO, Paris, 30.05.2014.

Masters or PhD level are accepted each year to her university. She paved the way for this scientific cooperation in a way.

UNESCO also has lots of opportunities for organizing various events. Turkey could be more proactive at this platform. There are very good opportunities at the UNESCO National Committee of Turkey for Science/Cultural Diplomacy. It could be used better for increasing influence.

She is one of the best representatives of Turkish women scientists abroad and she is also the first women director at the UNESCO from Turkey. Gender equality has always been the priority area of UNESCO, together with Africa. They are the global priorities of the UNESCO as mentioned in the Mid-Term Strategy of UNESCO in 2008-2013 and in 2014-2021 as well.

6.9 Conclusion

As a result, Turkey is the 17th country in the world in terms of its share of world's GDP (as purchasing power parity) as of 2014 and was ranked 18th in terms of its population of 76 million people in 2014[343], so it is in top 20 both with its economy and population.[344]

Moreover Turkey pursues a multilateral foreign policy with a "zero-problem" approach towards its neighbors[345]. In this sense, it has developed its relations with its neighbors in the Middle East, Balkans and South Caucasus over the years.

[343] http://stats.oecd.org/ Retrieved in March 2014.

[344] Dries Lesage & Yusuf Kacar (2010), "Turkey's Profile in the G20: Emerging Economy, Middle Power and Bridge-Builder", *Studia Diplomatica,* Vol.LXIII, 2, p.125.

[345] Ahmet Davutoglu, "Turkey's Zero-Problems Foreign Policy", *Foreign Policy*, 20 May 2010 in Ibid., p.129.

As argued by Aktay and Larrabee in different articles, Turkey "is rapidly expanding its diplomatic contacts, economic activities, and even its soft power in the Arab world, Africa, and Latin America. Ankara has also intensified its visibility and engagement in various multilateral fora".[346] It is active in many regional organizations towards Mediterranean, Black Sea, Balkans, Middle East, Caucasus as well as Central Asian regions. Turkey's multilateral foreign policy is also enhanced by its new embassies opened in Africa as well as Latin America.

It is part of the Western security architecture as being a member of the NATO and a candidate country to the EU. It is also an OECD member country. It also acts as a constructive member of certain international institutions, like the UN as in the case of having a non-permanent seat in the UN Security Council for the years 2009-2010. Turkey has also strong ties with its wider neighborhood, as in Russia, Central Asia and the Arab world. Turkey also assumed the G20 Presidency for the first time in 2015.

In addition to these, Science and Research was the first chapter which was opened and provisionally closed successfully in 2006 within the negotiation process of the Turkey's EU membership in line with the EU acquis. In this regard, it is regarded as one of the most successful areas and an example of best practice in the EU-Turkish relations.

This progress was also reflected in the Regular Progress Reports of Turkey published by the European Commission annually and in the increasing success rates of Turkey in FP7. In this sense, the positive impetus of Turkey in its integration with the EU and ERA can be reflected on the other related areas of European integration as a spillover effect.

[346] Aktay, Y., Politics at Home, Politics in the World. The Return of the Political in Turkish Foreign Policy, *Mediterranean Quarterly,* Vol. 21, No. 1, 2010; Larrabee, S.F., Turkey's New Geopolitcs, *Survival*, Vol. 52, No. 2, 2010 in Lesage & Kacar, op.cit., p.130.

In this regard, today it is even more important for Turkey to enhance its science diplomacy activities in the world since science diplomacy is a useful way both for developing and strengthening international collaborations worldwide and being a global player with an impact in the world scene.

Turkey is a rising and emerging world economy and has gained a new momentum with its Science Diplomacy activities. In fact there are already "diplomacy for science" activities of Turkey all around the world with its researchers and international research cooperation activities at all levels. However it should be institutionalized and formalized now with the appointment and activities of its first science attaches. It is not too late, but not early as well. It needs a leap-forward in a sense.

In conclusion, based on the interviews with the experts and my research on this issue, the major aims of the Science Diplomacy activities of Turkey could be analyzed as below. More detailed analysis is provided at the "Conclusion" chapter of this study:

- Turkey is a center of attraction for its eastern countries in terms of research and education opportunities, such as Azerbaijan, Russia, Middle Eastern or Central Asian countries. The activities towards the LDCs or the Western Balkan countries are very valuable in this respect in terms of the "Diplomacy for Science" activities of Turkey. However it should also find ways to become more attractive to the Western countries in terms on research and education. We also need more experienced or post-doc researchers. Turkey is not yet attractive enough for them.
- The science diplomats of Turkey could focus on these issues, also which topics to be studied in those countries. They can negotiate about the tuition fees or accommodation opportunities for the Turkish students there. They can assist the Turkish students and researchers there in terms of their needs and in terms of furthering their international scientific network.
- Science diplomats should be experts at their fields of expertise and have at least PhD and an academic background/competence. They should stay

interconnected and active in their field of expertise. The knowledge of foreign language is also very necessary.

- Science diplomats should work on the priority scientific areas for Turkey in line with the needs of Turkey. This could be the priority areas defined by the BTYK.
- Short term appointments would be more effective. U.S. Embassy Science Envoys program is a good model for example.
- Domestic and foreign researchers in Turkey who have PhD degree are not sufficient. Turkey should leap forward towards developing or export-based industrial infrastructure, such as high-tech war planes, cyber technologies…etc.
- "Brain circulation" activities, such as the Destination Turkey Workshops are very important in this regard. It should be continued not only in the USA, but also in Europe and maybe in some developed Asian countries as well where there is a big diaspora of Turkish scientists.

Turkey's regional role in terms of Science Diplomacy is difficult. It prevents Turkey as a co-player in Science Diplomacy sometimes. Its aim should be to increase connectedness with the international research system as well as international research flows.

At this point, as a starting point it is important to have science attaches of Turkey in the representations of the developed countries abroad, such as the USA, Germany, Japan, Korea…etc. as well as the permanent representations of important international organizations that have a R&D function, such as the UNESCO, NATO and the OECD. By this way, Turkey could build on its already existing international scientific and technological cooperation with these countries, as exemplified in the case studies of the USA and Germany. Taken the good practice examples of Science Diplomacy systems around the world, Turkey should build its own model of Science

Diplomacy based on its strengths and needs. It should be the endgame of Turkey to improve its economic and political status in the world by using Science Diplomacy.

CHAPTER 7

CONCLUSION

7.1 Summary

The global challenges, such as climate change, infectious diseases, famines, migration, nuclear non-proliferation or terrorism necessitate international scientific and technological cooperation in order to tackle the multi-layered problems associated with these challenges.[347] These global challenges have scientific dimensions and countries need to cooperate to solve them. This requires the use of different foreign policy tools and methods.

At this stage, the concept of "Science Diplomacy" gained importance and popularity in the global politics, which means developing international scientific and technological (S&T) cooperation to tackle these global challenges that require global cooperation to find scientific solutions.

It was first developed in the United States as a concept and used widely in the Anglo-saxon world. Science diplomacy was defined as "the use and application of science cooperation to help build bridges and enhance relationships between and amongst societies, with a particular interest in working in areas where there might not be other mechanisms for engagement at an official level."[348]

[347] Flink, T., Schreiterer, U., Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches, *Science and Public Diplomacy*, 37(9), p.665, (2010).

[348] *Science Diplomacy for France Report*, French Ministry of Foreign Affairs, France, 2013, p.3.

Today it is widely used both in the Western countries, such as the USA, the UK, Germany, France…etc. as well as non-Western countries, such as Japan, China, Korea and many other developing countries. Many countries have their science diplomats around the world either in their Embassies or represented in certain international organizations. They aim to develop international S&T cooperation with the countries they are located in or access to new scientific resources and technologies.

Naturally, in today's global world, Science Diplomacy is not conducted only through official channels or science diplomats. There is a natural channel of cooperation among the scientists from many different disciplines all around the world. They also act as "science diplomats" of the countries they represent in a sense since they facilitate developing international S&T cooperation among countries.

For the sake of this work, science diplomacy activities and systems of different countries, namely Turkey, the USA and Germany are analyzed from the "Diplomacy for Science" perspective, meaning building international scientific and technological collaborations.

Science can moreover play a bridging role between the countries, which have weak political relations through their scientists. It means the usage in science as a tool of diplomacy for the sake of developing better relations among countries. In the long run, this would have a spillover effect through interactive learning.

Science is considered as a neutral area and has no nationality. In this respect, it is relatively easier to develop international cooperation through science rather than in political or military relations for instance. There is a "common interest" for all in the field of science in a sense.

In this PhD Dissertation, the main focus is the place of science diplomacy in the future international role of Turkey and what can be learned from other country examples that are advanced in their science diplomacy system and activities.

In terms of the contribution of this thesis to the literature, this PhD Dissertation is considered to be one of the first academic studies at the PhD level on the topic of Science Diplomacy in Turkey. It is a new concept both for Turkey and the world and in this regard there are not many written resources on this topic.

One of the main contributions of this study is the analysis of the Science Diplomacy concept in a limited literature from the Turkish perspective as a "late-comer" as stated in the beginning.

It is also a novel study in analyzing the concept of Science Diplomacy from the perspective of mainstream International Relations theories.

The major hypotheses in the beginning of this study were:

- Realist paradigm seems to be an appropriate framework for the analysis of Science Diplomacy concept.
- Turkey needs to give priority and enhance its Science Diplomacy activities to be a global player in the world.
- Science diplomacy is mainly used as a tool for influence and control in the Western models, such as Germany or USA.

At the end of this study, it can be argued that:

- Realism is an appropriate framework to analyze the Science Diplomacy concept, since it is mainly an inter-state activity and the decisions are given at the governmental level where the national interests are at stake.
- It is important for Turkey to develop its Science Diplomacy system and activities at the best standards in order to be a global player in the world.
- In the Western country examples that were analyzed in the frame of this study, namely the USA and Germany, Science Diplomacy is primarily used

to increase their influence and access to the countries that are priorities for them.

7.2 Analysis

Science Diplomacy has three main goals in essence as explained before; namely:

1. To reach researchers, research results and resources in order to develop national innovation capacity and competitiveness; (ACCESS)
2. To attract best students, researchers and firms in the world by presenting the successes and international collaborations of a specific country in R&D; (PROMOTION)
3. To influence the public opinion, policymakers and leaders of other countries by science diplomacy and its soft power. (INFLUENCE)

As analyzed in the previous chapters, different countries use Science Diplomacy for different purposes in line with their national interests and country priorities. Some examples would be given.

The first example of Science Diplomacy system that was analyzed for the sake of this dissertation is the USA. The U.S. has a relatively long tradition of Science Diplomacy. However, science and technology system in the USA is very diversified and decentralized in a sense. Its advantage is in its flexibility and there are many funding opportunities. Its disadvantage is a lack of unique national S&T policy, except the White House's OSTP.[349] The White House Office of Science and Technology Policy (OSTP) is mainly responsible for the coordination of the science and technology activities.

[349] Meeting with Dr. Carmen Huber, Head of NSF Europe Office, 04.09.2013, Paris.

Science diplomacy in terms of advancing international scientific and technological partnerships (namely "Diplomacy for Science") is practiced for a relatively long period of time with different policy tools, such as bilateral agreements, visits, fellowship programs…etc. by the U.S. government.
It has used effectively the power of science in diplomacy, especially after the World War II, be it in the case of the Soviet Union in the Cold War period or in the cases such as the diplomatic relations with China or North Korea.

It is quite obvious from the abovementioned reports and the individual interviews that are made that the U.S. needs to advance its Science Diplomacy activities in the third countries and use the power of science in order to maintain its relatively strong position at the global level. This reveals the dominance of the Realist approach in the Science Diplomacy activities of the U.S.

Although the U.S. Science Envoys program, which aimed to develop the relations between the U.S. and Muslim majority countries in the Middle East through S&T, started as a very brilliant idea in 2009 and an excellent example of Science Diplomacy, it did not bear the expected results yet in a sense, since it was not backed up with necessary funding.

This importance given to the Science Diplomacy activities of the U.S. was also reflected in the changes or reforms in the S&T ecosystem of the U.S., such as the formation of the position of Assistant Secretary of State for Oceans, International and Environmental Affairs (OES) in 1974 by the U.S. Congress or the establishment of the STAS position in the beginning of the 21st century.

They also have some good examples of programs to develop their system of Science Diplomacy, which Turkey could also make use of in establishing its Science Diplomacy system. "U.S. embassy science attaché program" (U.S. Department of State's Embassy Science Fellows program) is one of these good examples, where the

U.S. diplomatic system could benefit from the experience of the scientists and experts in different fields of science.

There are also some other programs, such as the White House's Science Envoy Program of 2009. The Science and Technology Policy Fellowships, the American Association for the Advancement of Science (AAAS) could also be counted among them.

