

B. Shin

Jeonbuk National University, South Korea, Jeonju

e-mail: shboram@jbnu.ac.kr

SOUTH KOREA'S SCIENCE DIPLOMACY AND ODA IN CENTRAL ASIA

This paper aims to analyze South Korea's science diplomacy engagement with Central Asia, particularly through official development assistance (ODA). It investigates how South Korea's science and technology (S&T) ODA can align with its science diplomacy in the region, with a focus on the flagship project of establishing a Center of Chemical Technology in Uzbekistan (UzCCT). Through this project, South Korea aims to showcase its technological expertise and contribute to the economic growth of its partner countries. To achieve this, the paper provides a brief overview of previous research on science diplomacy and South Korea's science diplomacy evolution, examining its characteristics and limitations. The paper then shifts to South Korea's ODA in Central Asia, utilizing a case study approach to illustrate the effective use of science diplomacy and S&T ODA in supporting economic development and strengthening diplomatic ties.

Key words: South Korea, Central Asia, Science Diplomacy, Science and Technology ODA.

Б. Шин

Чонбукский национальный университет, Оңтүстік Корея, Чонджу қ.

e-mail: shboram@jbnu.ac.kr

Оңтүстік Кореяның ғылыми дипломатия және Орталық Азиядағы дамуға ресми көмегі (ODA)

Бұл мақала Оңтүстік Кореяның Орталық Азиямен, әсіресе дамуға ресми көмек (ODA) арқылы ғылыми дипломатиялық қатынасын талдауға бағытталған. Мақала Өзбекстандағы Химиялық технологиялар орталығы (UzCCT) флагмандық жобасы құрылуына назар аударатырып, Оңтүстік Кореяның ғылым және технологиясы және ODA ғылыми дипломатиясымен қалай үйлесетінін зерттейді. Бұл жоба арқылы Оңтүстік Корея өзінің технологиялық тәжірибесін көрсетіп, серіктес елдердің экономикалық өсуіне үлес қосуды мақсат етеді. Осы мақсатқа жету үшін мақалада ғылыми дипломатия және Оңтүстік Кореяның ғылыми дипломатия эволюциясы бойынша алдыңғы зерттеулерге қысқаша шолу жасалады, оның сипаттамалары мен шектеулері қарастырылады. Содан кейін мақала экономикалық дамуды қолдау және дипломатиялық байланыстарды нығайтудағы ғылыми дипломатия мен ғылым және технологияға ODA-ны тиімді пайдалануды көрсету үшін кей-стади әдісін қолдана отырып, Оңтүстік Кореяның Орталық Азиядағы ғылым және технологиясындағы ODA-сы талқылайды.

Түйін сөздер: Оңтүстік Корея, Орталық Азия, Ғылым дипломатиясы, Ғылым және технология ДРК.

Б. Шин

Чонбукский национальный университет, Южная Корея, г. Чонджу

e-mail: shboram@jbnu.ac.kr

Научная дипломатия и официальная помощь в целях развития (ОПР) Южной Кореи в Центральной Азии

Данная статья направлена на анализ участия Южной Кореи в научной дипломатии в Центральной Азии. Цель исследования заключается в изучении того, как официальная помощь в целях развития (ОПР) в области науки и технологий Южной Кореи может быть согласована с усилиями по научной дипломатии в регионе, с фокусом на создание Центра химических технологий в Узбекистане. Через этот проект Южная Корея стремится продемонстрировать свою технологическую экспертизу и внести вклад в экономический рост своих партнерских стран. В работе представлен краткий обзор предыдущих исследований в области научной дипломатии и развития научной дипломатии Южной Кореи, исследуются их характеристики и ограничения. Затем рассматривается ОПР Южной Кореи в Центральной Азии, используя метод исследования

на основе кейсов, для иллюстрации эффективного использования научной дипломатии и ОПР в области науки и технологий для поддержки экономического развития и укрепления дипломатических связей. Работа способствует более глубокому пониманию участия Южной Кореи в научной дипломатии в Центральной Азии и подчеркивает потенциал для дальнейшего сотрудничества в области науки, технологий и ОПР.

Ключевые слова: Южная Корея, Центральная Азия, научная дипломатия, ОПР по науке и технологиям.

Introduction

In 2022, South Korea commemorated the 30th anniversary of the establishment of its diplomatic relations with the five Central Asian countries. Since 1992, Central Asia has increasingly gained significance for South Korea, a country that is highly industrialized but has limited energy resources and invested foreign policy interests in the Eurasian region. Central Asia's abundant energy resources, potential as a trade partner and new market, and its strategic location linking China, India, Russia, and the EU have made the region an area of interest for South Korea. In 2006, South Korea established the Korea-Central Asia Cooperation Forum to enhance multi-party cooperation based on mutual trust and explore public and private sector partnership opportunities between Korea and the five Central Asian countries. Until 2020, 13 forums commenced to this effect. In 2017, the Korea-Central Asia Cooperation Forum Secretariat was established to support the forum's organization and ensure the effective implementation of cooperation projects discussed during the forums.

