STRENGTHENING GLOBAL TIES: THE CRITICAL NEED FOR SCIENCE DIPLOMACY AND TÜRKİYE'S POTENTIAL

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Abstract

Pandemics, emerging and re-emerging diseases, global warming, and migration are among the most pressing challenges of our time. The rapid advancement of science and technology is driving the development of global solutions to address these complex issues. Evolving technologies and new scientific discoveries in fields such as particle physics, quantum studies, and artificial intelligence are also at the forefront of the global agenda. No country can be "sufficient" on its own. Determining priorities in science and technology and collaborating with other countries in these areas is not a luxury or an option, but a necessity. Countries with strong international collaborations, those that integrate multidisciplinary approaches into every aspect of daily life and possess inclusive sociological frameworks, are preparing for the future with greater confidence. Nations and communities that share common values are coming together to consolidate their strengths in scientific endeavors. Science diplomacy has become increasingly prominent and is now a key priority in international relations. The framework for science diplomacy is being established through the identification of key actors and the adoption of professional methodologies. Furthermore, the practice and implementation of science diplomacy are continuously evolving, shaped by best practices in the field. Türkiye, with its strategic geographical location, centuries-old state tradition, and robust diplomatic experience, stands as a significant player both regionally and globally. According to the Global Diplomacy Index, Türkiye (Turkey) is the third-largest diplomatic actor in the world. With its universities open to international collaboration, research centers, funding bodies, and a young, highly qualified human resource base, Türkiye has considerable potential to play a pivotal role in science diplomacy, both within its region and globally.

Keywords

International Cooperation, Scientific Cooperation, Diplomatic Relations, Science and Technology, Foreign Policy

Introduction

The COVID-19 pandemic marked a pivotal turning point in recognizing the critical need for science diplomacy. The virus transcended borders, requiring no visas, and impacted the entire world within weeks. The global response involved the rapid development of diagnostic kits, treatments, repurposing of existing drugs, sharing scientific findings, vaccine development, and the initiation of clinical trials, all matters of global concern. Developments in each of these areas were closely monitored on an international scale. The sharing of information with the global community and the consolidation of efforts were crucial. At the same time, addressing the infodemic and ensuring access to accurate information presented its challenge, necessitating direct communication with international institutions and organizations. Effective communication with decision-makers and policymakers, along with providing appropriate guidance, was essential. National and international scientific boards were established, bringing together researchers, academics, and policymakers (Kocak Tufan, 2020). Countries with research centers open to international collaboration and in contact with scientific hubs across various nations, made more rapid progress than others. In Türkiye, the political, diplomatic, and scientific actors worked together to create an effective response. Forming new scientific coalitions, opening of new calls across the international research ecosystem, organization of a virtual scientific conferences, and launching of a new portal in support of cocreation processes and open science were among the first responses from Türkiye's Scientific and Technological Research Council (Mandal, 2020). Alongside the National COVID-19 Science Board of Ministiry of Health, regular meetings were held with member and observer countries of the Turkic Council, and Türkiye closely monitored efforts in countries such as the United States, European Union members, China, and India, leveraging its strong diplomatic history for swift communication (Demirbilek, 2020; Kocak Tufan, 2020; Barlas, 2021).

It has become evident that no country can stand alone in the fight against global threats such as pandemics. No country possesses the capacity to independently access the vast amount of information produced daily through global research or to keep pace with all technological advancements. Issues ranging from the free movement of qualified human resources across borders to the common use of international research infrastructures must be addressed collectively. Science diplomacy, therefore, serves as a platform that unites diplomats, bureaucrats, politicians, policymakers, and academics to tackle these global challenges.