The U.S. agencies responsible for the S&T policy structure and structuring of its Science Diplomacy system make use of different tools effectively, such as formal bilateral S&T cooperation agreements; promotion and support of S&T entrepreneurs and innovators; exchange of scientists and students; organization of various workshops, conferences, and meetings; public-private partnerships and so on. They also cooperate with some non-governmental organizations, such as the AAAS or the U.S. Civilian Research and Development Foundation (CRDF) in this process.

As a result, Science Diplomacy activities of the U.S. are mostly tools of strengthening U.S. presence in the world and developing its diplomatic relations through science, so it is mainly "Science for Diplomacy". It has a long history of Science Diplomacy and leading many discussions on this topic today. However the S&T expertise among the Department of State (DoS) personnel as well as their coverage worldwide needs to be developed further. It is an important example for Turkey since the U.S. is one of the priority countries that Turkey is planning to send its first science attachés.

Another example of Science Diplomacy system covered in this dissertation is the German system. The science diplomacy activities in Germany are coordinated mainly by the German Federal Ministry of Education and Research (BMBF) and the German Federal Foreign Office together. In this system, worldwide famous research institutions of Germany, such as the Fraunhofer, Max Planck, DAAD, DFG…etc.

play a significant role with their research network worlwide, especially for the "diplomacy for science" activities of Germany.

Apart from that Germany has an active network of science diplomats in the countries of critical importance in terms of the scientific and technological cooperation and their resources.

In the current science and technology system of Germany, there are certain problems of coordination, especially between the BMBF and the German Federal Foreign Office as observed from certain articles and the individual interviews.

In the Internationalization Strategy of 2008 that was developed by the BMBF, topics such as the brain circulation; attracting the best brains to Germany; starting joint research and education programs; as well as cooperation with the developing countries in order to tackle the global challenges gain importance. Also all the research alumni of Germany are seen as the scientific representatives of Germany in their own countries. Taken all these factors together, the contribution of this Strategy to the "science for diplomacy" and "diplomacy of science" activities of Germany is clear. The Action Plan that is published recently in October 2014 and it is expected to be an important document in terms of what has been achieved in concrete terms during the past 4-5 years of the Strategy and what is expected to be achieved during the following years.

In terms of the so-called *Aussenwissenschaftspolitik* Strategy of Germany, its contribution to the Science Diplomacy activities of Germany and its concrete implications seem to be rather unclear for now although the German Houses for Science and Innovation (DWIH) like structures are good results of this strategy. It needs to be clarified and explained more precisely to the public.

Both of these strategies are still in progress as of 2014. They need to have more concrete steps and results.

Apart from that German Federal Foreign Office established a structure like the "Swissnex" network of Switzerland abroad in New York, Moscow, New Delhi, Sao Paulo and Tokyo and they are named as the "German House for Research and Innovation" (Deutsches Wissenschafts und Innovationshaus-DWIH). DWIH is very interesting and unique structures and could be a good example for Turkey. They host different German research institutions in the country they are present.

German Academic Exchange Service (Deutscher Akademischer Austausch Dienst-DAAD) and Alexander von Humboldt Foundation (AvH) have an increased support to the international mobility of the young researchers, which is an important component of the Science Diplomacy activities of Germany. These researchers work as science diplomats of Germany in a sense and they have a bridging role between the civil society and academia.

Conservatives and Social Democrats in Germany made an "Agreement of Coalition" in order to raise foreign students up to three times. Now it is 200.000 foreign students (by 2014), in 2018 it is aimed to increase the number of foreign students up to 350.000.

The science diplomacy policies of Germany are very much related to the internal politics and political conjuncture in Germany. It is also in line with the research policies of Germany in the frame of the European Union (EU) and European Research Area (ERA). It has also been related to the economic developments worldwide as it is understood from the interviews made with the experts and officials from the German institutions that are influential players in the German science diplomacy system.

Their main instruments of German Science Diplomacy activities are:

- Mobility and exchange of students and researchers through either short-term or long-term scholarships

- Stable STI cooperation between German and foreign research institutes and universities
- Representation of German education and research landscape worldwide
- Use of German Alumni network worldwide
- Development of German as a foreign as well as scientific language

In the interviews with the individual German research institutions, it was also stated that:

A new demographic situation emerged in Germany around five years ago also with the competition resulted from the globalization. There is a need for qualified labor from different countries that is a crucial motivation behind the Science Diplomacy activities and strategies of Germany.

The countries of international S&T cooperation of the German research institutions as well as science attaches are selected generally on the basis of:

- To work with the best researchers in the world
- To solve the problems and grand challenges at the global level (in energy, health...etc.)

All in all, scientific and technological relations between Turkey and Germany have gained importance in the recent years, especially with the Turkish-German Year of Science 2014, which was analyzed more deeply in the Turkey Chapter.

7.3 Policy Recommendations

In April 2012, a Protocol between the Turkish Ministry of Foreign Affairs and the Ministry of Science, Industry and Technology was signed in order to develop the science diplomacy activities of Turkey. It is also planned to send science diplomats to Los Angeles, London, Beijing, Seoul, Moscow and India to extend the science

diplomacy activities of Turkey all over the world. The first countries of appointment would be Germany and the USA.

As stated in the Official Gazette of Turkey dated 07/02/2013 with 28552 number; diplomatic representations were allocated at these five priority countries, namely the USA, Germany, China, South Korea and Japan under the Science and Technology Counsellor cadre of the foreign representation of the Ministry of Science, Industry and Technology of Turkey.
Accordingly, the following duties were assigned to the Science and Technology Counsellors of Turkey:

- Execution of the science diplomacy activities of the foreign representation of the Ministry of Science, Industry and Technology;
- Follow-up, reporting and evaluation of the scientific, technological and industrial activities of the country of appointment and informing the Ministry about their results;
- Follow-up of the scientific, technological and industrial policies in foreign scientific and technical academies, at industrial and governmental institutions and representation of Turkey in the areas of science and technology;
- Advising the Ambassador in scientific and technical subjects;
- Analysis of the university-industry partnership and technology transfer mechanisms of that countries and their applicability to our country as well as developing appropriate projects for our country;
- Suggestion of new cooperation models for our country in the priority areas and playing an active role in the implementation phase;
- Providing service as an information center in the form of one-stop office in the areas of scientific, technological and industrial activities, investment opportunities and incentives in our country;
- Informing the Turkish scientists, researchers and entrepreneurs abroad about the entrepreneurship, innovation, R&D and scientific support programs of our country and assisting them for the applications to be made to the Ministry;

- Building cooperation and communication opportunities among the technologically leading and market leader firms of those countries and the institutions and firms of the same sector in our country;
- Assisting the exchange of scientific knowledge and scientists;
- Informing the counterpart organizations at our country about the scientific programs and activities of that country and ensuring their participation;
- Organization of events that bring together foreign and Turkish scientists in common thematic areas with the aim of developing joint project development culture;
- Monitoring and evaluation of the decisions taken at the meetings of permanent joint commission, memorandums of understanding, protocols and bilateral agreements that are signed between two countries in the areas of science, industry and technology;
- Follow-up of those countries' relations with other countries and making proposals in terms of the opportunities provided in the areas of science, industry and technology;
- Fulfilling other duties given by the affiliated foreign mission (representative) and execution of their duties in this regard in an effective, fast and efficient way.

These are the duties officially assigned by the Ministry of Science, Industry and Technology to the Turkish science diplomats.

It may be too ambitious in the beginning to expect all of these duties to be fulfilled by the Turkish science diplomats since Turkey is a country in the beginning phase of establishing its Science Diplomacy system. Therefore a good time planning should be made in line with the aims of Turkey in establishing its science diplomacy network.

Also these duties would depend on the country of appointment and the R&D ecosystem of that country. For instance, in some of these countries, development of

new scientific cooperation models or agreements could be necessary. Whereas in some other countries, like the USA, there is an already existing scientific base between Turkey and the USA. Therefore the role of science diplomats could be developing further this scientific basis or promotion of the Turkish R&D system there.

More detailed policy recommendations for Turkey are presented below.

What is the policy aim in this framework?

The policy aim of Turkey is the establishment of a full-fledged Turkish Science Diplomacy system and network in the target countries, namely the USA, Germany, Japan, Korea and China.

What could be the possible recommendations for Turkey in terms of:

1) ACCESS, meaning reaching researchers and resources to develop national innovation capacity
2) PROMOTION, meaning attracting the best brains and firms in the world
3) INFLUENCE, meaning influencing the public opinion as well as international policymakers

Priorities for Turkish Science Diplomacy activities could be:

ACCESS

- Countries of strategic importance in terms of S&T cooperation for Turkey
- Countries with bilateral S&T cooperation agreements and active bilateral programs
- Developing countries, like the Least Developed Countries (LDCs)
- Developed countries

PROMOTION

- Promotion of the Turkish R&D ecosystem, like the Destination Turkey event or the activities targeting the LDCs
- Cooperation through the Turkish universities and research centers
- Representation of the Turkish ecosystem in the Turkish Embassies around the world
- Representation in the international organizations, such as the OECD, UNESCO or EC
- Attracting the R&D active firms especially in high-tech
- Making frontier research through collaboration

INFLUENCE

- Influence through the neighbouring regions, such as the FP7 INCO projects
- Influence through the use of science in diplomacy
- Influence through the strengthening Turkish research ecosystem

In this context, the policy recommendations at the micro, meso and macro levels and their possible tools are presented below.

By micro level, it is meant the short-term Science Diplomacy activities of Turkey inside the country at the agent-level. The framework would be mainly "Diplomacy for Science" activities of Turkey.

By meso level, it is meant the middle-term Science Diplomacy activities of Turkey, especially at the national level. The framework would be mainly "Diplomacy for Science" and "Science in Diplomacy" activities of Turkey.

By macro level, it is meant the long-term, international and more policy-oriented activities of Turkey abroad. Especially the "Diplomacy for Science" as well as the "Science for Diplomacy" activities could be mentioned here.

In this context, first of all, the criterion for the selection of the Turkish science diplomats (either attachés or counsellors in line with their place of appointment) should be set. Looking at the other country examples from the world, such as the USA, Germany or France and also the interviews made with the experts, the following criterion could be set:

- They could be either academicians that are experts in a scientific field that is of common interest to Turkey and the country of appointment or they could be bureaucrats that have expertise in the scientific issues. For some of the countries, such as the USA, more than one Turkish science diplomats could be appointed from both sectors, namely academy and government as well as private sector and science-based industries.
- They should have an expertise in a specific scientific field and could have PhD and an academic background/competence preferably. They should stay interconnected and active in their field of expertise. The knowledge of foreign language is also very necessary.
- They should work on the priority scientific areas for Turkey in line with the needs of Turkey. This could be the priority areas defined by the Supreme Council for Science and Technology and the National Science, Technology and Innovation system.
- Short term appointments would be more effective. US Embassy Science Envoys program is a good model for example.
- Their duties and responsibilities in the country of appointment should be defined clearly.

Following the selection process of the appropriate science diplomats from Turkey to the selected priority countries (namely the USA, Germany, Korea, China and Japan), it would be beneficial to give them some kind of diplomatic training by the Ministry of Foreign Affairs and related agencies. There could also be a training given on the subject of “Science Diplomacy” to the career diplomats in the related Embassies of

Turkey where the science diplomats would be appointed. This is a practical example of "Science in Diplomacy". This training could be given by the Ministry of Science, Industry and Technology or TÜBİTAK.

After the appointment process, it could be advised to have a system of coordination among the Turkish science diplomats in different countries. This coordination could be managed by the Ministry of Foreign Affairs and the Ministry of Science, Industry and Technology. They could organize regular meetings once or twice every year to bring these science diplomats together and share their experiences.

There could also be regular meetings organized with the science diplomats of foreign countries in Turkey, such as the USA or Germany. This would be an appropriate platform for the sharing of best practices as well as challenges faced as science diplomats of respective countries.

There could also be short-term appointment of the new Turkish diplomats to the centers like the Science Diplomacy Center of the AAAS in the USA or the Royal Society in the UK as well as ministries of foreign countries that are experienced in the field of science diplomacy. There may be practice sharing among them.

Turkish science diplomats should also work in coordination with the education diplomats sent by the Ministry of Education in Turkey in the related diplomatic representations of Turkey abroad. In the long run, it would also be beneficial to have diplomats from the Higher Education sector of Turkey since the Higher Education and Science are highly related with each other and could not be separated easily as could be seen in other country examples such as France and Germany.

Of course, there would be different priorities of action in different countries of appointment based on the priorities and needs of these countries. However, some general policy recommendations applicable to these places of appointments would be presented below.

Turkey should develop a Strategy for its Science Diplomacy activities in the middle term in coordination with the related agencies in the Turkish STI system. This strategy could include a roadmap for the future Science Diplomacy activities of Turkey.