Over the past three decades, South Korea's bilateral relationships with the five Central Asian countries have also been strengthened. Since 1992, a total of 18 presidential summits were held between South Korea and Uzbekistan, 15 between South Korea and Kazakhstan, 5 between South Korea and Turkmenistan, and 2 between South Korea and Kyrgyzstan (MOFA 2022). As a result, South Korea's relationship with Uzbekistan was elevated to a "Special Strategic Partnership" in 2019. South Korea and Kazakhstan agreed to establish a "Strategic Partnership" in 2009, while it signed a "Beneficial Partnership" agreement with Turkmenistan in 2008.

Central Asian countries are also important development cooperation partners for South Korea. South Korea's economic growth, which has been fueled by technological innovation, has elevated its status as a benchmark for developing countries, including those in Central Asia, to follow. South

Korea's experience in economic development has become particularly relevant to Central Asian countries, which are seeking to modernize and diversify their economies. Today, South Korea ranks top 6th in the global innovation index (GII) and top 4th in terms of innovation output (WIPO 2022).

The aim of this paper is to explore South Korea's science diplomacy engagement with Central Asia, through an analysis of its S&T official development assistance (ODA) in Central Asia. The paper aims to explore how South Korea's science and technology (S&T) ODA can align with its science diplomacy efforts in Central Asia. The establishment of a Center of Chemical Technology in Uzbekistan (UzCCT) may serve as a flagship project that illustrates this potential and showcases South Korea's ability to leverage its technological expertise to support the economic growth of partner countries. The paper begins by providing a brief overview of previous research on science diplomacy and the evolution of South Korea's science diplomacy, exploring its characteristics and limitations. The discussion then turns to South Korea's ODA in Central Asia, which is examined as a case study to illustrate how science diplomacy and S&T ODA can be effectively utilized to support economic development and strengthen diplomatic ties.

Materials and Methods

This paper delves into South Korea's science diplomacy engagement with Central Asia, particularly in the realm of official development assistance. The paper discusses South Korea's science diplomacy strategy and its unique characteristics. It then examines South Korea's collaborative efforts in science and technology ODA with Central Asian countries. The analysis will draw upon relevant information and materials from the Organization for Economic Co-operation and Development (OECD), the Korea International Cooperation Agency (KOICA), and the Export-Import Bank of Korea (EXIM Bank)—two organizations responsible for

managing overseas official development aid. KOICA is a government agency specializing in ODA grants, which provide international development funds without expecting repayment. On the other hand, the EXIM Bank mainly operates the Economic Development Co-operation Fund (EDCF), a form of concessional loan. In addition, documents from various governmental organizations committed to South Korea's science and technology ODA in Central Asia, such as the Ministry of Foreign Affairs (MOFA), Ministry of Science and IT (MISIT), the Ministry of Education (MOE), and the National Research Foundation (NRF), are consulted.

It is important to note that while science and technology ODA is gaining significant for achieving the Sustainable Development Goals (SDGs), tracking the scale of such aid remains challenging. The OECD's Query Wizard for International Development Statistics (QWIDS) uses CRS codes to classify aid activities based on sectors and sub-sectors, but science and technology ODA is not recognized as an independent aid sector. Consequently, there is no internationally agreed method for estimating the scale of science and technology ODA, making it difficult to provide an exact estimate of South Korea's contributions in this area to Central Asia (Chang and Bae, 2020). Instead, this paper offers a general overview of South Korea's ODA activities in Central Asia, and uses an ongoing benchmark projects as a case study to further evaluate the opportunities and challenges presented by the country's ODA engagement in the region, specifically within the science and technology domain. The benchmark project discussed here is the joint efforts between South Korea's EXIM Bank and KOICA to establish a chemistry research facility in Uzbekistan.

Literature review

Scientific and technological collaboration has played a critical role in diplomatic efforts since the Cold War. The idea that science is impartial, universal, and devoid of political influence made it an attractive tool for diplomacy. Despite the importance of science-technology in the conduct of diplomacy, attempts to conceptualize it for academic inquiry have only recently emerged. In 2010, the British Royal Society and the American Association for the Advancement of Science (2010, pp. v-vi) published a joint report, in which they delineated three types or realms of science-technology diplomacy: science in diplomacy, science for

diplomacy, and diplomacy for science. Science in diplomacy involves leveraging scientific advice to inform foreign policy objectives. For instance, environmental scientists may offer their expertise to craft diplomatic negotiating strategies against climate change. Science for diplomacy, on the other hand, refers to using scientific cooperation to foster better international relations between countries. The 1957 Pugwash Conference, which brought Soviet and US physicists together to negotiate nuclear non-proliferation, is a prime example of this type of diplomacy. Finally, diplomacy for science entails facilitating international scientific collaboration through diplomatic means. Ministries of Foreign Affairs can support scientific exchanges through specialized visa waiver programs or other forms of assistance.