This paper is dedicated to some recent developments in the field of science diplomacy, the growing demand for science diplomacy on different subjects, and Türkiye's potential in this area. Although the author of this paper is not a social sciences expert, but a medical scientist and an academic who has also worked as a bureaucrat and diplomat, she brings her insights, observations and experience. As a medical expert from the field, she worked as a member of the COVID-19 Scientific Board of the Ministry of Health of Türkiye; she was a former executive board member of the Council of Higher Education (YÖK), and served as a Counselor in Turkish Embassy in Washington, D.C., where she had the opportunity to assess science diplomacy efforts of different countries in the U.S.. She has

previously published an article on Türkiye's science diplomacy tools in another journal (Koçak Tufan, 2024). Drawing on these diverse perspectives, this paper revisits the need for science diplomacy and examines Türkiye's potential in this field, incorporating relevant excerpts from the aforementioned article, with a focus on the importance of the identified "tools."

The Urgent Need for Improving Science Diplomacy

In recent years, the increasing interest in science diplomacy has emerged as a response to the complex challenges at the intersection of science and foreign policy. As previously mentioned, the COVID-19 pandemic has played a pivotal role in this development. Scientific soft power has become essential in bilateral dialogues and the search for joint solutions to global challenges. It is possible to establish common science diplomacy objectives among stakeholders united by shared challenges. The suspension of international scientific collaborations for political or geopolitical reasons would result in the breakdown of diplomatic communication, which continues to thrive thanks to the universality of science (Nature, 2025). Science diplomacy, however, is viewed as more than just international scientific cooperation; it encompasses non-scientific interests beyond the realm of science itself, directly or indirectly serving diplomatic objectives (S4D4C, 2019).

The world is more interconnected than ever before: geographies are increasingly accessible, research centers are more reachable, and teams are more inclusive. For example, a researcher in India can now easily contact an investor in the U.S. via LinkedIn about chip cooling technologies. Similarly, a research team leader in Finland can identify a qualified young researcher from Asia for quantum studies through social media. Government agencies and international organizations are increasingly issuing calls for funding and scholarships to promote international collaborations, and courses are made to foster science diplomacy studies among different stakeholders (AAAS-TWAS, 2025; EUSD Alliance, 2025, Global Outreach, 2025; UNESCO, 2025). Meanwhile, climate change worsens, migration increases, and communication systems, defense technologies, and sociological structures continue to evolve. As wars and conflicts unfold in both virtual and physical realms, countries and institutions with strong technological and intelligence capabilities collaborate to ensure survival and prosperity. Countries that isolate themselves and close their borders cannot effectively address the rapid mobility and transformation occurring globally. In this interconnected world, nations sharing "common values" are increasingly drawn together. In an era where scientific and technological advancements are unfolding at an extraordinary pace, and many fields of expertise are being surpassed by artificial intelligence, no country can remain "sufficient" on its own. Determining priorities in science and technology, and collaborating with other countries in these fields, is not a luxury or an option, but a necessity.

Three significant projects funded and highlighted under Horizon 2020 in the field of science diplomacy emphasize the need for such initiatives (European Commission, 2024):

- Using Science for/in Diplomacy for Addressing Global Challenges (S4D4C)
- Inventing a Shared Science Diplomacy for Europe (InsSciDE)
- European Leadership in Cultural, Science and Innovation Diplomacy (EL-CSID)

These projects enhanced our understanding of European science diplomacy, explored options and developed training material as well as position papers such as the Madrid Declaration on Science Diplomacy. This has led to the establishment of the EU Science Diplomacy Alliance, gathering some of the most important academic players in the field (European Commission, 2024). The first biennial report on the implementation of a Global Approach to Research and Innovation highlighted that the EU's science diplomacy efforts were largely uncoordinated, lacking synergies and a unified approach across the Union. The report also noted that such deficiencies created vulnerabilities, especially as other international actors increasingly used science diplomacy in a more targeted manner, within the rapidly changing geopolitical, scientific, and technological landscape (Directorate-General for Research and Innovation, 2023).

Science Diplomacy on the Agenda of European Union Ministers

The history of diplomacy is long and rich, filled with examples of best practices across various domains over the centuries. However, the history of modern scientific work is relatively recent, and while there have been some initiatives in science diplomacy in our century, it remains a relatively newer field. Discussions and meetings continue regarding its definitions, actors, methodologies, professionally structured work proposals, and its implementation (UNESCO, 2025).