In the related country of appointment, one of the first priorities should be the "access to resources in the field of science and technology". It could be realized through the representation at the Turkish Embassies as well as Permanent Representations, such as the OECD, UNESCO or NATO. Another important tool could be the development of new bilateral scientific and technological agreements with the respective scientific agencies of that country and activation of the existing bilateral scientific and technological cooperation agreements. Delegation visits from Turkey and scientific meetings could also be organized in this respect.

Another policy area should be the "promotion of Turkish R&D ecosystem" in the country of appointment. It could be done through the promotion of good Turkish universities or innovative Turkish firms abroad by roadshows or science fairs.

Turkey is a center of attraction for the countries on its East in terms of research and education opportunities, such as Azerbaijan, Russia, Middle Eastern, North African or Central Asian countries. The activities towards the LDCs or the Western Balkan countries are very valuable in this respect in terms of the "Diplomacy for Science" activities of Turkey. However, it should also become more attractive to the Western countries in terms of research and education. We also need more experienced or post-doc researchers. Turkey is not yet attractive enough for them.

"Brain circulation" activities, such as the Destination Turkey Workshops are very important in this regard. It should be continued not only in the USA, but also in Europe and maybe in some developed Asian countries as well where there is a big diaspora of Turkish scientists. There could also be organized brokerage and networking events between the scientists of Turkey and related country of

appointment in the scientific areas of common interest. TÜBİTAK has funding opportunities for supporting the organization of such events.

In the long-term, Turkey should use its science diplomacy network in the world to have "influence through science diplomacy". In this respect, joint research centers or labs between Turkey and target countries could be established abroad. For instance, CNRS (France) has such joint research centers abroad and they make effective use of these research institutions in their science diplomacy activities.

It would also be beneficial to have a structure like the Swissnex or German Houses of Science and Innovation (DWIH) for Turkey. The pilot countries could be these five countries that are selected as the priority countries for the appointment of the first science diplomats of Turkey, namely the USA, Germany, Korea, China and Japan.

Of course, the ongoing science diplomacy activities of Turkey, conducted by the Ministry of Science, Industry and Technology, TÜBİTAK, TÜBA as well as the Turkish universities and research centers shall continue.

Table 2 Policy Recommendations and Their Tools

	Micro Level (agent level)	**Meso Level (national level)**	**Macro Level (international level)**
Policy Recommendations	- **Criterion for the selection of the Turkish science diplomats** - **Selection of the priority countries**	- **Diplomatic training to the science diplomats** - **Learning from best practies** - **Development of a SD Strategy** -	- **Access to ST resources** - **Promotion of Turkish RD ecosystem** - **Influence through SD** -
Tools	- Academy and/or bureaucracy - Country needs and priorities - Education - Expertise in the field of S&T - Bilateral cooperation countries - Developing countries - SCST priorities	- MFA or BSTB - International examples - Bilateral meetings with their counterparts - Coordination among the Turkish SDs	- Representation at the Turkish Embassies - ST cooperation agreements - Destination Turkey events - Organization of brokerage events - FP7 INCO projects - Joint research centers/labs - Swissnex or DWIH kind-of structures -

7.4 A Roadmap for the Science Diplomacy Activities of Turkey

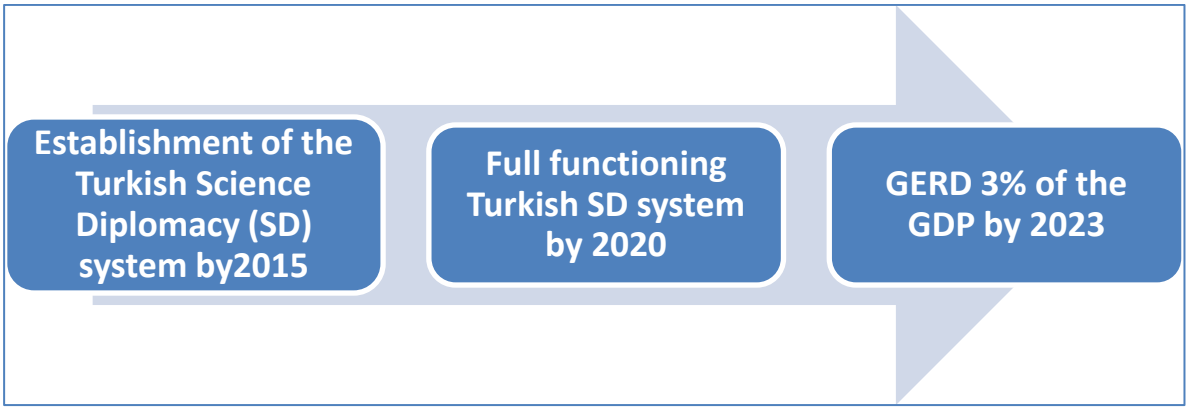

Figure 11 Roadmap for the Science Diplomacy Activities of Turkey

Turkish government has a goal that the Gross Domestic Expenditure on R&D (GERD) should reach 3% of the Gross Domestic Product (GDP) by 2023. In this regard, if Turkey could establish its Science Diplomacy system, which has already started in 2015 and could have a full functioning system around the world by 2020, this could help to reach the target of 3% by enhancing its STI capacity.

7.5 Suggestions and Limitations

The policy recommendations provided above could be a model for the countries that are so-called "new-comers" to the Science Diplomacy system like Turkey. In the countries like Turkey, activities of Science Diplomacy are very much related with the development goals and they should complement each other.

This study is one of the first academic studies on the Science Diplomacy concept and system of Turkey at the PhD level in Turkey. It could be a starting point in this respect and could be carried forward in the future.

The limitations of this study were mainly the lack of written literature on the case of Turkish science diplomacy system and activities since it is a new concept for Turkey.

It is a new concept, in fact, not only for Turkey, but to the world as well. There is very limited literature on the subject of Science Diplomacy in the world.

This study could be developed further when the science diplomacy system in Turkey is fully constructed and functioning and when the science diplomats are appointed. It could be enriched by making interviews with the science diplomats of Turkey after some time of their appointment and realization of certain events, activities in their countries of appointment.

After the full functioning of the system, a network analysis can be carried as a suggestion for future research.

Turkey's regional role in terms of Science Diplomacy is difficult since it is located in a dangerous neighbourhood with many countries in conflictual situations. It prevents Turkey as a co-player in Science Diplomacy sometimes. Its aim should be to increase connectedness with the international research system as well as international research flows.

At this point, as a starting point it is important to have science attaches of Turkey in the representations of the developed countries abroad, such as the USA, Germany, Japan, Korea…etc. as well as the Permanent Representations of important international organizations that have a R&D function, such as the UNESCO, WB and the OECD. By this way, Turkey could build on its already existing international scientific and technological cooperation with these countries, as exemplified in the case studies of the USA and Germany. Based on the good practice examples of Science Diplomacy systems around the world, Turkey should build its own model of Science Diplomacy based on its strengths and needs. It should be the endgame of Turkey to improve its economic and political status in the world through using Science Diplomacy.

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APPENDIX I: TURKISH SUMMARY

GİRİŞ

Günümüz küresel ve çok kutuplu uluslararası sisteminde geleneksel diplomasi yöntemlerinin yanı sıra, farklı diplomasi yöntemleri de gelişmiş ve gelişmekte olan ülkeler tarafından tercih edilmektedir. Bilim diplomasisi de uluslararası ortak sorunlara ortak çözüm arayışları çerçevesinde, bilgi temelli uluslararası bilimsel ve teknolojik ortaklıklara dayalı önemli bir dış politika aracı olarak ortaya çıkmaktadır. Yumuşak güç aracı olarak da kullanılan bilim diplomasisinin "diplomaside bilim", "bilim için diplomasi" ve "diplomasi için bilim" gibi bileşenleri bulunmaktadır.

Yirmi birinci yüzyılda, iklim değişikliği, gıda güvenliği, nükleer silahlanma gibi birçok önemli küresel sorunun bilimsel bir boyutu da bulunmaktadır ve hiçbir ülke tek başına bu sorunlarla mücadele etme gücüne sahip değildir. Bu da dış politikada farklı araçlar ve yöntemler kullanmayı gerekli kılmaktadır.

Bilim diplomasisi kavramı aslında yeni bir kavram değildir. Örneğin, İngiltere'de bu alanda hizmet veren ve 18.yüzyılda kurulan Royal Society (RS) isimli kuruluş, tarih boyunca askeri ve politik sorunların çözümünde bilimi bir araç olarak kullanmıştır.

İngiltere'nin yurt dışındaki ilk resmi bilimsel temsilcisi Sir Charles Galton Darwin, 1941 yılında Vaşington'da bulunan Merkezi Bilim Ofisinin Direktörü olma ünvanıyla atanmış ve Amerika Birleşik Devletleri (ABD)'nde bulunan araştırma kuruluşlarıyla bilimsel bilgi paylaşımı ve işbirliği alanlarında görev yapmıştır.

Bilim diplomasisinin temelde üç ana hedefi vardır:[350]

1) Araştırmacılara, araştırma sonuçlarına ve kaynaklarına, ulusal yenilik kapasitesi ve rekabet edebilirliğini geliştirmek amacıyla erişim sağlamak;
2) Belirli bir ülkenin Ar-Ge'deki başarılarını ve uluslararası işbirliklerini tanıtmak ve bu yolla dünyadaki en iyi öğrencileri, araştırmaları ve firmaları çekmek;
3) Bilim diplomasisi yoluyla ve yumuşak gücünü kullanarak, diğer ülkelerin kamuoyunu, politika yapıcılarını ve liderlerini etkilemek.

Bu bağlamda, bilim diplomasisinin üç boyutu bulunmaktadır:[351]

- Diplomaside Bilim (Science in Diplomacy)

Dış politika amaçlarına bilimsel boyutun eklenmesini ifade eder. Bunun en güzel örneklerinden biri, Hükümetlerarası İklim Değişikliği Paneli (Intergovermental Panel on Climate Change-IPCC)'dir. Bir diğer önemli örnek, Kanada, Danimarka, Norveç, İsveç, Rusya ve ABD'den bilim insanlarının, Kuzey Kutbu ile ilgili ilk detaylı atlası hazırlamalarıdır. Bu çalışma, Kuzey Kutbunda yaşanan egemenlik çatışmalarına son vermek için önemli bir adımdır.

- Bilim için Diplomasi (Diplomacy for Science)

Uluslararası bilimsel işbirliğinin teşvik edilmesini ifade eder. Uluslararası Termonükleer Deneysel Reaktörü (International Thermonuclear Experimental Reactor-ITER) ve Büyük Hadron Çarpıştırıcısı (Large Hadron Collider-LHC) gibi büyük çaplı uluslararası projeler bu yaklaşıma örnek olarak verilebilir.

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[350] Flink, T., Schreiterer, U., Science diplomacy at the intersection of S&T policies and foreign affairs: toward a typology of national approaches, *Science and Public Diplomacy,* 37(9), s.669, 2010.

[351] *The Royal Society Report*, New frontiers in science diplomacy: Navigating the changing balance of power, London, 2010, s.v-vi.

- Diplomasi için Bilim (Science for Diplomacy)

Ülkelerarası ilişkilerin geliştirilmesi için bilimsel işbirliğinin kullanılmasını ifade eder. Diplomasi için bilim şu tarz faaliyetleri içermektedir:

- Bilimsel işbirliği anlaşmaları
- Avrupa Nükleer Araştırma Merkezi (European Organisation for Nuclear Research-CERN) benzeri uluslararası kuruluşlar
- Eğitim bursları (Royal Society tarafından verilen Newton Uluslararası Bursları gibi)
- Diplomaside ikinci yol ("Track two" diplomacy): resmi müzakerelerin dışında, akademisyenlerin ve bilim insanlarının arabulucu olarak müzakerelerde yer almasıdır. Soğuk Savaş yıllarında, siyasi liderlerin dışında, ulusal akademiler arasında düzenlenen toplantılar bu tür diplomasi faaliyetlerine örnek olarak gösterilebilir.
- Bilim festivalleri ve sergileri

ARKAPLAN: ABD ve ALMANYA ÖRNEKLERİ

ABD'nin bilim ve teknoloji sisteminde, bilimsel politikaların farklı yönlerinin belirlenmesinden sorumlu birçok devlet kurumu, temel araştırma merkezleri ve özel kuruluşlar bulunmaktadır. Bilim ve teknoloji faaliyetlerinin genel eşgüdümünden, Beyaz Saray Bilim ve Teknoloji Politikası Ofisi sorumludur. Bunun dışında, ABD'de bilim bakanlığı eşdeğerinde bir kurum bulunmamaktadır.

Böyle bir yapıda bilimsel dış politikanın tek bir elden yürütülmesi mümkün olmamaktadır. Bu açıdan, ABD'de uluslararası bilim ve teknoloji politikaları oldukça dağılmış durumdadır ve her kurum kendi öncelikleri doğrultusunda politikalar oluşturmaktadır.