Turekian et al. (2014) note that science diplomacy is unique among other forms of international scientific cooperation in that it has a direct relationship with national interests and objectives. While other forms of scientific cooperation may be commercially oriented and occur without government participation, science diplomacy is often led by the state and aims to use science to promote foreign policy goals and inter-state interests (Ibid, pp.5-6). The concept of science diplomacy can be also distinguished from traditional diplomacy. According to Ruffini (2017), the modern practice and understanding of science diplomacy arose amidst the rapid globalization of science and technology development, as well as changes in the conduct of diplomacy resulting from globalization. Ruffini emphasizes that, as the importance of scientific research as the backbone of technological innovation increases, scientific research is becoming increasingly reliant on international collaboration. Additionally, diplomacy is evolving to become increasingly multilateral, with the role of non-state actors growing in significance. The scope of diplomacy's intervention also has broadened, with soft power – the power of attraction and persuasion – gaining prominence in a nation's foreign policy objectives. Therefore, science diplomacy can be used as a public diplomacy tool to expand a nation's cultural prestige or influence while pursuing pragmatic foreign policy or economic objectives such as procuring new technology or essential R&D capacity (Stine 2009; Copeland 2011; Leijten, 2017; Krasnyak 2018).

One possible application of science diplomacy in public diplomacy is through science and technology official development assistance (ODA). Wilson

(2007) emphasizes that science and technology ODA has evolved from a one-sided transfer of technology to a process of mutual learning between donor and recipient countries, reflected in concepts such as knowledge management and innovation systems. This means that modern science and technology ODA should be viewed as a process of mutual learning between donor and recipient countries, beyond the traditional concept of technology aid as a one-way technology transfer. Krasnyak (2018) also argues that science ODA can serve as a long-term strategy for building influence and demonstrating the attractiveness of a country through its soft power. She suggests that science ODA could be adopted as “concrete steps to demonstrate a country's scientific and moral authority, as well as its ethical responsibility as a wealthy and advanced power” (Ibid, p. 49). Sunami (2016), describing Japan's science diplomacy strategy, also notes that Japanese ODA in science and technology is pursued with the goal of projecting Japan's commitment as a responsible, developed nation to seeking new and mutual solutions to global challenges with developing countries.

The scholarly literature on South Korea's science diplomacy engagement with remains relatively sparse. This gap in the literature can be attributed, in part, to the recent adoption of a strategy for science diplomacy by South Korea. In addition, despite the growing recognition of the importance of science and technology cooperation in fostering international partnerships, studies examining South Korea's relationship with Central Asia have largely concentrated on geopolitical and economic considerations (Koh, 2009; Mirzohid, 2022; Eom, 2023). This is partly due to the fact that South Korea's Central Asia policy is often described as pragmatist (Fumagalli, 2012; Dadabaev, 2017). Similarly, research on South Korea's ODA in Central Asia has mainly focused on strategies for integrating economic and trade collaboration to optimize the efficiency of ODA, with little attention paid to the potential role of science and technology partnerships (Kim, 2016; Bae 2019). Nonetheless, these studies acknowledge the importance of expanding ODA collaboration to include the fields of science, technology, and medicine as a means of establishing a more durable and sustainable partnership between South Korea and Central Asia (Lee 2015; Jung, 2022). Further research is necessary to better understand the prospects and challenges of South Korea's ODA as science diplomacy efforts in Central Asia.

Results and Discussion

South Korea's Science Diplomacy Strategy

South Korea owes much of its economic growth to science diplomacy and international scientific-technology cooperation. Since its emergence from the ruins of the Korean War, the country has pursued collaboration with other nations to drive its technological progress. Se-In Park's (2011) analysis traces the institutional evolution of South Korea's international S&T collaboration from the 1950s to the present day, identifying five stages: technology aids (1950s-70s), technology transfer (1970s-80s), mutual cooperation (1980s), expanded cooperation (1990s-2000s), and highly sophisticated cooperation (2001-present). During the 1950s-70s, South Korea relied heavily on technology aid to develop its industrial capabilities. This was followed by a shift towards technology transfer in the 1970s-80s. By the early 1980s, the country had reached a level of scientific and technological advancement that enabled it to pursue mutual cooperation with its partners on a more equal footing. South Korea began diversifying its S&T collaboration efforts beyond Western countries in the late 1980s and early 1990s, establishing specialized organizations like the Korean-Russian Science and Technology Cooperation (KORUSTEC) in Moscow to facilitate scientific and technological exchanges. These collaborations were also used for diplomatic gains, particularly in South Korea's efforts to build relationships with socialist countries, as demonstrated by the establishment of KORUSTECT (Moon 2023). Starting in the early 2000, South Korea focused on more complex cooperation that emphasized collaboration in basic science research and partnership in information and communication technology (ICT) sector. Overall, South Korea's international scientific and technological collaboration has evolved over time, reflecting changing priorities and the shifting global landscape.

According to Yoo (2022), South Korea's engagement in science diplomacy has primarily focused on the 'science for diplomacy' approach, with its achievements being evaluated based on research and development (R&D) accomplishments and implementations. As mentioned earlier, Korea has long been in a position to absorb science and technology from advanced countries, which has led to limitations in formulating a distinct science diplomacy strategy. In 2014, the South Korean

government introduced the “Comprehensive Plan for International Cooperation based on Science, Technology, and ICT,” marking a significant shift towards the systematic and strategic implementation of policies for international cooperation in these fields. The plan emphasized the economic benefits of science, aiming to “contribute to the enhancement of global status and the realization of a creative economy.” Its primary goal was to “create economic outcomes and enhance innovation capabilities through the global expansion of science, technology, and ICT” (Ministry of Science, ICT and Future Planning 2014). Thus, while the plan signaled a shift in policy, its focus remained on the economic aspects of science diplomacy.