In 2018, the S4D4C group held the first Global Science Diplomacy Conference, where participants signed a declaration known as the Madrid Declaration. Within the context of this declaration, science diplomacy was defined as a set of practices situated at the intersection of science, technology, and foreign policy.

The Madrid Declaration identifies several areas where science diplomacy can provide significant benefits:

- Endeavours to address global challenges.
- More productive and sustainable international relations at multilateral and bilateral levels are owed to their interaction with science and technology.
- Evidence-informed foreign policy supported by science and technology, aiming at substantive and resilient international agreements, treaties and policies.
- Better conditions for scientific activities due to the contribution of foreign policy agendas.
- Improved interfaces between science and public policies.

The importance of not only capacity building but also the establishment of a clear methodology is emphasized concerning the subject. The development of evidence-based foreign relations is also discussed.

After these kinds of initiatives and meetings, the first meeting where science diplomacy was discussed at the ministerial level in charge of science, technology, and research in European Union countries took place in Spain in 2023. Subsequently, with

the support of the ERA Forum's Global Steering Team, the Commission developed a framework for science diplomacy, which was published on February 13, 2025 (European Commission, 2025).

Türkiye's Tools for Science Diplomacy (TEKA 2023)

It would be appropriate to address the tools and potential of Türkiye's science diplomacy under three main headings: infrastructures/organizations, related human resources, and topics/priority areas.

1. Infrastructures/organizations

The organizations in Türkiye that currently play a leading role in science diplomacy can be listed as follows:

- Council of Higher Education (YÖK)
- Ministry of National Education (MEB, Directorate General of Higher Education and Foreign Education; YLSY Scholarship Program)
- Turkish Academy of Sciences (TÜBA)
- Scientific and Technological Research Council of Türkiye (TÜBİTAK)
- Presidency of Turkish Health Institutes (TÜSEB)
- National Agency (UA)
- Directorate of Turks Abroad and Related Communities (YTB)
- Universities, Institutes, and Research Centers
- Turkish Academy and Scientific Cooperation Platform (TABİP)

In particular, the following research infrastructures, accredited under Law No. 6550, are crucial for international collaboration & research potential:

- İzmir International Biomedicine and Genome Institute (IBG)
- Middle East Technical University- MEMS Center (ODTÜ- MEMS)
- Ankara University Maritime Law Practice and Research Center (DEHUKAM)
- Turkish Accelerator and Radiation Laboratory (TARLA)
- METU Solar Energy Research and Application Center (ODTÜ-GÜNAM)
- Sabancı University Nanotechnology Research and Application Center (SUNUM)
- Bilkent University National Nanotechnology Research Center (UNAM)

Other infrastructures that are supported by different funds & grants, such as Boğaziçi University Life Sciences (LifeSci) are also important for international research potential.

Laboratories Supported Under TÜBİTAK 1515 - Frontier R&D Laboratory Support Programme:

- Future Mobility Technologies Laboratory – AVL Türkiye Research and Engineering Industry and Trade Ltd.
- Ericsson Research Türkiye Laboratory – Ericsson Research and Development and IT Services Inc.
- Türkiye Layered Manufacturing Technologies Research Laboratory – General Electric Marmara Technology Center

- IMPET Advanced R&D Laboratory – TUSAŞ Turkish Aerospace Industries Inc.
- Advanced Materials, Filtration, and Hygiene Technologies Advanced Research Laboratory – Arçelik Inc.
- Sustainable Propulsion and Power Technologies Laboratory – General Electric Marmara Technology Center Engineering Services
- Avionic Cybersecurity Laboratory – ASELSAN
- 6G and Artificial Intelligence Laboratory – TURKCELL
- Autonomous Networks and Data Innovation Laboratory – BTS GROUP
- Sustainable Advanced Materials Laboratory – KORDSA
- Artificial Intelligence Technologies Research Laboratory in Connected Electric Autonomous Vehicles – TOFAŞ
- XGeNTT - Turk Telekom Next Generation Technologies Lab – TÜRK TELEKOM
- Glass and Coating Technologies Advanced R&D Laboratory – ŞİŞECAM
- UL6B - ULAK 6G and Beyond Communication Technologies Laboratory – ULAK COMMUNICATION