ABD Dışişleri Bakanlığı'nın uluslararası bilimsel işbirliklerini destekleyen fonları bulunmadığı için, ABD'nin uluslararası bilimsel politikalarının oluşturulmasında çok fazla etkisi bulunmamaktadır. Bu da, özellikle son dönemde ABD'nin Bilim Diplomasisinde yumuşak gücünü kullanabilmesi konusunda bir engel teşkil etmektedir.

ABD'nin bilim diplomasisi faaliyetleri, II. Dünya Savaşı sonrası yıllara kadar uzanmaktadır ve bilim için diplomasi (ITER, CERN gibi), diplomasi için bilim (ABD bilim elçileri, GIST girişimi, ikili anlaşmalar gibi) ve diplomaside bilimin (Jefferson bursları) tüm örneklerine rastlamak mümkündür.

Uluslararası bilim ve teknoloji işbirliklerini geliştirmek anlamındaki Bilim Diplomasisi faaliyetleri ("Bilim için Diplomasi"), ABD hükümeti tarafından, ikili anlaşmalar, ziyaretler, burs programları gibi politika araçları yoluyla uzun yıllardır yürütülmektedir.

Dünyada bilim diplomasisi faaliyetleri açısından bir dönüm noktası teşkil eden ABD Başkanı Obama'nın Kahire konuşması, ABD'nin son dönemdeki bilim diplomasisi faaliyetleri ve amaçları açısından da önemli mesajlar taşımaktadır. Burada özellikle Müslüman nüfusun çoğunlukta olduğu ülkelerle bilimsel ve teknolojik işbirliği yolu ile yapıcı bir politika diyalogunun geliştirilmek istenmesi ve bölgede barışçıl bir yöntem olan bilim diplomasisi yoluyla istikrar sağlanması amacı ABD'nin bir yumuşak güç aracı olarak "diplomasi için bilim"i kullanmasının en açık örneklerindendir.

ABD'nin Bilim Elçileri programı, her ne kadar 2009 yılında ABD ile Orta Doğu'da Müslüman nüfusun yoğunlukta olduğu ülkeler arasındaki ilişkileri bilim ve teknoloji yoluyla geliştirmek için parlak bir fikir ve bilim diplomasisinin güzel bir örneği olarak ortaya çıksa da, fonlama yetersizliği sebebiyle istenilen etkiye ulaşamamıştır.

ABD'nin bilim diplomasisi faaliyetlerine ilişkin raporlar incelendiğinde ve yapılan görüşmelere bakıldığında, ABD'nin küresel düzeyde görece güçlü konumunu muhafaza edebilmesi için üçüncü ülkelerde bilim diplomasisi faaliyetlerini geliştirmesi ve bunun için de bilimin gücünü kullanması gerektiği düşünülmektedir. ABD, özellikle II. Dünya Savaşından sonra, Soğuk Savaş döneminde örneğin Sovyetler Birliği ile olan ilişkilerinde ya da Çin ve Kuzey Kore gibi ülkelerle olan diplomatik ilişkilerinde bilim diplomasisinin gücünden faydalanmıştır.

ABD'nin Bilim Diplomasisi faaliyetlerine verdiği önem, bilim ve teknoloji sisteminde yaptığı değişiklik ve düzenlemelere de yansımıştır. Örneğin bu amaçla, 1974 yılında ABD Kongresi tarafından, Okyanuslar ve Uluslararası Çevre ve Bilimsel İşler Ofisi (OES) kurulmuştur. OES'in amacı, iklim değişikliği, yenilenebilir enerji, kaynak kıtlığı, kutup konuları, okyanuslar politikası, bulaşıcı hastalıklar, bilim ve teknoloji, uzay politikası gibi alanlarda ABD dış politika amaçlarını geliştirmek için çalışmalar yürütmektir. Aynı şekilde, 21. yüzyılın başında, Dışişleri Bakanı Bilim ve Teknoloji Danışmanı (STAS) pozisyonu oluşturulmuştur.

Bunların yanı sıra, bilim diplomasisi sistemlerini geliştirmek için bazı önemli programlar geliştirmişlerdir. ABD Dışişleri Bakanlığının, "Büyükelçilik Bilim Ataşeleri" programı buna güzel bir örnektir. Söz konusu program kapsamında, çeşitli alanlardaki bilim insanları ve uzmanlar belirli sürelerle ABD büyükelçiliklerinde görevlendirilmektedir. Böylece bu diplomatik sistemde, bilimsel bilginin yaygınlaşması sağlanmaktadır. Bu sistem, Türkiye gibi Bilim Diplomasisi sistemini yeni oluşturmakta olan ülkeler tarafından örnek alınabilir.

Ayrıca Beyaz Saray Bilim Elçileri Programı (2009) da bu programlara örnek olarak verilebilir. Bilim ve Teknoloji Politikası bursları ile Amerika Bilimi Geliştirme Vakfi (AAAS) programları da bunlar arasındadır.

ABD'de bilim ve teknoloji politikalarının ve bilim diplomasisi faaliyetlerinin geliştirilmesinden sorumlu kurumlar çeşitli politika araçlarını etkili bir şekilde kullanmaktadır. Bunlar arasında, ikili bilimsel ve teknolojik işbirliği anlaşmaları; bilim ve teknoloji alanlarında girişimcilerin desteklenmesi; öğrenci ve araştırmacı değişim programları; çalıştay, konferans ve çeşitli bilimsel toplantın organizasyonları ve kamu-özel işbirlikleri sayılabilir.

Ayrıca ABD Bilimi Geliştirme Vakfı (AAAS) ve ABD Sivil Araştırma ve Geliştirme Vakfı (CRDF) gibi bazı hükümet dışı kuruluşlarla da işbirliği yapmaktadırlar.

Sonuç olarak, ABD'nin bilim diplomasisi faaliyetleri, dünyada varlığını güçlendirmek ve bilim yoluyla diplomatik ilişkilerini geliştirmek için birer araçtır; yani daha çok "Diplomasi için Bilim" faaliyetlerine girmektedir. Bu da, uluslararası ilişkilerde Realist yaklaşıma bir örnektir. Bilim diplomasisi konusunda uzun bir geçmişe sahiptir ve bugün dünyada bilim diplomasisi konusunda birçok tartışmaya da önderlik etmektedir. Öte yandan, ABD Dışişleri Bakanlığı personelinin bilim ve teknoloji konularında uzmanlığının geliştirilmesine ihtiyaç vardır. Türkiye'nin ilk bilim diplomatlarını göndermek için öncelikli ülke olması sebebiyle ABD önemli bir örnektir.

Almanya'da ise, Alman hükümeti, 2008 yılında Uluslararasılaşma Stratejisini (Internationalisierungsstrategie) oluşturmuştur. Bu stratejiyi takiben, 2009 yılında Bilimsel Dış Politika (Aussenwissenschaftspolitik) stratejisi, Almanya Dışişleri Bakanlığı tarafından hayata geçirilmiştir.

Almanya Federal Eğitim ve Araştırma Bakanlığı (Bundesministerium für Bildung und Forschung-BMBF), kaynaklara erişim ve tanıtım konularını, Almanya'nın küresel bilim politikasının en önemli amaçlarından biri olarak görmektedir. BMBF, Almanya'da Ar-Ge ve Bilim Diplomasisi faaliyetleri için harcanan fonların neredeyse tamamından sorumludur ve politik anlamda da bu alanda etkin olmak istemektedir. Bu bağlamda, Almanya'da bilim diplomasisinin yürütülmesinden

sorumlu bir diğer önemli kuruluş olan Almanya Dışişleri Bakanlığı ile farklı kurumsal kültürlerden ve çıkarlardan dolayı, fikir düzeyinde çatışmalar yaşamaktadırlar.

Almanya'nın mevcut Bilim ve Teknoloji sistemi yapılanmasında da eşgüdüm konusunda zorluklar yaşanmaktadır. Özellikle BMBF ve Almanya Dışişleri Bakanlığı'nın eşgüdümde yaşadığı zorluklar, bilim diplomasisi faaliyetlerinin yürütülmesinde ve yukarıda adı geçen stratejilerin uygulanmasında da kendini göstermektedir.

Almanya'da bilim diplomasisi faaliyetlerini, Almanya Dışişleri Bakanlığı ve yoğunluk olarak Almanya Federal Eğitim ve Araştırma Bakanlığı (BMBF) koordine etmektedir. Bu sistemde, Fraunhofer, Max Planck, Helmholtz, DAAD gibi Almanya'nın önde gelen araştırma kuruluşları da tüm dünyadaki araştırma ağları ve merkezleriyle Almanya'nın özellikle "bilim için diplomasi" ve "diplomasi için bilim" faaliyetlerine önemli katkılar sağlamaktadır.

Bunun dışında, Almanya'nın tüm dünyada ve özellikle B ve T işbirlikleri ve kaynakları açısından kritik olan ülkelerde etkin çalışan bir bilim diplomatları ağı da mevcuttur.

Almanya'nın, 2008 yılında kabul edilen "Uluslararasılaşma Stratejisi"nde, "tersine beyin göçü", dünyadaki en iyi beyinlerin Almanya'ya çekilmesi, ortak eğitim ve araştırma programlarının başlatılması gibi amaçlar ön plana çıkmaktadır.[352] Burada Almanya'da öğrenim gören öğrencilerin ya da araştırmalarda bulunan bilim insanlarının da birer bilim elçisi olarak görülmesi önemli bir husustur. Tüm bu faktörler göz önünde bulundurulduğunda, bu stratejinin Almanya'nın "diplomasi için bilim" ve "bilim için diplomasi" faaliyetlerine olan katkısı açıktır. Almanya'nın

[352] Strengthening Germany's role in the global knowledge society: Strategy of the Federal Government for the Internationalization of Science and Research, BMBF, February 2008.

Uluslararasılaşma Stratejisi bağlamında, 2014 yılı sonunda yayımlanan Aksiyon Planı, bu stratejinin somut sonuçlarını göstermesi açısından önem arz etmektedir.
Almanya'nın Bilimsel Dış Politika stratejisinin, bilim diplomasisi faaliyetlerine somut katkısı henüz çok net olmamakla beraber, Almanya Bilim ve Yenilik Evleri (DWIH) gibi yapılar söz konusu stratejinin önemli somut çıktılarındandır.

Her iki strateji de 2014 yılı itibariyle gelişime açıktır. Somut adımları ve sonuçları beklenmektedir.

Almanya Dışişleri Bakanlığı, İsviçre'nin yurt dışında oluşturduğu "Swissnex" benzeri bir yapıyı, Alman Bilim ve Yenilik Evleri (DWIH) adı ile New York, Moskova, Yeni Delhi, Sao Paulo ve Tokyo gibi merkezlerde kurmuştur. DWIH, çok ilginç ve özgün bir yapıdır ve Türkiye için de güzel bir örnek teşkil edebilir. Bulundukları ülkelerde farklı Alman araştırma kurumlarına ev sahipliği yapmaktadırlar.

Almanya Akademik Değişim Servisi (DAAD) ve Alexander von Humboldt Vakfı, genç araştırmacıların uluslararası dolaşımına yönelik verdikleri destekleri artırmıştır ve bu Almanya'nın bilim diplomasisi faaliyetlerinin önemli bir boyutunu teşkil etmektedir. Bu araştırmacılar bir anlamda Almanya'nın bilim diplomatları gibi çalışmakta ve sivil toplum ile akademi arasında bir köprü görevi üstlenmektedir.

Almanya'daki muhafazakar partiler ile sosyal demokrat partiler bir koalisyon anlaşması yapmış ve Almanya'daki yabancı öğrencilerin sayısını üç katına çıkarmayı hedeflemiştir. 2014 yılı itibariyle, bu sayı 200.000'dir ve 2018 yılında yabancı öğrencilerin sayısının 350.000'e çıkartılması hedeflenmektedir.[353]
Almanya'daki bilim diplomasisi politikaları, Almanya'nın iç politikası ve siyasi durumu ile yakından ilgilidir. Aynı zamanda, Almanya'nın Avrupa Birliği ve Avrupa Araştırma Alanına yönelik bilim politikaları ile de bağlantılıdır. Yapılan

[353] Sn. Alexander Puk ile Toplantı, Almanya Dışişleri Bakanlığı, Berlin, 02.09.2014.

görüşmelerde, dünyadaki ekonomik gelişmelerin de Almanya'nın bilim diplomasisi faaliyetlerine etkisi olduğu anlaşılmaktadır.
Almanya'nın bilim diplomasisi faaliyetlerinde kullandığı temel araçlar şu şekildedir:

- Kısa ya da uzun süreli burslar yoluyla öğrenci ve araştırmacıların uluslararası dolaşımı
- Alman araştırma kurumları ve üniversiteleri ile yabancı araştırma kurumları arasında kalıcı bilim, teknoloji ve yenilik işbirlikleri
- Alman eğitim ve araştırma sisteminin dünya çapında temsili
- Alman mezun ağının dünya çapında kullanımı
- Almancanın bir yabancı dil ve bilim dili olarak geliştirilmesi

Ayrıca yapılan ikili görüşmelerde, Almanya'da özellikle son beş yıldır, küreselleşmeden kaynaklanan rekabetin de etkisiyle yeni bir demografik durumun ortaya çıktığı ve değişik ülkelerden kalifiye elemana ihtiyaç duyulduğu ifade edilmiştir.