South Korea's “Science and Technology Diplomacy Strategy for an Innovative and Inclusive State” was adopted in 2019 to address emerging diplomatic and security threats and intensifying global technological competition (Ministry of Foreign Affairs, 2019). Jointly established by the Ministry of Foreign Affairs and the Ministry of Science and ICT, this strategy aims to leverage science and technology to achieve three primary goals: building a common future and promoting innovative growth for humanity, fostering global collaborative growth, and protecting the safety and lives of Korean citizens. The strategy includes four main agendas: leading global agendas and promoting national interests, contributing to the sustainable development of the international community, improving national security and the standard of living for South Korean citizens, and establishing an implementation system for science-technology diplomacy. To achieve these agendas, the strategy outlines five tasks: building a science-technology diplomacy support system, expanding cooperation with countries possessing innovative and advanced technology, providing science and technology-related official development assistance (ODA), strengthening cybersecurity and overseas disaster response systems, and operating a policy council composed of relevant ministries involved in science-technology diplomacy.

Overall, South Korea's Science and Technology Diplomacy Strategy for an Innovative and Inclusive State demonstrates its dedication to utilizing science and technology to address global challenges and foster inclusive growth. The introduction of the “Science and Technology Diplomacy Strategy” marked the first time a specialized governmental organization was appointed to oversee science diplomacy. To expedite the implementation of the

science diplomacy strategy, South Korea's Ministry of Science and ICT initiated a novel project titled “Science Diplomacy” within the “Inter-governmental Cooperation Infrastructure Development Project” in 2020, designating the Korea Institute of Science and Technology Evaluation and Planning (KISTEP) as the executing agency. This project encompasses plans to establish a provisional “Science Diplomacy Center” and, as stipulated in the “Science and Technology Policy Directions for New Preparedness after COVID-19 (August 2020)”, appoints KISTEP as the “Science Diplomacy Center” to bolster its think-tank functions within the sphere of science diplomacy (Kim et al, 2021).

As of 2019, the government research and development (R&D) budget totals KRW 20.5 trillion, with international cooperation R&D representing approximately KRW 379.9 billion, or roughly 1.8% of the overall budget (Ibid, p. 101). Moreover, international cooperation R&D, in connection with the previously mentioned number of science and technology international cooperation projects, has been predominantly spearheaded by the Ministry of Science and ICT, which consistently allocates over 50% of its annual budget to this area. Although the term of science and technology ODA has only recently emerged, development aid initiatives in related fields, such as R&D capacity building in developing countries and technology transfers, have amounted to approximately KRW 152,9 billion constituting around 11% of the total budget for international science and technology collaboration (Kim et al., 2020, p.82). Furthermore, the Science and Technology Policy Institute (STEPI), a government research institution dedicated to formulating and assessing science and technology policies in South Korea, has initiated S&T policy consultations for developing countries as a form of ODA project. STEPI has branded its S&T policy ODA as the transplantation of South Korea's technology-driven development model, aiming to share the successful approach with other nations to foster their growth and innovation (STEPI 2019).

South Korea's science diplomacy and S&T ODA projects showcase the nation's commitment to fostering international collaboration and promoting inclusive growth through sharing its successful technology-driven development model. As we turn our attention to South Korea's ODA initiatives in Central Asia, we will further examine the impact of these efforts and explore how they contribute to the development and innovation in the region as well as South Korea's policy interests

South Korea's ODA in Central Asia as Science Diplomacy

Since 2006, with the adoption of the “Comprehensive Strategy for Advancing into Central Asia,” South Korea has pursued a series of plans and strategies to bolster foreign aid projects and solidify ties with Central Asian nations, particularly Uzbekistan and Kazakhstan. Following the enactment of the “Basic Law on International Development Cooperation” in 2010, South Korea has adopted a more systematic approach to selecting priority ODA partnership countries (Park et al, 2017). Consequently, Uzbekistan (2011-2015; 2016-2020; 2021-2025), Kyrgyzstan (2021-2025), and Tajikistan (2021-2025) were selected as priority ODA partner countries from Central Asia.

South Korea's ODA to Central Asia has steadily increased since 2006, reaching approximately 80 million USD in 2020. The proportion of South Korea's ODA to Central Asia also increased from 2.21% in 2006 to 4.18% in 2020. Between 2006 and 2020, the primary sectors receiving ODA were ‘education’ (31.2%) and ‘health’ (24%), followed by ‘public administration and civil society’ (12.3%), ‘communications’ (5.9%), and ‘industry’ (5.4%) (Moon et al, [forthcoming in 2023]). The education sector continuously held the largest share, peaking at 78.19% in 2011. The health sector maintained a significant proportion, especially during the COVID-19 pandemic, reaching around 45% in 2020. The communications sector witnessed substantial shares between 2006 and 2010, while support for public administration and civil society steadily increased from 2014. Assistance for the industrial sector expanded until the COVID-19 outbreak, with agriculture, energy, and other multi-sector areas also obtaining notable proportions at varying times. Additionally, between 2016 and 2020, South Korea's digital ODA—or aids provided for modernizing ICT infrastructure and improving digital technology usage among the local population—to five Central Asian countries constituted approximately 26.9% of the total ODA grants, with digital ODA amounting to roughly 88.18 million USD out of a total of 327.27 million USD (Ibid).