Under TÜBİTAK 1515, the Frontier R&D Laboratory Support Programme, certain expenses of R&D laboratories established in Türkiye by national/international organizations that generate pioneering scientific and technological knowledge in their field are supported as non-repayable (grant) funding. The funds and grants are not limited to this; in addition to TÜBİTAK and TÜSEB, there are other organizations offering funding opportunities depending on the relevant subject.

Some studies present Türkiye's international potential in science diplomacy, along with organizations and potential collaboration institutions and examples in different countries (Özkaragöz, 2015; Büyüktanır Karacan, 2021). The doctoral thesis published by Özkaragöz examines the science diplomacy efforts that gained momentum during the relevant period, using examples from European countries and providing a detailed analysis from the perspective of Türkiye.

2. Human resources: Academics, researchers, diplomats, students

According to an article published in Science & Diplomacy magazine in 2014, referencing a Turkish newspaper report from 2012, Türkiye was planning to appoint science diplomats to the U.S., the United Kingdom, Russia, China, and India (Linkov, 2014). At that time, alongside France and South Korea, Türkiye was listed among the countries that prioritize science diplomacy. Indeed, the Turkish Official Gazette No. 28552, dated February 7, 2013, published positions for science and technology counselors for Washington, Berlin, Seoul, Tokyo, and Beijing, and a science and technology attaché position for Los Angeles on behalf of the Ministry of Science, Industry, and Technology. However, those appointments did not take place, and current science diplomacy efforts are primarily carried out by education counselors and attachés.

Some European countries, as well as many Asian and South American countries, carry out their science diplomacy activities through "education and cultural diplomats" or foreign ministry advisors and attachés. Türkiye's experience with education attachés and counselors is relevant in this context. The education counselors and attachés of Türkiye

are responsible for graduate students who hold government scholarships. These students conduct research in priority areas and are expected to return to Türkiye and serve for double the duration of the scholarship they received (YLSY Scholarships). They play a crucial role in building bridges between Türkiye and the research centers of other countries. However, education counselors/attaches are of course not enough to sustain a professional science diplomacy in foreign policy, which requires dedicated academics, scientists, and diplomats working in a more focused and strategic manner.

Today, as exemplified by Italy and France, the clarity of the roles and area distributions of science diplomats in European Union countries gives the impression that these countries will lead the current rules of science diplomacy (Kocak Tufan, 2023). However, given Türkiye's vast experience in diplomacy through its overseas missions, Türkiye can play a guiding role by incorporating both its current scholarship holders and international scientists into the processes through specific actions.

3. Priority Areas

Previously, the Science and Technology High Council (BTYK) established in Türkiye was the highest-level body where decisions regarding science and technology were made at the Prime Ministerial level. The council was responsible for determining the priority areas in science and technology. The founding law of BTYK, established in 1983, was abolished in 2018. Instead, with the Presidential Decree on the Organization of the Presidency No. 1 dated July 10, 2018, the Science, Technology, and Innovation Policies Council (BTYPK) was established within the Presidency, alongside other councils focused on different issues.

Since 2013, TÜBİTAK has been preparing the "TÜBİTAK Priority R&D and Innovation Topics" study every two years. The current TÜBİTAK 2024-2025 Priority R&D and Innovation Topics study, which includes the latest priority topics, aims to contribute to an ecosystem that is "Environmentally Conscious, Disaster-Resilient, and Produces High Added Value Based on Advanced Technology," in line with the national vision of the 12th Development Plan. It focuses on the dual transformation of "green" and "digital" and includes a total of 482 priority topics, targeting 252 critical products/technologies across 4 main sections (TÜBİTAK, 2024).