Almanya'nın uluslararası bilim ve teknoloji işbirliği yaptığı ülkeler ve bilim diplomatları gönderdiği ülkeler genel olarak şu kriterlere göre belirlenmektedir:

- Dünyada en iyi araştırmacılarla çalışmak
- Enerji, sağlık gibi alanlarda, küresel düzeydeki problemlere ve zorluklara çözüm üretmek

Genel olarak bakıldığında, son yıllarda özellikle de 2014 yılında Türkiye-Almanya Bilim Yılı ile Türkiye ile Almanya arasındaki bilimsel ve teknolojik ilişkilerin geliştiği gözlenmektedir.

Ayrıca Almanya'nın bilim diplomasisi politikalarının da, realist yaklaşım ile uyumlu olduğu gözlenmektedir; çünkü bilim diplomasisi faaliyetleri ve stratejileri, devlet

eliyle yürütülmekte ve bu sistemin ana aktörü olan kuruluşlar da, devlet destekli araştırma kurumları olmaktadır.

Almanya'nın bilim diplomasisi faaliyetlerinin ana amaçlarından biri de, AB'de öncü konumunu ulusal çıkarları doğrultusunda güçlendirmektir.

TÜRKİYE'DE BİLİM DİPLOMASİSİ

Ülkemizin BTY vizyonunun gerçekleştirilmesinde, Ar-Ge ve yenilik sistemindeki temel dinamiklerin işlevselliğini artıracak stratejileri içeren ve 2011-2016 dönemini kapsayan Ulusal Bilim, Teknoloji ve Yenilik Stratejisi (UBTYS)'nde yatay eksende 6.Stratejik Amaç, "Ülkemizin Çıkarları Doğrultusunda Uluslararası BTY İşbirliklerinin Etkinleştirilmesi" olarak belirlenmiştir. Burada amaçlanan, uluslararası BTY işbirliklerinin ülkemizin çok taraflı taahhütleri de dikkate alınarak UBTYS 2011-2016 stratejik çerçevesini desteklemesidir. UBTYS 2011-2016 ile Türkiye'nin her zaman önemli olan uluslararası BTY faaliyetleri ilk defa bir strateji haline dönüşmüştür.

Bu stratejik amaç doğrultusunda, bilim diplomasisi faaliyetlerinin başlatılması ve yaygınlaştırılması da stratejilerden biridir.

Türkiye, 2014 yılı itibariyle Gayri Safi Yurtiçi Hasıla (GSYİH) sıralamasında dünyada 17. sıradadır ve yine 2014 yılında, 76 milyon nüfusuyla dünyada 18. sıradadır. Ekonomi ve nüfus sıralamasında en baştaki 20 ülkeden biridir.[354]

Ülkemiz, Asya, Avrupa ve Afrika kıtalarının kesişme noktasında konumlanmış bir ülke olarak, bu geniş coğrafyada, refah, güvenlik ve istikrarın artırılmasına katkıda

[354] http://stats.oecd.org/ Mart 2014.

bulunacak politikaları desteklemektedir. Türkiye, bu bölgede bir refah kuşağı oluşmasını hedeflemektedir.

Çeşitli problem ve çatışmalar nedeniyle, uzun yıllar gerçek olumlu potansiyelini yansıtamayan bu bölgede Türkiye, bölgesinde ve ötesinde, istikrar, güvenlik, karşılıklı ekonomik bağımlılık ve kültürel uyumun yaygınlaştırılması için dış politikasında komşularıyla "sıfır sorun" politikasını sürdürmektedir. Bu bağlamda, yıllar içinde Orta Doğu, Balkanlar ve Güney Kafkasya'daki komşularıyla ilişkilerini geliştirmiştir.
Ülkemiz dış politikadaki etkisini, bölgesinin ötesine taşımayı hedeflemektedir. Yükselen ekonomilerin, küresel düzende daha fazla söz sahibi olmasıyla ülkemiz de iktisadi kalkınmasıyla uyumlu olarak küresel barış, istikrar ve refahı sağlama çabalarına aktif katkı sağlamaktadır. G20, BM, NATO, AGİT, OECD gibi uluslararası platformlarda yapıcı rolünü sürdürürken, dünyanın çeşitli bölgelerinde, diplomatik temsilcilik sayısını arttırmaktadır.

Türkiye, Akdeniz, Karadeniz, Balkanlar, Orta Doğu, Kafkasya ve Orta Asya bölgelerinde bulunan birçok bölgesel kuruluşta aktif rol oynamaktadır. Türkiye'nin çok taraflı dış politikası, Afrika ve Latin Amerika'da açılan yeni büyükelçiliklerle de pekişmiştir.[355] Örneğin, 2009 yılında Afrika kıtasında, 12 büyükelçiliğe sahip olan Türkiye, 2014 yılında, bu sayıyı 39'a çıkarmıştır.[356]

Ayrıca NATO üyeliği ve AB aday ülkesi olması hasebiyle Batı güvenlik yapısının da bir parçasıdır. Aynı zamanda OECD kurucu üyelerindendir. Bunların yanı sıra, birçok uluslararası organizasyonda yapıcı üye konumundadır. Örneğin, BM Güvenlik

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[355] Aktay, Y., Politics at Home, Politics in the World. The Return of the Political in Turkish Foreign Policy, *Mediterranean Quarterly,* Vol. 21, No. 1, 2010; Larrabee, S.F., Turkey's New Geopolitcs, *Survival*, Vol. 52, No. 2, 2010 in Lesage & Kacar, op.cit., s.130.

[356] www.mfa.gov.tr Mayıs 2015.

Konseyi'nde 2009-2010 yılları arasında geçici üye olarak yer almıştır. Ayrıca 2015 yılında ilk defa küresel ekonomik düzenin belirlenmesinde temel platformu teşkil eden G20'nin Dönem Başkanlığı görevini üstlenmiştir. Türkiye ayrıca Rusya, Orta Asya ve Arap dünyasındaki daha uzak komşularıyla da güçlü bağlara sahip bir ülke konumundadır.

Her yıl artan kalkınma yardımıyla yükselen bir donör ülke olan Türkiye, 2011 yılında, ev sahipliği yaptığı En Az Gelişmiş Ülkeler (EAGÜ) için BM Konferasının, 2016 yılında yapılacak Ara Dönem Konferansına da ev sahipliği yapmayı hedeflemektedir.

Bunların dışında, Türkiye'nin AB ile olan üyelik müzakereleri sürecinde Bilim ve Araştırma, ilk açılan ve geçici olarak 2006 yılında başarıyla kapanan ilk ve tek fasıldır. Bu bağlamda, Türkiye-AB ilişkilerinde, bilim ve araştırma, en başarılı alanlardan biri ve en iyi örneklerdendir.

Bu ilerleme, Avrupa Komisyonu tarafından her sene yayımlanan Türkiye'nin İlerleme Raporlarına ve AB 7. Çerçeve Programında artan başarı oranlarına da yansımıştır. Bu açıdan, Türkiye'nin AB ve Avrupa Araştırma Alanı'na entegrasyonu açısından bilimsel alanda yakaladığı bu pozitif ivme, Avrupa ile entegrasyonu bağlamında diğer ilgili alanlara da yansıtılabilir.

Bu bağlamda, hem kalkınmak hem de dünyadaki uluslararası işbirliklerini güçlendirmek ve dünyada etkisi olan küresel bir oyuncu olmak için bugün Türkiye açısından bilim diplomasisi faaliyetlerini güçlendirmesi her zamankinden daha çok öneme sahiptir.

Türkiye yükselen ve gelişen bir dünya ekonomisidir ve Bilim Diplomasisi faaliyetleri yoluyla yeni bir ivme kazanmış durumdadır. Aslında Türkiye, araştırmacıları ve her düzeyde uluslararası bilimsel işbirlikleri yoluyla hali hazırda "bilim için diplomasi" faaliyetlerini sürdürmektedir. Öte yandan, bu aktiviteler, ilk bilim ataşelerinin

atanması ve faaliyete geçmesi yoluyla daha kurumsal ve yasal bir yapı kazanmalıdır. Bunun için geç değildir, ama erken de değildir. Bu açıdan bir atılıma ihtiyaç duyulmaktadır.

Sonuç olarak, bu konunun uzmanları ile yapılan görüşmeler ve araştırmalarıma dayanarak, Türkiye açısından Bilim Diplomasisi faaliyetlerinin temel amaçları aşağıdaki şekilde özetlenebilir. Daha detaylı analiz "Sonuç" bölümünde sunulmaktadır.

- Türkiye, doğusunda bulunan bazı ülkeler için araştırma ve eğitim olanakları açısından bir cazibe merkezi konumundadır. Batısında bulunan ülkeler için de bu açıdan daha cazip hale gelmelidir.
- Türkiye'nin bilim diplomatları, atanacakları ülkelerde hangi konuların ya da hangi bilimsel alanların çalışılabileceğine odaklanabilir. Aynı zamanda o ülkelerde öğrenim gören Türk öğrencileri için harç ya da konaklama olanakları hakkında müzakereler yürütebilir. Buradaki Türk öğrencilerin, uluslararası bilimsel ağlara katılımını artırma amacıyla ihtiyaçlarına yönelik faaliyetlerde bulunulabilir.
- Bilim diplomatları, kendi alanlarının uzmanı olmalı ve en az doktora derecesine ve akademik bir arka plana sahip olmalıdır. Alanlarında aktif olmalıdırlar. Yabancı dil bilgisi de çok önemli ve gereklidir.
- Bilim diplomatları, Türkiye'nin ihtiyaçları doğrultusunda, BTYK tarafından belirlenen öncelikli alanlarda faaliyet göstermelidir.
- Kısa süreli görevlendirmeler, ABD Büyükelçiliği Bilim Elçileri örneğinde olduğu gibi daha etkili olabilir.
- Türkiye'de yeterli derecede Türk ya da yabancı doktora derecesine sahip araştırmacı bulunmamaktadır. Türkiye, gelişmekte olan ya da ihracata dayalı sanayi altyapılarına yönelmelidir. Örneğin, ileri teknoloji savaş uçakları ya da siber teknolojiler gibi.
- "Beyin Dolaşımı"na yönelik, Hedef Türkiye çalıştayları gibi etkinlikler bu anlamda çok önemlidir. Bu faaliyetler, sadece ABD ve Avrupa'da değil, bazı

gelişmiş Asya ülkelerinde ve Türk araştırmacılarının yoğun olduğu başka ülkelerde de sürdürülmelidir.

Türkiye'nin Bilim Diplomasisi faaliyetleri bakımından bölgesel rolü oldukça zordur. Bu durum, bazı zamanlarda Türkiye'nin bilim diplomasisinde bir oyuncu olmasına engel teşkil etmektedir. Türkiye'nin amacı, uluslararası araştırma sistemleri ile bağlantısını güçlendirmek olmalıdır.

Bu noktada, başlangıç olarak Türkiye'nin ABD, Almanya, Japonya, Kore gibi gelişmiş ülkelerdeki temsilciliklerinde ve UNESCO, OECD, NATO gibi Ar-Ge fonksiyonu da bulunan önemli uluslararası örgütler nezdindeki daimi temsilciliklerinde bilim diplomatlarının olması önemlidir. Bu şekilde Türkiye, ABD ve Almanya örneklerinde olduğu gibi bu ülkelerle mevcut uluslararası bilimsel ve teknolojik işbirliklerini geliştirebilir. Türkiye, dünyadaki Bilim Diplomasisi sistemleri içindeki iyi örneklere bakarak ve kendi güçlü yönleri ile ihtiyaçlarını göz önünde bulundurarak kendi Bilim Diplomasisi modelini oluşturmalıdır. Bilim diplomasisini kullanarak dünyadaki ekonomik ve siyasi statüsünü geliştirmek, Türkiye'nin temel amacı olmalıdır.