Uzbekistan received the highest proportion of South Korea's Central Asian ODA, with the first Country Partnership Strategies (2011-2015) and the second Country Partnership Strategies (2016-2020) focusing on cooperation in human resource development, healthcare, public administration, and water management. South Korea's ODA to

Uzbekistan increased from 5 million USD in 2006 to a peak of 58.45 million USD in 2020, with varying proportions of total ODA throughout the years. The sector representing the largest proportion of South Korea's ODA to Uzbekistan is education, with a total support of approximately 136.53 million USD (32.8%) from 2006 to 2020. Subsequent sectors include health (approximately 122.85 million USD, 29.5%), public administration and civil society (approximately 41.21 million USD, 9.9%), industry (approximately 28.8 million USD, 5.9%), and communication (approximately 24.7 million USD, 5.9%) (Moon et al, [forthcoming in 2023]).

Until 2012, Kazakhstan received the second-largest amount of official development assistance from South Korea, with the largest proportion allocated to education, followed by health and telecommunications, and notable allocations to trade policy, forestry, public administration, and civil society. The sector holding the greatest proportion of South Korea's ODA for Kazakhstan is education, which garnered a cumulative contribution of approximately 14 million USD (35.4%) between 2006 and 2020. Other significant sectors include health (approximately 5.5 million USD, 13.6%) and telecommunications (approximately 5.1 million USD, 12.5%). Furthermore, trade policy and regulations, forestry, public administration, and civil society each received over 2 million USD (5%) in ODA allocations (Moon et al, [forthcoming in 2023]).

Since 2012, Kyrgyzstan has become the second-largest recipient of South Korean ODA, with the 2022 Country Partnership Strategy (CPS) for Kyrgyzstan focusing on climate change mitigation, rural environmental improvement, administrative transparency, and public health (Joint Ministries of ROK, 2022a). Concurrently, the 2022 Tajikistan CPS aimed to align with the Tajikistan National Development Strategy 2030, emphasizing human and physical infrastructure, education, energy accessibility, and household income and food security, with the energy sector receiving the largest ODA proportion (Joint Ministries of ROK, 2022b). In contrast, South Korea's ODA to Turkmenistan prioritized education, accounting for a significant portion of the total support provided between 2006 and 2020, followed by allocations for various sectors.

In the previous section, it was mentioned that there is no specific code for science ODAs, making it challenging to track the number of projects and budget allocated to science and technology

development. However, in Uzbekistan, around 85 out of 129 ongoing ODA projects (as of 2022) involve some form of technology partnership, such as joint research, R&D capacity building, or education and training. The total budget allocated to these projects is 203.7 million USD (ODA Korea, 2022). Similarly, in Kyrgyzstan, 66 out of 87 ongoing ODA projects and in Tajikistan, 4 out of 18 ongoing ODA projects involve technology cooperation, with 3.8 million USD and 180 thousand USD allocated, respectively (Ibid). These figures indicate that science and technology are significant components of South Korea's development cooperation with Central Asia.

One notable example of South Korea's ongoing science and technology ODA in Central Asia is the country's collaboration with Uzbekistan on establishing the Center of Chemical Technology. This project represents a significant effort to advance Uzbekistan's chemical industry through technological innovation, human resource development, and infrastructure modernization and expansion. By working closely on this initiative, South Korea is not only promoting economic development in the region but also strengthening ties between the two countries. The success of this project may also serve as a model for South Korea's future science and technology ODA efforts in Central Asia.

South Korea-Uzbekistan's Cooperation on Establishing Center of Chemical Technology

Although Uzbekistan is the world's 11th largest gas producer, the country primarily uses and exports its natural gas as a low-value-added fuel (IEA 2020). In order to achieve economic development, the production of resource-based, high-value-added chemical products is crucial. Uzbekistan's geographical location as a doubly landlocked country makes maritime trade impossible, while its lack of coastal access presents challenges that hinder the construction of large-scale chemical plants for the mass production of chemical products. Moreover, the majority of Uzbekistan's chemical industry facilities were constructed during the Soviet era. Since the Soviet collapse, investment in new facilities and technological development has been limited. As a result, many processes remain manual, leading to low operational efficiency. Outdated systems and facilities also limit the growth of Uzbekistan's chemical industry. To address these challenges, investments in technology, human resources, and funding for infrastructure modernization and expansion are required.

In August, 2017, Uzbekistan introduced a national plan, "On the Program for the Development of the Chemical Industry for 2017 – 2021" (Presidential Resolution No. PP-3236) to bolster the national chemical industry's growth potential and export competitiveness. This plan featured 45 projects, including expanding domestic chemical production, increasing exports, developing new chemical products, creating jobs, conducting overseas market research, building partnerships with foreign companies, and attracting foreign investment. Through this program, Uzbekistan aims to double industrial production, increase exports by 1.5 times, develop over 30 new products, and create more than 3,000 new jobs within 4-5 years.