Each of these topics should be addressed separately, with scientific diplomacy initiatives that can be carried out with different countries considered individually. In the context of science diplomacy, institutions and potential actors that can be followed for topics such as funding, internship opportunities, involvement in joint projects, and international reporting in priority areas are provided in Table 1.

Table 1

Some of the Important International Institutions in terms of Science Diplomacy Studies, Depending on the Priority Areas

- International Thermonuclear Experimental Reactor (ITER)
- Large Hadron Collider (LHC)
- Partnership for Research and Innovation in the Mediterranean Area (PRIMA3)
- Central Asian Regional Water Stakeholder´s Platform (WASP)
- European Organization for Nuclear Research (CERN)
- European Cooperation in the field of Scientific and Technical Research (COST)
- European Centre for Disease Prevention and Control (ECDC)
- European Union Agency for Cybersecurity (ENISA)
- European Research Council (ERC)
- European Organization for Nuclear Research (CERN)
- European Space Agency (ESA)
- European Science Foundation (ESF)
- The Intergovernmental Network for International R&D&I Cooperation (EUREKA)
- United Nations Educational, Scientific and Cultural Organization (UNESCO)
- World Health Organization (WHO)

Some of the key actors in the U.S. in the field of science and technology funding or international collaborations for science diplomacy are listed in Table 2. These institutions play a crucial role in fostering global scientific partnerships, supporting research funding, and promoting science diplomacy initiatives.

Table 2

Institutions of the United States

- Air Force Research Laboratory (AFRL)
- Centers for Disease Control and Prevention (CDC)
- National Science Foundation (NSF)
- National Institutes of Health (NIH)
- NIH- Fogarty International Center
- National Aeronautics and Space Administration (NASA)
- NASA- STEM Gateway
- The Bureau of Oceans and International Environmental and Scientific Affairs (OES)
- The Science and Technology Advisor to the State (STAS)
- The Office of Science and Technology Policy (OSTP)
- The American Association for the Advancement of Science (AAAS)
- Center for Science Diplomacy
- The National Science and Technology Council (NSTC)
- The U.S. Agency for International Development (USAID)
- The U.S. Civilian Research and Development Foundation (CRDF)
- The National Academy of Science, Engineering and Medicine (NASEM)
- The Global Innovation through Science and Technology (GIST)

Recent Science Diplomacy Efforts of Türkiye in the U.S.

An example of good practice is the activities of the Education Office at the Turkish Embassy in Washington, D.C. The Office organized a series of meetings focused on Turkish and American research centers, collaboration opportunities, as well as funding and grants (MEB AMERİKA, n.d.). These events brought together academics/researchers and institutions from both sides to foster collaborations and explore available opportunities. For instance, the series covered topics such as scholarships and funding opportunities

from Türkiye and Europe for international researchers and academics in the U.S. (EURAXESS, 2024 January). Country resources website of Euraxess NA, which links researchers in North America with the European Research Area by providing free information and events on research funding, research careers, and collaboration opportunities with Europe, is renewed with the contribution of the related Turkish diplomat to help researchers interested in Türkiye (EURAXESS, n.d.; EURAXESS, 2023).

Another important activity was the contribution of the Turkish Embassy to the ''Tenth Annual Meeting of the European Scientific Diasporas in North America''. The meeting was held at the Residence of the Turkish Ambassador in Washington, DC. The theme was ''Global Talent Mobility: Navigating Opportunities Between Europe and the U.S.''. Representatives from scientific diaspora networks, European embassies, North American universities, U.S. government, industry, research institutions, and more participated. Hon. Ambassador of Türkiye to the U.S. and Science Counselor, Delegation of the European Union to the U.S., made the opening speeches. A keynote speech was held by Prof. Pamir Alpay, the Vice President for Research, Innovation, and Entrepreneurship of the University of Connecticut. A panel about ''Navigating Opportunities in a Transatlantic Context: Europe & North America'' was joined by counselors from Embassy of Sweden, Office for Science and Technology, D-Fi USA, French diaspora network, Polish Researcher Diaspora, U.S. Science and Innovation Policy, the The National Academies of Sciences, Engineering, and Medicine and from Air Force Office of Scientific Research (AFOSR). A fireside chat on "International Collaboration Challenges: Finding Talents and Addressing Mobility'' was joined by Türkiye's Education Counselor and by Prof. Larry Nagahara, the Vice Dean for Research and Translations of Johns Hopkins University. The event is aimed at researchers in North America, as well as those based in the U.S. and Canada who have or would like to benefit from European research grants to further their careers, as well as academic staff and leadership who want to learn more about European funding and collaboration opportunities for their school's researcher and student community.