AMAÇ VE YÖNTEM

Bu doktora çalışmasında, özellikle Soğuk Savaş sonrası dönemde, bilim diplomasisi kavramının tarihsel gelişimini, uluslararası ilişkiler teorileri kapsamında ve çeşitli ülke örneklerinden yola çıkarak incelenmesi amaçlanmaktadır. Bu bağlamda, gelişmiş çeşitli ülkelerin bilim diplomasisi faaliyetleri ile Türkiye'nin bu alandaki faaliyetlerinin ele alınması ve bu örneklerden Türkiye'nin nasıl yararlanabileceğinin analizi amaçlanmaktadır. Bu çalışmadaki temel araştırma sorusu, gelişen bir ekonomi olan Türkiye'nin gelecekteki uluslararası rolünde Bilim Diplomasisinin yeri ve önemi üzerinedir. Bu bağlamda, ABD ve Almanya'nın Bilim Diplomasisi sistemleri de ele alınmıştır. Yöntem olarak, ikincil kaynaklara dayanan nitel araştırmanın yanında, bilim diplomasisi konusunda Türkiye ve yurt dışından kamu ve akademiden

uzmanlarla da birebir görüşmeler ve çeşitli ülkelere kısa çalışma ziyaretleri gerçekleştirilmiştir. Bilim diplomasisi konusunda yazılı literatürün kısıtlı olması sebebiyle röportaj tekniği kullanılmıştır.

Doktora tez çalışmaları, Temmuz 2013-Haziran 2014 döneminde bir yıllığına Fransa/Paris'de sürdürülmüştür.

Doktora tez çalışması daha çok nitel araştırma yöntemleri ile Türkiye'de ve yurt dışında uzmanlarla yapılan röportaj yöntemine dayalıdır. Bu bağlamda, bir senede (Eylül 2013-Eylül 2014), doktora tez çalışmalarına yönelik, birçoğu Fransa'da ve aynı zamanda Hollanda, Belçika ile Türkiye'de bulunan 28 farklı kamu ve araştırma merkezinden yönetici ve/veya uzman düzeyinde toplamda 42 uzmanla birebir görüşmeler yapılmıştır.

Almanya/Bonn'a 25-26 Şubat 2014 tarihlerinde, bilim diplomasisi faaliyetleri ile ilgili bilgi almak amacıyla bir çalışma ziyareti düzenlenmiş ve bu bağlamda Alman Araştırma Vakfı (DFG), Alman Havacılık Ajansı (DLR), Alman Federal Eğitim ve Araştırma Bakanlığı (BMBF) ve Alexander von Humboldt Vakfı yetkilileri ile birebir görüşmeler gerçekleştirilmiştir.

Tez çalışmaları kapsamında ayrıca, 23-24 Nisan 2014 tarihlerinde, Hollanda/Maastricht'e bir çalışma ziyareti düzenlenmiş olup, UNU-MERIT ve Maastricht Üniversitelerinden bilim diplomasisi konusunda uzman araştırmacılarla birebir görüşmeler gerçekleştirilmiştir. Ayrıca 3 Haziran 2014 tarihinde, Avrupa Komisyonu ve ABD Büyükelçiliğinden yetkililerle görüşmek üzere Belçika/Brüksel'e bir çalışma ziyareti yapılmıştır.

Türkiye'de ise, bilim diplomasisi konusunda ya da Türkiye'de bilim politikalarının belirlenmesi sürecinde tecrübesi olan akademisyen ya da devlet yetkilileri ile röportajlar yapılmıştır. Bunlar arasında, Dışişleri Bakanlığı, Bilkent Üniversitesi ve İstanbul Kültür Üniversitesi gibi kurumlar yer almaktadır. Ayrıca görüşme

gerçekleştirilen yetkililerin, Türkiye ile ABD ya da Türkiye ile Almanya arasındaki ikili bilim ve teknoloji işbirlikleri konularındaki deneyimleri de dikkate alınmıştır.

Tez yazımı aşamasında, tezin içeriği ve amacı doğrultusunda bu görüşmelerden bazılarına yer verilmiştir.

ABD ülke örneği incelenirken, ABD'nin Paris ve Brüksel'de yer alan bilim diplomatları ile yapılan röportajların yanı sıra, ABD Ulusal Bilim Vakfı (NSF) ve Bilkent Üniversitesinden yetkililerle de ABD'nin bilim diplomasisi faaliyetlerine ilişkin görüşmeler yapılmıştır.

Fransa, ayrı bir bölüm olarak tezde incelenmese de, Fransa'da bulunulması ve Fransa'nın bilim diplomasisi konusundaki tecrübesi dikkate alınarak, buradan da uzmanlarla birebir görüşmeler gerçekleştirilmiştir. Örneğin, Fransa Yüksek Öğrenim ve Araştırma Bakanlığı, Dışişleri Bakanlığı, Fransa Ulusal Araştırma Merkezi (CNRS), Sciences Po Üniversitesi, Telecom-EM Üniversitesi, Toplumda Araştırma ve Yenilik Enstitüsü (IFRIS), Kalkınma için Araştırma Enstitüsü (IRD) gibi kuruluşlardan uzmanlarla görüşülmüştür.

Ayrıca İktisadi İşbirliği ve Gelişme Teşkilatı (OECD), Birleşmiş Milletler Eğitim, Bilim ve Kültür Örgütü (UNESCO) ve Avrupa Komisyonu (EC) gibi uluslararası kuruluşlardan yetkililerle de röportajlar yapılmıştır.

Ülke örnekleri seçilirken, Türkiye'nin yanı sıra ABD ve Almanya örneklerinin seçilmesinin başlıca üç sebebi vardır:

1. Bu ülkelerin geleneksel ve uzun süreli bilim diplomasisi sistemleri ve geniş bir bilim diplomatları ağları mevcuttur.
2. ABD ve Almanya, Türkiye'nin ilk bilim diplomatlarını göndermeyi düşündüğü öncelikli ülkeler arasındadır.

3. Bu ülkelerde, önemli bir Türk araştırmacı ve öğrenci diasporası mevcuttur ve bu bağlamda, ikili bilimsel ve teknolojik işbirlikleri açısından potansiyeli yüksek ülkelerdir.

Yardımcı Araştırma Soruları

- Özellikle İkinci Dünya Savaşından sonra yeni bir yöntem olarak Bilim Diplomasisinin gelişimi ve kullanılmasının başlıca nedenleri nelerdir?
- Modern uluslararası sistemde Bilim Diplomasisinin analizinde ana akım Uluslararası İlişkiler teorilerinin yeri nedir?
- ABD ve Almanya gibi batılı ülkelerde, bir etki ve güç aracı olarak Bilim Diplomasisi nasıl kullanılmaktadır?

Temel Varsayımlar

- Realizm, Bilim Diplomasisi kavramının analizi için uygun bir teori olarak ele alınabilir.
- Türkiye, dünyada önemli bir küresel aktör olabilmek için Bilim Diplomasisi faaliyetlerine önem vermeli ve geliştirmelidir.
- Bilim Diplomasisi, ABD ve Almanya gibi batılı ülke modellerinde, bir etki ve güç aracı olarak kullanılmaktadır.

LİTERATÜRE KATKISI

Bilim Diplomasisi, dünyada olduğu gibi Türkiye'de de yeni bir kavramdır. Bu konuda, bazı uluslararası dergilerde yayımlanan son yıllarda makaleler dışında çok fazla yazılı kaynak mevcut değildir. Bu bağlamda, söz konusu bu Doktora tezi, Türkiye'de Bilim Diplomasisi alanında, Doktora düzeyindeki ilk akademik çalışmalardan biridir.

Ayrıca bu çalışmada, ABD, Almanya ve Türkiye'den çeşitli Bilim Diplomasisi sistemlerinin analizi yapılmaktadır. Ayrıca Kavramsal bölümde başka ülke örneklerine de yer verilmektedir. Çalışmanın orijinalliği aynı zamanda Bilim Diplomasisi kavramının çeşitli ana akım Uluslararası İlişkiler teorileri tarafından ilk kez analiz edilmesinden kaynaklanmaktadır.

Bir diğer önemli katkısı, Bilim Diplomasisi kavramının, kısıtlı bir literatürle ve sisteme geç gelen bir ülke olan Türkiye bakış açısıyla analiz edilmesidir.

SONUÇ

Ülkemizin taraf olduğu uluslararası bilimsel anlaşma ve sözleşmeler çerçevesinde, Kurumumuz görüşüne başvurulmakta ve ilgili birim ve Enstitülerimiz aracılığıyla çeşitli bilimsel konularda Dışişleri Bakanlığı gibi kurumlara görüş verilmektedir. Bunlara örnek olarak, iklim değişikliği, kimyasal silahlar konusu, NATO verilebilir.

Bu noktada, Türkiye'de de diplomatlara ve politika yapıcılara özellikle uluslararası teknik müzakerelerde kullanabilecekleri bilimsel bilgi ve veri desteği sağlanabilir. Bu konuda TÜBİTAK tarafından Dışişleri personeline yönelik düzenli eğitimler verilebilir.

Türkiye, şu anda G20 üyesi, GSYİH bakımından dünyada 16. sırada olan ve 70 milyonu aşan nüfusuyla dünyada 18. sırada yer alan çok güçlü bir ülkedir.

Bulunduğu coğrafyada, hem Avrupa ve Asya arasında bir köprü vazifesi üstlenmekte, hem de bölgesel bir güç olarak karşımıza çıkmaktadır. Ayrıca komşularıyla "sıfır sorun" politikası izlemekte ve çok taraflı bir dış politika sergilemektedir.[357]

Tüm bu faktörler göz önünde bulundurulduğunda, Türkiye için bilim diplomasisi faaliyetlerinin önemi çok daha fazla artmaktadır. Türkiye de UBTYS 2011-2016 ve ulusal çıkarları doğrultusunda, bilimsel işbirliklerini ve araçlarını çeşitlendirerek bölge ülkelerine bir "bilimsel güç" olarak da nüfuz edebilir. Bu bağlamda, AB ile geliştirdiği başarılı bilimsel ve teknolojik işbirlikleri modeli, diğer bölgeler için de kullanılabilir. Bilimsel potansiyelini daha iyi tanıtarak, Türkiye, Orta Doğu, Orta Asya, Balkanlar, Akdeniz ve Karadeniz bölgesindeki ülkelere de örnek teşkil edebilir.

Sonuç olarak, Bilim, Teknoloji ve Yenilik konularında, Türkiye modeli çalışmasına daha fazla odaklanılmalıdır. Bu amaçla, örneğin Türkiye hedef ülkelerdeki kilit BTY uzmanlarına yönelik her sene kendi BTY stratejisi, modeli ve fon yöntemlerini içeren eğitimler verebilir. Yine hedef ülkelerdeki ilgili Büyükelçiliklerimiz aracılığıyla, BİDEB programlarının daha etkin bir şekilde tanıtımı da Türkiye'nin yurt dışındaki bilim diplomasisi faaliyetlerinin etkisini artırabilecek önerilerdendir.

Bilim diplomasisinin temelde üç ana amacı bulunmaktadır:

1. Ulusal inovasyon kapasitesi ve rekabet edebilirliği geliştirmek amacıyla araştırmacılara, araştırma sonuçlarına ve kaynaklara ulaşmak; (ERİŞİM)
2. Ülkenin Ar&Ge yetkinliklerinin ve uluslararası işbirliklerinin tanıtımı yoluyla en iyi öğrencileri, araştırmacıları ve firmaları çekmek; (TANITIM/PROMOSYON)
3. Bilim diplomasisi ve yumuşak gücünü kullanarak diğer ülkelerin kamuoyunu, politika yapıcılarını ve liderlerini etkilemek. (ETKİ)

[357] Dries Lesage & Yusuf Kacar (2010), "Turkey's Profile in the G20: Emerging Economy, Middle Power and Bridge-Builder", *Studia Diplomatica,* Vol.LXIII, 2, s.125.

Bu bağlamda, politika amacı nedir?

Türkiye'nin politika amacı, tam teşkilatlı bir Bilim Diplomasisi sisteminin ve ABD, Japonya, Almanya, Kore ve Çin gibi hedef ülkelerde bir bilim diplomasisi ağının kurulmasıdır.

Bu üç boyutta (erişim, promosyon ve etki), Türkiye'nin öncelikleri şunlar olabilir:

ERİŞİM

- Türkiye için BT işbirliği açısından stratejik öneme sahip ülkeler
- İkili BT işbirliği anlaşmaları ve aktif ikili işbirliği programları olan ülkeler
- Gelişmekte olan ülkeler, En Az Gelişmiş Ülkeler (EAGÜ) gibi
- Gelişmiş ülkeler

PROMOSYON

- Türk Ar&Ge ekosisteminin promosyonu, Hedef Türkiye ya da EAGÜ etkinlikleri gibi
- Türkiye'deki üniversiteler ve araştırma merkezleri aracılığıyla işbirliği
- Türkiye'nin Büyükelçilikleri yoluyla Ar-Ge potansiyelinin tanıtımı
- OECD, UNESCO, Avrupa Komisyonu gibi uluslararası örgütlerde temsil
- İleri teknolojilerde Ar-Ge konusunda aktif firmaları Türkiye'ye çekmek
- İşbirlikleri yoluyla öncül araştırmaların yapılması

ETKİ

- Komşu bölgelere etki, 7.ÇP INCO projeleri gibi araçlarla
- Diplomaside bilim yoluyla etki
- Türk araştırma ekosistemini güçlendirme yoluyla etki

Bu bağlamda, mikro, mezo ve makro düzeylerde politika önerileri ve muhtemel politika araçları aşağıda sunulmaktadır.