On October 25, 2018, President Mirziyoyev signed the presidential resolution "On Measures for the Accelerated Development of the Chemical Industry of the Republic of Uzbekistan" (Presidential Resolution No. PP-3983), which aims to promote the development and diversification of the Uzbek chemical industry. The resolution's primary objectives include expanding high value-added product manufacturing, boosting mineral fertilizer production and exports, attracting foreign direct investment, and promoting research and development. Chemical product production is anticipated to increase 4.5 times between 2018 and 2030, with mineral fertilizers doubling and exports quadrupling. The plan also involves establishing the Center of Chemical Technology (UzCCT) in collaboration with the Korea Research Institute of Chemical Technology (KRICT). This initiative for the cooperation began in September 2017, when the Uzbek ambassador to South Korea met with the Korean Chemical Research Institute (KRI) to discuss project direction. In November 2017, during the Uzbek President's visit to Seoul, a Memorandum of Understanding (MOU) was signed between KRI and the Uzbek Chemical Corporation.

In addition to providing a 40 million USD EDCF loan for constructing the Center of Chemical Technology, Korea and Uzbekistan have agreed to collaborate on designing and installing a chemical R&D system as part of KOICA's science ODA program (KOICA 2019, 2020). This cooperation focuses on comprehensive consulting for establishing the research institute, securing the organization, personnel, and budget required for the Center's operation, and joint research development. Comprehensive consulting involves analyzing Uzbekistan's chemical industry, related

industries, and technology; developing a mid-to-long-term roadmap for UzCCT considering the country's economic and social development; and establishing detailed plans for research areas and topics post-establishment. The project also aims to secure the organization, personnel, and budget for Uzbekistan to operate UzCCT. To support this, the research capacity-building program includes master's and doctoral degree programs for 12 master's and five doctoral candidates (Ibid). Majors will be assigned based on each field, taking into account the Uzbek side's input. Joint research will offer guidance, aiding initial R&D and standardizing operations during UzCCT's establishment phase. Research areas will be chosen considering factors such as Uzbekistan's current status, government policies, research demand, budget, UzCCT's size, and human resource availability. The final research areas chosen for UzCCT are petrochemicals, catalysis and polymer chemistry, fine chemistry, and process engineering. The Uzbek side maintains decision-making authority over joint research projects, research content, and research team composition.

The successful implementation of the UzCCT has the potential to considerably contribute to Uzbekistan's economic growth by bolstering the country's R&D capacity within a vital industrial sector. Furthermore, the human resource development program in the chemical technology domain is anticipated to generate employment opportunities in associated industries. This R&D in chemical technology will likely catalyze innovation and augment the production of high-value-added chemical products, facilitating the dissemination and enhancement of knowledge and experience in technology and innovation.

The project's primary objectives are to enhance Uzbekistan's R&D capacity in chemical technology, spur the nation's economic growth, and foster a strategic partnership between South Korea and Uzbekistan, consistent with South Korea's New Northern Policy. This policy endeavors to consolidate relations with Central Asian countries, including Uzbekistan, and diversify South Korea's economic and diplomatic ties. By offering technological support, cultivating research capacity, and establishing a foundation for collaborative research and development ventures, the project is poised to benefit both Uzbekistan's chemistry sector and South Korean enterprises exploring new prospects in the region.

The construction of the Center also contributes to South Korea's science diplomacy efforts in Central Asia, employing science and technology to advance international cooperation and construct bridges between nations. This engenders goodwill and trust, paving the way for collaboration between South Korean and Uzbek researchers, culminating in joint research and development initiatives, academic exchanges, and additional partnerships. Moreover, the project aligns with South Korea's New Northern Policy objectives, which seek to broaden its diplomatic and economic influence in Central Asia. By investing in Uzbekistan's chemical industry and championing research and innovation, South Korea can elevate its regional standing, position itself as a crucial partner for Central Asia's economic and technological growth, and reinforce bilateral ties, ultimately promoting regional stability and cooperation.

Conclusion

South Korea is actively engaging in science diplomacy and science and technology official development assistance (ODA) to promote international collaboration and inclusive growth. Its commitment to using science and technology to tackle global challenges is evident in the 2019 "Science and Technology Diplomacy Strategy for an Innovative and Inclusive State." However, the focus of this strategy has mostly been on the economic aspects of science diplomacy, indicating a need to broaden the scope of science diplomacy initiatives and include more policy objectives.

South Korea's science and technology ODA efforts in Central Asia, specifically in Uzbekistan, also demonstrate the country's dedication to sharing its successful technology-driven development model and fostering international collaboration. By investing in science, technology, and innovation in Central Asia, South Korea can establish itself as a valuable partner for economic and technological growth and strengthen bilateral ties, leading to regional stability and cooperation. A prime example of this is the ongoing partnership for the creation of the Center of Chemical Technology in Uzbekistan. This project has the potential to significantly contribute to Uzbekistan's economic growth by enhancing its R&D capacity in a crucial industrial sector. Additionally, the human resource development program in chemical technology is expected to create employment opportunities, spur innovation, and promote the production of

high-value-added chemical products. As a result, South Korea's science diplomacy and science and technology ODA in Central Asia can play a critical role in shaping the region's economic and technological landscape while promoting international cooperation between South Korea and Central Asia.