The dedication of the Euraxess NA group and contributions of the diplomats and the Education Office of the Turkish Embassy made the event even more beneficial (EURAXESS, 2024 November). The institutions, organizations and representatives of countries in the 'Tenth Annual Meeting of the European Scientific Diasporas in North America'' hosted by the Turkish Embassy were as follows:

- Diplomats, counselors & attaches of Austria, Croatia, Czechia, Estonia, Finland, France, Hungary, Ireland, Moldova, New Zeland, Norway, and the U.S.
- Air Force Office of Scientific Research (AFOSR),
- SACC-USA (Swedish-American Chambers of Commerce),
- Meridian International Center,
- The National Academies of Sciences, Engineering, and Medicine,
- U.S. Geological Survey (USGS),
- GAIN -German Academic International Network,
- Italıan Scıentısts And Scholars In North Amerıca Foundation,
- Deutsche Forschungsgemeinschaft (DFG)
- German Research Foundation,
- U.S. National Science Foundation,

- The Netherland-America Foundation,
- Romanian Researcher Diaspora,
- National Human Genome Research Institute,
- NASA
- American Association of the Advancement of Science

Conclusion

Science diplomacy is a multi-actor field where not only diplomats, scientists, and policymakers, but also other non-state actors can contribute. The Madrid Declaration emphasizes that this should be applicable at local, regional, national, and international levels. The innovative model introduces new governance and coordination mechanisms that need to be managed through dialogue with all stakeholders (Madrid Declaration, 2023).

According to the author's experience and observations, bringing together scientists, diplomats, politicians, and policymakers to address specific issues and establish sustainable relations with tangible outcomes is a complex and challenging process. As noted above, diplomacy has evolved over centuries, with established actors, rules, and methodologies. However, there are no standardized procedures for incorporating science into international politics and diplomacy, apart from international collaborative scientific efforts. While scientific conferences often delve into highly specialized topics and present the latest research findings, science diplomacy meetings typically focus on broader themes. In these meetings, research results are communicated in ways that are accessible to policymakers, requiring strong persuasion and communication skills to highlight their significance. Diplomats may not always fully understand the scale, scope, or key participants involved in scientific issues within their own countries. In such cases, diplomats with an academic background play a vital role. In short, successful practices in science diplomacy can be achieved through collaborative teams. As these practices become more widespread, countries will find it easier to develop their roadmaps for integrating science into diplomacy.

Success in science diplomacy is closely tied to its position within a country's foreign policy priorities. If its importance is not recognized and it is not placed among the top priorities, it may unfortunately be too late to take effective action in the future. When scientific and technological developments, ranging from defense technologies to communications, quantum studies, artificial intelligence in healthcare, and solutions for combating climate change, are not actively engaged with, a country risks being relegated to the role of a recipient rather than a producer. Türkiye's scientific institutions, organizations, research centers, and its global scientific diaspora provide a strong foundation for science diplomacy. Coupled with its geographic and cultural ties to countries in its region and beyond, Türkiye has significant potential to become a leader in science diplomacy. Despite frequent discussions on science diplomacy in recent years, there remains a need to develop professional models for inclusive, multi-faceted, flexible, and up-to-date foreign policy proposals, along with their effective implementation in science diplomacy.

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