Mikro düzey ile Türkiye'nin ulusal ve birim düzeyinde, kısa vadeli Bilim Diplomasisi faaliyetleri kastedilmektedir. Söz konusu faaliyetler özellikle "Bilim için Diplomasi" boyutunda incelenecektir.

Mezo düzey ile Türkiye'nin ulusal düzeyde, orta vadeli Bilim Diplomasisi faaliyetleri kastedilmektedir. Söz konusu faaliyetler "Bilim için Diplomasi" ve "Diplomasi için Bilim" boyutlarıyla ele alınacaktır.

Makro düzey ile Türkiye'nin uluslararası düzeyde, uzun vadeli ve politika odaklı faaliyetleri kastedilmektedir. Söz konusu faaliyetler özellikle "Bilim için Diplomasi" ve "Diplomasi için Bilim" boyutlarıyla ele alınacaktır.
Bu bağlamda, öncelikle Türk bilim diplomatlarının (görev yerlerine göre ataşe ya da müsteşar olabilir.) seçim kriterleri belirlenmelidir. Ayrıca ABD, Almanya ya da Fransa ülke örneklerine ve bu ülkelerden uzmanlarla yapılan görüşmeler ışığında, aşağıdaki kriterler belirlenebilir:

- Türkiye ve görevlendirildikleri ülkenin ortak ilgi alanına giren bilimsel bir alanda çalışan bir akademisyen ya da bilimsel konularda uzman bir bürokrat olabilirler. ABD gibi bazı ülkelere birden çok bilim diplomatı atanabilir, böylece hem akademiden hem de kamu ya da özel sektörden temsilciler olabilir.
- Belirli bir bilimsel alanda uzmanlıkları olmalıdır ve tercihen doktora derecesine ve akademik yeterliliğe sahip olmalıdırlar. Uzmanlık alanları ile aktif olarak ilgileri devam etmelidir. Yabancı dil bilgisi çok gereklidir.
- Türkiye'nin Bilim ve Teknoloji Yüksek Kurulu (BTYK) tarafından belirlenen öncelikli alanlarında ve Türkiye'nin ihtiyaçlarına yönelik çalışmalıdırlar.
- ABD Büyükelçiliği Bilim Elçileri programında olduğu gibi kısa süreli görevlendirmeler daha etkili olabilir.
- Görevlendirildikleri ülkelerdeki görev ve sorumlulukları net bir şekilde belirlenmelidir.

Seçilen öncelikli ülkelere (ABD, Almanya, Kore, Çin ve Japonya), Türkiye'den uygun bilim diplomatlarının seçilmesini takiben, onlara Dışişleri Bakanlığı ya da ilgili kurumlarca bir tür diplomatik eğitim verilmesi yararlı olacaktır. Ayrıca bilim diplomatlarının atanacakları ülkelerdeki Türk Büyükelçiliklerinde çalışan diplomatlara da "Bilim Diplomasisi" konusunda eğitim verilebilir. Bu, "Diplomaside Bilim"in güzel bir örneğidir. Bu eğitim, Bilim, Sanayi ve Teknoloji Bakanlığı ya da TÜBİTAK tarafından verilebilir.

Bilim diplomatlarının atanmasını takiben, değişik ülkelerde bulunan Türk bilim diplomatları arasında bir eşgüdüm sistemi oluşturulmalıdır. Bu eşgüdüm, Dışişleri Bakanlığı ile Bilim, Sanayi ve Teknoloji Bakanlığı tarafından sağlanabilir. Her yıl Türk bilim diplomatlarını biraraya getiren ve tecrübe paylaşımını içeren düzenli bir ya da birkaç toplantı organize edilebilir.

Ayrıca Türkiye'de bulunan yabancı ülkelerin bilim diplomatları (ABD ya da Almanya gibi) ile de düzenli toplantılar organize edilebilir. Bu platform, iyi örneklerin ve yaşanan zorlukların ilgili ülkelerin bilim diplomatlarınca paylaşılması açısından uygun olacaktır.

Bunların yanı sıra, Türk diplomatları, kısa sürelerle ABD'de bulunan AAAS Bilim Diplomasisi Merkezi ya da İngiltere'de bulunan Royal Society gibi kurumlarla, yabancı ülkelerin bakanlıklarında görevlendirilebilir. Böylece bilim diplomasisi konusunda daha tecrübeli ülkelerle tecrübe paylaşımı sağlanmış olur.

Türk bilim diplomatları, Milli Eğitim Bakanlığı tarafından ilgili yurtdışı temsilciliklere atanan eğitim ataşeleri ile de eşgüdüm halinde çalışmalıdır. Uzun vadede, yüksek öğretim alanında da Türkiye'den diplomatların yurt dışına görevlendirilmeleri faydalı olacaktır; çünkü, bilim ve yüksek öğretim yakından bağlantılıdır ve Almanya, Fransa gibi ülke örneklerinde de görüldüğü gibi birbirinden ayırmak çok zordur.

Tabii ki, görevlendirilen her ülkenin önceliği ve ihtiyaçlarına göre, farklı öncelikli alanlar olacaktır. Ne var ki, bu ülkelere yönelik bazı genel politika önerileri aşağıda sunulmaktadır.

Orta vadede, Türkiye'de BTİ sisteminin ilgili kuruluşları eşgüdüm halinde bir Bilim Diplomasisi Stratejisi oluşturmalıdır. Bu strateji kapsamında, Türkiye'nin gelecekteki bilim diplomasisi faaliyetleri için bir yol haritası da yer alabilir.

Görevlendirilen ilgili ülkede, ilk önceliklerden biri, o ülkenin bilim ve teknoloji kaynaklarına erişim olmalıdır. Bunun için, Türkiye'nin o ülkede bulunan Büyükelçilikleri ya da OECD, UNESCO, NATO gibi kuruluşlar nezdindeki Daimi Temsilciliklerinden destek alınabilir. Bir diğer öncelik, o ülkede bulunan ilgili bilimsel kuruluşlarla ikili bilimsel ve teknolojik işbirliği anlaşmalarının geliştirilmesi ya da mevcut anlaşmaların aktive edilmesi olabilir. Bu kapsamda, Türkiye'den bu ülkelere delegasyon ziyaretleri ya da bilimsel toplantılar düzenlenebilir.

Diğer bir politika alanı, Türk Ar-Ge ekosisteminin o ülkede tanıtımı olmalıdır. Bu tanıtım, iyi Türk üniversitelerinin ya da yenilikçi Türk firmalarının çeşitli bilim fuarları ve etkinliklerinde tanıtımı yoluyla yapılabilir.

Türkiye, eğitim ve araştırma olanakları bakımından, doğusunda bulunan Azerbaycan, Rusya, Orta Doğu, Kuzey Afrika ve Orta Asya gibi ülkeler açısından bir cazibe merkezidir. Bu bağlamda, En Az Gelişmiş Ülkeler (EAGÜ) ya da Batı Balkanlara yönelik Türkiye'nin bilimsel anlamda yaptığı etkinlikler, "Bilim için Diplomasi" faaliyetleri açısından çok değerlidir. Ne var ki, batısından bulunan ülkeler için de eğitim ve araştırma olanakları bakımından daha cazip hale gelmelidir. Ayrıca Türkiye'nin daha fazla deneyimli ve doktora sonrası araştırmacıya ihtiyacı vardır.

Bu boyutta, Hedef Türkiye gibi beyin dolaşımını destekleyen faaliyetler çok önemlidir. Bu faaliyetler, sadece ABD'de değil, Avrupa ve Türk bilim insanları diasporalarının güçlü olduğu bazı Asya ülkelerinde de sürdürülmelidir. Ayrıca bilim

diplomatlarının görevlendirildikleri hedef ülkelerde, iki ülke için öncelikli alanlarda Türkiye ile bu ülkelerin bilim insanları arasında proje pazarı ya da ağ oluşturma (networking) faaliyetleri düzenlenebilir. TÜBİTAK'ın bu tarz etkinlikleri destekleyen fon kaynakları bulunmaktadır örneğin.

Uzun vadede, Türkiye, dünyada bilim diplomasisi yoluyla etki sağlamak amacıyla bilim diplomasisi ağından faydalanmalıdır. Bu bağlamda, Türkiye ile hedef ülkeler arasında ortak araştırma merkezleri ya da laboratuvarları kurulabilir. Örneğin, Fransa'nin (CNRS) yurt dışında bu tarz ortak araştırma merkezleri vardır ve bilim diplomasisi faaliyetlerinde bu araştırma merkezlerinden etkin bir şekilde yararlanmaktadır.
Ayrıca İsviçre'nin Swissnex ya da Almanya'nın Bilim ve İnovasyon Evleri (DWIH) tarzı yapıları da Türkiye açısından faydalı örnekler olabilir. Pilot ülkeler, Türkiye'nin ilk bilim diplomatlarını ataması düşünülen 5 ülke olabilir. Bunlar ABD, Almanya, Kore, Çin ve Japonya'dır.

Tabii ki, Türkiye'nin Bilim, Sanayi ve Teknoloji Bakanlığı, TÜBİTAK, TÜBA ve üniversiteleri aracılığıyla halihazırda sürdürmekte olduğu bilim diplomasisi faaliyetleri devam etmelidir.

Politika Önerileri ve Araçları Tablosu

	Mikro Düzey (aktör düzeyi)	**Mezo Düzey (ulusal düzey)**	**Makro Düzey (uluslararası düzey)**
Politika Önerileri	- **Türk bilim diplomatlarının seçim kriterleri** - **Öncelikli ülkelerin belirlenmesi**	- **Bilim diplomatlarına diplomatik eğitim verilmesi** - **İyi örneklerden öğrenilmesi** - **Bilim Diplomasisi Stratejisinin geliştirilmesi**	- **BT kaynaklarına erişim** - **Türk Ar-Ge ekosisteminin promosyonu** - **Bilim Diplomasisi yoluyla etki**
Politika Araçları	- Akademiden ya da bürokrasiden - Ülke ihtiyaçları - Eğitim - BT alanında uzmanlık - İkili işbirliği yapılan ülkeler - Gelişmekte olan ülkeler - BTYK öncelikleri	- Dışişleri Bakanlığı ya da BSTB - Uluslararası örnekler - Muhatapları ile ikili görüşmeler - Türk bilim diplomatları arasında eşgüdüm	- Türk Büyükelçiliklerinde temsil - BT işbirliği anlaşmaları - Hedef Türkiye etkinlikleri - Proje pazarlarının düzenlenmesi - 7.ÇP INCO projeleri - Ortak araştırma merkezleri/lab.lar - Swissnex ya da DWIH tarzı yapılanmalar

TÜRKİYE'NİN BİLİM DİPLOMASİSİ YOL HARİTASI

Türk hükümetinin, 2023'e kadar Ar-Ge'ye ayrılan Gayri Safi Yurt içi Hasılanın (GSYİH) %3'e çıkarılması hedefi mevcuttur. Bu bağlamda, eğer Türkiye, hazırlıkları başlayan bilim diplomasisi sistemini 2015'de oluşturabilir ve 2020'de dünyada tam olarak işleyen bir bilim diplomasisi sistemi oluşturabilirse, bu %3 amacına BTI kapasitesini geliştirme suretiyle ulaşabilir.

APPENDIX II: CURRICULUM VITAE

ELİF ÖZKARAGÖZ DOĞAN

TÜBİTAK
DIRECTORATE FOR INTERNATIONAL COOPERATION
BILATERAL AND MULTILATERAL COOPERATION
DEPARTMENT

EXECUTIVE SUMMARY

Mrs. Elif Özkaragöz Doğan, is working at the Scientific and Technological Research Council of Turkey (TÜBİTAK) in the Directorate for International Cooperation since 2007. She had worked in the European Union Framework Programmes (EU FP) National Coordination Office and the Bilateral and Multilateral Relations Department respectively. She has worked as the National Contact Point (NCP) of Turkey in the EU 7th FP International Cooperation Activities area (2007-2013). She is still working as Scientific Programs Expert in the Bilateral and Multilateral Relations Department. In this regard, she has contributed to the development of bilateral scientific and technological cooperation between Turkey and the USA, Canada and the Latin American countries. She is now responsible for the bilateral S&T cooperation between Turkey and Japan, China, Korea as well as Southeast Asian countries. Moreover she is the Coordinator of a EU FP7 INCO project towards Japan, which is the CONCERT-Japan project as well as the Project Manager of another EU FP7 INCO project called JEUPISTE project.