Acknowledgments

This work was supported by Global Research Network program through the Ministry of Education of the Republic of Korea and the National Research Foundation of Korea (NRF-2019S1A2A2032519).

References

- Bae, Joon-Hyun. (2019). Study on Evaluation and Development method Inclusive Trade Strategies of Korea's ODA: Focused on Central Asia, ASEAN FTA countries (in Korean). *Journal of Global Trade & Management*, 16-4. pp.45-75.
- Chang, Bowon and YoungJa Bae. (2020). Science and Technology ODA: Concepts and International Landscape (in Korean). *Journal of Asia-Pacific Studies* 27-4. pp. 195-227.
- Copeland, Daryl. (2011). *Science Diplomacy: What's It All About? CEPI-CIPS Policy Brief-13*. Center for International Policy Studies. <https://www.cips-cepi.ca/wp-content/uploads/2011/11/Copeland-Policy-Brief-Nov-11-5.pdf>. (accessed April 15, 2023).
- Dadabaev, Timur. (2017). Silk Road” as foreign policy discourse: The construction of Chinese, Japanese and Korean engagement strategies in Central Asia. *Journal of Eurasian Studies*, vol. 9-1. Pp. 30-41. <https://doi.org/10.1016/j.euras.2017.12.003>. (accessed April 20, 2023).
- Fumagalli, Matteo. (2016). Growing inter-Asian connections: Links, rivalries, and challenges in South Korean–Central Asian relations. *Journal of Eurasian Studies*, vol. 7-1. pp. 39-48. <https://doi.org/10.1016/j.euras.2015.10.004>. (accessed on April 20, 2023).
- International Energy Agency. (2020). Uzbekistan Energy Profile. *International Energy Agency: The Energy Mix*. <https://www.iea.org/reports/uzbekistan-energy-profile> (accessed April 20, 2023).
- Joint Ministries of the Republic of Korea. (2022a). *Kyrgyz Republic Country Partnership Strategy*. <https://odakorea.go.kr/articleFile/countryProfile/CPS/2022/KGZ.pdf> (accessed April 30, 2023).
- Joint Ministries of the Republic of Korea. (2022b). *Tajikistan Country Partnership Strategy*. <https://odakorea.go.kr/articleFile/countryProfile/CPS/2022/TJK.pdf> (accessed April 30, 2023)
- Jung, Sunmi. (2022). Current situation and tasks for public health and medical cooperation between South Korea and Central Asia: Focusing on Kazakhstan and Uzbekistan. *Journal of Eurasian Studies*, 13-2. pp. 212-221. <https://journals.sagepub.com/doi/full/10.1177/18793665221123596> (accessed on April 20, 2023).
- Kim, Wang-dong., et al. (2019). *[K-Innovation] 2019 International Technology Innovation Cooperation Project*. Sejong Science and Technology Policy Institute. <https://stepi.re.kr/site/iiccko/report/View.do?reIdx&pageIndex=1&searchYear=&searchCondition=&searchKeyword=&searchSort=&cateCont=A0203> (accessed on April 20, 2023).
- Kim, Jinha., et al. (2020). *Establishment of Strategies and Systems for S&T Diplomacy* (in Korean). Seoul: Ministry of Science and ICT of Republic of Korea, 2020.
- Kim, Jinha., et al. (2021). *The Study on Establishment of S&T Diplomacy and International Cooperation* (in Korean). Seoul: Ministry of Science and ICT of Republic of Korea.
- Kim, Taehwang. (2016). ODA Effects in Middle Asian Countries and Strategic Revitalization of Economic Cooperation (in Korean). *Journal of International Trade and Industry Studies*, 21-3 : pp. 81-103.
- Korea International Cooperation Agency (KOICA). (2019). *Basic Plan for Establishment of R&D Design Institute-Center of Chemical Technology in Uzbekistan (UzCCT) February 2019*. KOICA. https://lib.koica.go.kr/search/detail/CATTOT000000042469?mainLink=/search/tot&briefLink=/search/tot/result?type=local_A_commandType=advanced_A_si=TOTAL_A_st=KWRD_A_lmtn=000000000001_A_lmst=OR_A_oi=DISP06_A_os=DESC_A_lmt0=TOTAL_A_p1=91_A_q=%EC%9A%B0%EC%A6%88%EB%B2%A0%ED%82%A4%EC%8A%A4%ED%83%84+%ED%99%94%ED%95%99_A_x=0_A_y=0 (accessed April 23, 2023).
- Korea International Cooperation Agency (KOICA). (2020). *Basic Plan for Establishment of R&D Design Institute-Center of Chemical Technology in Uzbekistan (UzCCT) March 2020*. KOICA. https://lib.koica.go.kr/search/detail/CATTOT000000043122?mainLink=/search/tot&briefLink=/search/tot/result?type=local_A_commandType=advanced_A_si=TOTAL_A_st=KWRD_A_lmtn=000000000001_A_lmst=OR_A_oi=DISP06_A_os=DESC_A_lmt0=TOTAL_A_p1=91_A_q=%EC%9A%B0%EC%A6%88%EB%B2%A0%ED%82%A4%EC%8A%A4%ED%83%84+%ED%99%94%ED%95%99_A_x=0_A_y=0 (accessed April 23, 2023).
- Korea International Cooperation Agency (KOICA). *ODA Statistics*. KOICA. <https://stats.odakorea.go.kr/portal/odakorea/> (accessed April 30, 2023)
- Koh, Jae-nam. (2009). Korea's Diplomacy to Central Asia. In Jeong Eun-sook (Ed), *Korea's Diplomacy as a Developing State* (Sejong Policy Studies Series 2009-1). (pp. 55-98). Sejong Foundation.
- Krasnyak, Olga. (2018). *National Styles in Science, Diplomacy and Science Diplomacy*. Brill.
- Lee, Sang-Joon. (2015). Development Cooperation in ICT Sector among Korea and Inner Eurasian Countries (in Korean). *Sino-Soviet Studies*, 39-2. pp.121-151.

- Leijten, Jos. (2017). Exploring the Future of Innovation Diplomacy. *European Journal of Futures Research* 5. <https://eujournalofuturesresearch.springeropen.com/articles/10.1007/s40309-017-0122-8>. (accessed April 15, 2023).
- Ministry of Foreign Affairs of the Republic of Korea (MOFA). (2019). Government Announces Science and Technology Diplomacy Strategy for Innovative and Inclusive Nation. *Press Release*, October 31, 2019. https://www.mofa.go.kr/www/brd/m_4080/view.do?seq=369702#:~:text=%E3%85%87%20%E2%96%B3%EA%B8%80%EB%A1%9C%EB%B2%8C%20%EC%9D%98%EC%A0%9C%20%EC%84%A0%EB%8F%84,%EB%8C%80%20%EC%A0%84%EB%9E%B5%EC%9D%84%20%EC%A0%9C%EC%8B%9C%ED%95%98%EC%98%80%EB%8B%A4 (accessed April 20, 2023)
- Ministry of Science, ICT and Future Planning of the Republic of Korea (MISP). (2014). *Comprehensive Plan for International Cooperation based on Science, Technology, and ICT* (in Korean). MISP. http://www.msip.go.kr/cms/www/open/go30/info/info_1/1220056_1305.html (accessed April 20, 2023)
- Moon, Kyungyon, et al. (2023 [forthcoming]). *Development and Application of “K-Better Digital Inclusiveness Indicator” for South Korea’s Central Asian ODA Strategy in the Post-COVID-Era*. KOICA.
- Moon, Manyong. (2023). South Korea’s Detent with Soviet Russia: Building Diplomatic Relationship through Science and Technology Diplomacy, 1988–1998. *Journal of Eurasian Studies*, 14-1. pp.43-52. <https://doi.org/10.1177/1879366523116056> (accessed April 30, 2023).
- Park, Joungho, Park. Boogyun Kang, and Yun ChiHyun. (2017). *Analysis on Development Issues in Central Asia and its Implications for Korea’s Development Cooperation*, Korean Institute for International Economic Policy.
- Park, Se-in, Park. (2011). “Institutional Evolution of Korea’s International Cooperation of Science and Technology from the Viewpoint of Historical Institutionalism” (in Korean), *Journal of Korea Technology Innovation Society* 14-3. pp. 516-551.
- Royal Society and American Association for the Advancement of Science. (2010). *New Frontiers in Science Diplomacy*. London: Royal Society. https://www.aas.org/sites/default/files/New_Frontiers.pdf. (accessed April 5, 2023)
- Ruffini, Pierre-Bruno. (2017). *Science and Diplomacy: New Dimension of International Relations*, London: Springer.
- Stine, Deborah. (2009). *Science, Technology, and American Diplomacy: Background and Issues for Congress*. CRS Report. <https://digitalcommons.unl.edu/crsdocs/56/>. (accessed April 15, 2023)
- Sunami, Atsushi. (2016). Japan’s Science and Technology Diplomacy. Carnegie Endowment for International Peace. <https://carnegieendowment.org/2016/02/10/japan-s-science-and-technology-diplomacy-pub-63476>. (accessed April 15, 2023)
- Turekian, Vaughan., et al. (2014). The Emergence of Science Diplomacy. In Lloyd Davis and Robert Patman (Eds). *Science Diplomacy: New Day or False Dawn?* World Scientific Publishing Company, pp.3-24.
- Yoo, Jungu Yoo. (2022). *Recent changes in science and technology diplomacy Korea's response* (in Korean), IFANS 2022-40. Ministry of Foreign Affairs. <https://www.ifans.go.kr/knda/ifans/kor/pblct/PblctView.do?csrfPreventionSalt=null&pblctDtaSn=14113&menuCl=&clCode=P01&koreanEngSe=KOR&pclCode=&chcodeId=&searchCondition=searchAll&searchKeyword=&pageIndex=1> (accessed April 20, 2023).