EDUCATION

PhD Candidate– Department of International Relations-METU, Ankara 2009-2015
PhD Dissertation: "Science Diplomacy in the Global Age: Examples from Turkey and the World"
Thesis Advisor: Prof. Dr. Hüseyin BAĞCI
(High Honurs Degree)

Masters – European Studies- Rheinische-Freidrich-Wilhelms-Universität Bonn, Germany (Jean Monnet Scholar) 2005-2006

Thesis Topic: "The Human Rights Policy of the European Union: Human Rights Dimension in the EU-Turkish Relations"
Thesis Advisor: Prof. Dr. Ludger KÜHNHARDT

Bachelor of Science (B.Sc.) – Department of International Relations-
METU (Major), Ankara 2001-2005
(High Honours Degree)

Psychology– METU (Minor), Ankara 2002-2005

FOREIGN LANGUAGES

- English (Fluent)
- German (Upper Intermediate)
- French (Beginner)

PROFESSIONAL EXPERIENCE

TÜBİTAK
DIRECTORATE FOR INTERNATIONAL COOPERATION *Since September 2011*

Bilateral and Multilateral Relations Department
Ankara
Scientific Programs Expert

TÜBİTAK
DIRECTORATE FOR INTERNATIONAL COOPERATION *September 2010 – September2011*

Bilateral and Multilateral Relations Department
Ankara
Scientific Programs Assistant Expert

TÜBİTAK *September 2007 –*
DIRECTORATE FOR INTERNATIONAL COOPERATION *September 2010*

European Union Framework Programmes National Coordination Office
Ankara
Scientific Programs Assistant Expert

MIDDLE EAST TECHNICAL UNIVERSITY (METU)
September 2004 – September 2005
Department of International Relations
Ankara
Prof. Dr. Hüseyin BAĞCI – Student Assistant

CERTIFICATES

- State Planning Organization, Internship, Ankara, January 2004
- Ministry of Foreign Affairs, Internship, Ankara, July-August 2004
- Center for Eurasian Strategic Studies (Middle Eastern Studies Desk), Internship, Ankara, August-September 2004
- Center for Eurasian Strategic Studies (European Studies Desk), Internship, Ankara, February-May 2005
- Wilton Park: Atlantic Youth Forum, Conference, UK, 01-05 August 2005
- UNFCCC Secretariat, Internship, Bonn, April 2006-June 2006
- UNFCCC Secretariat, Internship, Bonn, July 2006-October 2006
- Foreign Policy Institute, Internship, Ankara, November 2006-January 2007
- DGAP "Democracy and Security Revisited: Transformations in the Arab World and EU Re- (Dis) Orientation", 15. International Summer School, Berlin, 10-22 July 2011

INTERNATIONAL APPOINTMENTS

TUR&BO Office, Belgium/Brussels, January-April 2009

France/Paris, June 2013 - June 2014 (Annual Leave/PhD Research)

PROJECT MANAGEMENT

- **INCONTACT Project – TÜBİTAK Project Manager**

  [EU FP7 INCO NCP project], (January 2008-January 2010)

- **SEA-EU-NET Project – TÜBİTAK Project Manager/Work Package Leader**

  [EU FP7 INCO project towards SEA], (August 2008-December 2012)

- **ShERACA Project – TÜBİTAK Project Manager**

  [EU FP7 INCO project towards Egypt], (January 2010-May 2013)

- **EECA INCO-NET Project– TÜBİTAK Project Manager/Work Package Leader**

  [EU FP7 project towards Eastern Europe and Central Asia], (November 2009-September 2010)

- **MIRA Project – TÜBİTAK Project Manager**

  [EU FP7 INCO project towards Mediterranean], (May 2011-November 2011)

- **BILAT-USA 2.0 Project - TÜBİTAK Project Manager/Work Package Leader**

  [EU FP7 INCO project towards USA], (November 2012-June 2013)

- **INNO INDIGO Project - TÜBİTAK Project Manager**

  [EU FP7 INCO project towards India], (July 2014-September 2014)

- **CONCERT-Japan Project - TÜBİTAK Project Manager /Project Coordinator**

  [EU FP7 INCO project towards Japan], (July 2014-February 2015)

- **JEUPISTE Project - TÜBİTAK Project Manager/Work Package Leader**

  [EU FP7 INCO project towards Japan], (July 2014-ongoing)

SCHOLARSHIPS AND AWARDS

Büyük Kolej 1st Degree Graduation Award (Secondary School)	*(1995-1998)*
Büyük Kolej 1st Degree Graduation Award and Scholarship (High School)	*(1998-2001)*
Jean Monnet Scholarship (Masters)	*(2005-2006)*

SOFTWARE

- Microsoft Software: MS Office (Word, Excel, PowerPoint), MS Visio, MS Project.

INTERNATIONAL PUBLICATIONS

- **ÖZKARAGÖZ, E.,** 2006, "*Belgium and the Ratification of the Constitutional Treaty"* (published in Nina Eschke/Thomas Malick (eds.), The European Constitution and its Ratification Crisis: Constitutional Debates in the EU Member States, ZEI Discussion Paper), Germany
- **ÖZKARAGÖZ, E.,** 2011, "*The Science and Research Dimension in the European Integration Process: The Case of Turkey"*, ZEI EU-Turkey-Monitor, September 2011, 7(2/3), Germany

NATIONAL PUBLICATIONS

- **ÖZKARAGÖZ, E.,** 2005, ***"****Russian-American Relations in the Putin Period"* in http://www.turksam.org/en/a136.html
- **ÖZKARAGÖZ, E.,** 2005, ***"****Turkey's Role in the Foreign and Security Policy of the EU"* http://www.turksam.org/en/a148.html
- **ÖZKARAGÖZ, E.,** 2011, Book Review: Michelle Pace & Peter Seeberg (eds.) "The European Union's Democratization Agenda in the Mediterranean" (Routledge: USA and Canada, 2010), *Spectrum Journal of Global Studies,* Spring 2011, 3(4), Ankara
- **ÖZKARAGÖZ, E.,** 2011, "Yumuşak Güç Aracı Olarak Bilim Diplomasisi: ABD ve Avrupa Örnekleri" (Science Diplomacy as a Soft Power Tool: Examples from the USA and Europe", July 2011, Ankara (Expertise Thesis)

- **ÖZKARAGÖZ, E.,** 2013, Book Review: Malik Mufti "Daring and Caution in Turkish Strategic Culture: Republic at Sea" (Hampshire: Palgrave Macmillan, 2009), *Insight Turkey*, 2013, 15(1). http://www.insightturkey.com/daring-and-caution-in-turkish-strategic-culture-republic-at-sea/book-reviews/251

INTERNATIONAL CONFERENCE PRESENTATIONS

- **ÖZKARAGÖZ, E.,** 2010, *"The Euro-Mediterranean Cooperation Process: Research and Technology as a Tool for Development and Cooperation",* 9th METU Conference on International Relations on the Mediterranean in the World System: Structures and Processes, 20-22 May 2010, METU Northern Cyprus Campus, Güzelyurt

ORGANIZED & CO-ORGANIZED EVENTS

Events that either I organized or I was part of the Organization Team:

- Turkish R&D Day, January 2009, Brussels
- Southeast Asia National Contact Point Training, February 2009, Turkey/Ankara, Germany/Bonn, Belgium/Brussels
- Southeast Asia Bogor Conference, 3rd Work Package Session (SEA-EU-NET), November 2009, Indonesia/Bogor
- Regional Cooperation Council (Balkans) Conference, March 2010, Turkey/Istanbul
- CA/SC(Central Asia & South Caucasus) project Kick-off Meeting, April 2010, Turkey/Istanbul
- Egypt National Contact Points Training (ShERACA), July 2010, Egypt/El Gouna
- Southeast Asia National Contact Points Training (SEA-EU-NET), August 2010, Thailand/Bangkok
- Egypt National Contact Points Training (ShERACA), October 2010, Turkey/Ankara
- Southeast Asia National Contact Points Training, June 2011, Belgium/Brussels
- TÜBİTAK-NSF (USA) Info Day, September 2011, Turkey/Ankara
- TÜBİTAK-NSF-ESF Joint Workshop, October 2011, Turkey/Istanbul
- TÜBİTAK Info Days, December 2011, Turkey
- TÜBİTAK High-level Delegation Visits to the USA, April 2012, USA/Washington DC, New York, Chicago
- Congress of the Turkish Scientists Abroad, July 2012, Turkey/Istanbul
- Turkey-USA 1st High-level Scientific and Technological Cooperation Meeting, April 2013, Turkey
- CONCERT-Japan Project Final Conference, December 2014, Turkey/Izmir

APPENDIX III: LIST OF INTERVIEWS

	Country	Name-Surname	Insitution	Position	Meeting Date
1	US	**Carmen Huber**	NSF	Head of Europe/Eurasia Office	4.9.2013
2	US	**Blake Butler**	US Embassy	Deputy Counselor for ESTH	10.9.2013
3	US	**Mary Weld**	US Embassy	Specialist ESTH	10.9.2013
4	US	**Thomas N. Halphen**	US Embassy	Economic Officer	10.9.2013
5	France	**Müge Ozman**	Telecom-EM	Instructor	18.9.2013
6	France	**Riva Kastoryano**	Sciences Po	Senior Research Fellow	24.9.2013
7	Turkey	**Adnan Akay**	Bilkent Üniversitesi	Vice President	10.10.2013
8	Germany	**David Musial**	German Embassy	Responsible for Science Cooperation	27.11.2013
9	Germany	**Stefan Kern**	German Embassy	Science Counsellor	27.11.2013
10	France	**Rigas Arvanitis**	IRD	Researcher	4.12.2013
11	France	**Patrick Llerena**	BETA/Strasbourg	Instructor	11.12.2013
12	France	**Jacques Galliard**	IRD	Researcher	6.1.2014
13	France	**Elif Köksal**	OECD	STI Unit	16.1.2014
14	France	**Francis Verillaud**	Sciences Po	Vice Rector	23.1.2014
15	France	**Sebastien Linden**	Sciences Po	Turkey Responsible	23.1.2014
16	Germany	**Christiane Schmeken**	DAAD/Paris	Director	28.1.2014
17	Germany	**Ester Basri**	OECD	STI Unit	7.2.2014
18	France	**Florence Lelait**	Min.Higher Edu. Research	Director	12.2.2014
19	France	**Marienne Noel**	IFRIS	Former French Science Diplomat	13.2.2014
20	Germany	**Jörg Schneider**	DFG	Head of Unit/Int. Coop.	25.2.2014

21	Germany	**Joern Sonnenburg**	DLR	Director	25.2.2014
22	Germany	**Isabel Vogler**	BMBF	Officer	26.2.2014
23	Germany	**Peter Webers**	BMBF	Head of Unit	26.2.2014
24	Germany	**Judith Schildt**	AvH	Head of Unit	26.2.2014
25	Germany	**Gülay Sağırlı**	AvH	Programme Officer	26.2.2014
26	France	**Arnaud Lalo**	CNRS	Officer	14.3.2014
27	Turkey	**Orhan Güvenen**	Bilkent Üniversitesi	Instructor	28.3.2014
28	France	**Mona Boussedra**	FR MFA	Head of Unit	17.4.2014
29	Netherlands	**Luc Soete**	Maastricht University	Rector	23.4.2014
30	Netherlands	**Saaed Parto**	Maastricht	Instructor	23.4.2014
31	Netherlands	**Adam Szirmai**	UNI-MERIT	Instructor	24.4.2014
32	Netherlands	**Serdar Türkeli**	UNI-MERIT	Researcher	24.4.2014
33	Turkey	**Hüseyin Avni Botsalı**	TR MFA	UNESCO Ambassador	30.5.2014
34	Turkey	**Gülser Corat**	UNESCO	Director for Gender Equality	30.5.2014
35	Belgium	**Robert Burmanjer**	European Commission	Head of Unit	3.6.2014
36	US	**Susan Vesel**	US Embassy	Science Counsellor	3.6.2014
37	Belgium	**Leonidas Karapiperis**	European Commission	Advisor	3.6.2014
38	France	**Siegfried Demuth**	UNESCO	Chief Expert	4.6.2014
39	Turkey	**Semahat Demir**	IKU	Rector	17.6.2014
40	Turkey	**Armağan Erdoğan**	SBU	Rector Advisor	21.8.2014
41	Germany	**Alexander Puk**	DE MFA	Expert	2.9.2014
42	Turkey	**Ömer Demir**	ASBU	Rector	19.9.2014

APPENDIX IV: TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü ☐

Sosyal Bilimler Enstitüsü ■

Uygulamalı Matematik Enstitüsü ☐

Enformatik Enstitüsü ☐

Deniz Bilimleri Enstitüsü ☐

YAZARIN

Soyadı : Özkaragöz Doğan
Adı : Elif
Bölümü : Uluslararası İlişkiler

TEZİN ADI : Science Diplomacy in the Global Age: Examples from Turkey and the World

TEZİN TÜRÜ : Yüksek Lisans ☐ Doktora ■

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir. ☐
3. Tezimden bir bir (1) yıl süreyle fotokopi alınamaz. ■

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: