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Cooperation in Science and Technology for Building a Shared Future

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Graphic Design • Mehmetcan Öztürk

Editorial Office • Aksaray Mah. Cerrahpaşa Cad. No: 5 D: 9 Fatih-İstanbul +90 (212) 586 72 31
www.briqjournal.com • editor@briqjournal.com

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Emine Sağlam on behalf of Turkish-Chinese Business Development and Friendship Association

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Principles of Publication

At a time when US ambitions for a unipolar world order have lost their appeal, a new order is taking shape thanks to the multipolarization of world politics and the acceleration of cooperation between developing countries, rejecting the globalism of imperialist states. Under these conditions, the new agenda of global cooperation should respond to the needs and aspirations of developing countries seeking joint development and solidarity under the guidance of public-driven projects. In particular, the Belt and Road Initiative (BRI) -put forward in 2013 by Xi Jinping, President of the People's Republic of China- provides a suitable opportunity and a sound foundation for the implementation of this new agenda of global cooperation.

BRI is an epoch-making move to re-implement the concept of the Silk Road, which dates back 2,000 years, to a time when China was immensely contributing to global prosperity and the development of trade and cooperation. The revival of this concept entails a much more comprehensive approach that also incorporates rail and sea transport, and digital systems.

BRI proposes to bring together over 60 countries across Asia, Europe, Africa, and Latin America –together accounting for nearly half of the world's gross domestic product– for prosperity and development at the initiative of China. Unlike the Western-centered world order, BRI seeks peaceful collaboration for improving global trade and production towards common goals for humanity. It firmly rejects crude imperialist exploitation. Two thousand years ago, the Silk Road was a conduit for the flow of gunpowder, spices, silk, compasses and paper to the world. Today, it offers artificial intelligence, quantum computers, new energy and material technologies, and space-age visions to developing countries. In addition, the New Silk Road provides incentives and opportunities for the development and implementation of bio-economic schemes in stakeholder countries against the threat of climate change and other environmental threats that bring the entire ecosystem to the brink of extinction.

Turkey has a significant role –real and potential– in accelerating South-South cooperation. Turkey is conveniently located as Asia's farthest outpost to the West. It assumes a critical position as a pivotal country on BRI's North-South and East-West axes. However, China's development and BRI's contribution to the future of humanity have remained to a large extent underrecognized and superficially evaluated in Turkish academia, media, and politics. This is mainly because Turkey's academics, media professionals, and policy makers have been observing China using Western sources. In the same manner, China and BRI's other potential partners have been viewing Turkey through a Western lens.

BRIQ has committed itself to developing an in-depth understanding of the present era, with a particular emphasis on the new opportunities and obstacles on the road to the New Asian Century.

BRIQ assumes the task of providing direct exchange of views and information among Chinese and Turkish academics, intellectuals, and policy makers. In the meantime, this journal will serve as a platform to bring together the intellectual accumulation of the whole world, especially developing countries, on the basis of the Belt and Road Initiative, which presents a historic opportunity for the common future of humanity.

BRIQ is also devoted to publishing research and other intellectual contributions that underline the transformative power of public-driven economies, where popular interests are upheld as the basic principle, ahead of individual profit. The fundamental tasks of BRIQ are to demonstrate how BRI can contribute to the implementation of this public-driven model, and to help potential BRI partners -including Turkey- to realize their real potential.

BRIQ stands for the unity of humanity and a fair world order. It will therefore be a publication for the world's distinguished intellectuals, especially those from Eurasia, Africa, and the Americas: the defenders of a new civilization rising from Asia on the basis of peace, fraternity, cooperation, prosperity, social benefit and common development.

Submission Guidelines

BRIQ features a broad range of content, from academic articles to book reviews, review essays, interviews, news reports, and feature articles.

The Editorial Board can issue calls for papers for special issues and invite authors to contribute manuscripts; however, it also welcomes unsolicited submissions.

Submissions are invited in English or Turkish. All submissions are to include a short biography (150-word limit) and should be sent as Microsoft Word attachments to briq@briqjournal.com Articles or other content that have been previously published or are under review by other journals will not be considered for publication.

BRIQ follows American Psychology Association (APA style, 6th edition, https://www.apastyle.org) and uses American English spelling.

BRIQ applies a double-blind review process for all academic articles.

Academic articles should be between 5000 and 9000 words in length, including abstracts, notes, references, and all other content. Please supply a cover page that includes complete author information, and a fully anonymized manuscript that also contains an abstract (200-word limit) and five keywords.

Book reviews should not exceed 1,000 words; review essays covering two or more works can be up to 3,000 words.

News reports consisting of brief analyses of news developments should not exceed 1,500 words; feature articles combining reporting and analysis can be up to 3,500 words.

Please contact the Editorial Board for interview proposals.

EDITORIAL

Few would deny that scientific and technological development responds to social needs. In our time, huge problems threatening the common future of humanity await resolution through scientific and technological advances.

It is possible to discern two different attitudes towards the solution of such problems in the present age. Firstly, the way the developed capitalist countries deal with these problems is certainly building up to a dead end. The ultimate solution for the metropolitan centers of the capitalist-imperialist system is to put the burden on to the shoulders of developing countries and to ensure the continuation of the neoliberal system for a certain period of time. However, the very source of the problems threatening the common future of humanity is the system itself. Genuine efforts to solve these problems cannot generate any profit of a substantial size. It follows that making large-scale public investments and conducting globally coordinated planning activities necessary to secure the common future of humanity are definitely out of consideration from the standpoint of the capitalist centers. Hence, the advanced capitalist countries in the developed world do not have any intention for substantially improving scientific and technological cooperation with the rest of the world.

The second perspective is the perspective of the developing world. The priority of developing countries is sustainable economic development. During the 1980s and 1990s, most of the developing countries were rendered dependent on the programs of the World Bank and the IMF, and became paralyzed under the heavy load of foreign debts.

This being said, the recent developments in the pandemic era have clearly demonstrated the superiority of a public-driven system over neoliberalism. Public-based policies have become the necessary condition for success in overcoming the negative consequences of the COVID-19 pandemic, which has caused worldwide economic turmoil, while exposing the interconnection between the economy and the environment.

Under these circumstances, there seems no other solution for sustainable development than implementing a planned and public-driven mixed economy for the developing world. This also requires the guidance of science and technology, which can only be only be fully realized through closer scientific and technological cooperation between developing countries, adding to other areas of cooperation, from economy to national security and foreign policy.

In this respect, the Belt and Road Initiative (BRI) assumes an ever-increasing relevance. BRI's guiding principle of "shared development" is a direct response to humanity's need for scientific and technological cooperation. One could argue that the cooperation model proposed by BRI foresees a holistic paradigm shift at the level of countries and societies. The basis of this change can be phrased as "collectivism versus individualism", or "sharing versus competitiveness". Herein lies the key that will secure the common future of humanity. In this framework, the International Association of Scientific Organizations (ANSO), which includes the Chinese Academy of Sciences (CAS) and The Scientific and Technological Research Council of Turkey (TÜBİTAK), has started to develop a closer collaboration in the area of science and technology, responding to the specific needs of developing countries. This cooperation model guided by the principle of "shared development" offers the developing world the opportunity to realize their fullest potential of development. It also imposes a duty to take the lead in this process, especially for major countries such as Turkey and China, including their scientific institutions, scientists and intellectuals, in order to solve huge problems threatening humanity's common future.

FİKRET AKFIRAT
Editor-in-Chief

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Executive Director, the Secretariat of the Alliance of International Science Organizations (ANSO) Prof. Jinghua CAO:

"Our Mission: Scientific Cooperation for Shared Development in the Belt & Road"

Prof. Jinghua Cao is Executive Director at the Secretariat of the Alliance of International Science Organizations (ANSO). Before his current position, Prof. Jinghua Cao was Director-General of the Bureau of International Cooperation (BIC) at the Chinese Academy of Sciences (CAS). He is an English major and graduated from the Beijing Foreign Languages Institute in 1982. He holds a master's degree in Business Management and International Policy from CCNY, U.S. (1987). He has worked in different posts that allowed him to gain experience in international relations at CAS such as Deputy Director of the Office of External Financing, Deputy Director and Director of the Office of American and Oceanian Affairs (BIC), Assistant Director, Deputy Director-General and Director-General of BIC. He also worked as a Second and First Secretary in the S&T Section of the Chinese Embassy in Washington D.C., US, from 1995 to 1997. His research interests are science policy and international cooperation in science and engineering. His publications include several articles in international SCI journals.

"Our vision is to and build a community for the whole humankind with a shared future under the principles of the BRI drawn discussions. We promote shared benefits with a set of concrete Science, Technology, Innovation, and Capacity building actions (STIC). The 2020 call for ideas and suggestions for ANSO-led collaborative research focused on four priority areas: Environmental challenges, agriculture & food security, health, well-being, and green technology. 75 proposals from ANSO members have been received with the participation of research institutes and universities in the BRI region. The ANSO Cross-cutting Platform includes the Health Corridor, Food Security Corridor, Green Technology Corridor, and would be developed Energy Corridor, which are developed to integrate various scientific research, innovation, and technology, and encourage tech transfer that benefits green development and human well-being. As an international science organization, ANSO attaches great importance to knowledge, information, communication, and dissemination. Very early on, almost one month after the outbreak of the pandemic, Chinese scientists developed the DNA sequencing information of COVID-19. ANSO used its own communication channel to quickly disseminate genome information to the rest of the world through our network or our newsletters."

Prof. Jinghua Cao answered the questions of BRIQ Editor Deniz Eren Erişen.

First, what kind of partnership does ANSO represent? Could you briefly tell us about the establishment process of ANSO and the scientific institutions and organizations cooperating with ANSO from the beginning?

Jinghua Cao: The Chinese Academy of Sciences (CAS) attaches tremendous importance to international collaboration. We consider international cooperation a key to CAS's continuous growth and development, and its continuing impact in the international scientific arena because you have to be engaged with the rest of the world to do innovative work. Today, innovation occurs in all parts of the world.

Transformations are occurring in different sectors of the economy. We want to be open to this change so we can continue to be innovative and contribute CAS's accomplishments to the rest of the world. When I was Director-General of the Bureau of International Cooperation of CAS, we gave particular emphasis to the internationality of CAS Science and Technology. We engaged a lot of countries and a lot of institutions. In the last couple of years of my term as Director-General of that department, we created about 10 overseas research and education sites and centers, from Chile to Brazil from Brazil to Sri Lanka and Central Asia. We also reached Kenya in Africa and Myanmar in Southeast Asia, for instance, where we have a biodiversity research centre.

Also, we had extensive engagements with institutions in many developed economies, including activity with the United States. For a time, we had a good partnership with US national lab under the U.S. Department of Energy and

some of the United States' universities. Also, the Max Planck Society in Germany and the National Research Center in France.

The Chinese Academy of Sciences took an important role in the creation of ANSO. As is known, the idea of establishing ANSO first appeared in the "First International Science Forum of National Scientific Organizations on the Belt and Road Initiative" held in Beijing in November 2016. This Forum resulted in the "Beijing Declaration." Can you tell us about the Chinese Academy of Sciences and its contributions to the Beijing Declaration?

Jinghua Cao: When the Belt and Road Initiative was proposed by the Chinese government, as the largest national R&D organization, CAS believed it should have a role in it, including our scientists from CAS and the Chinese community, and our international partners, they all thought so. They called for a more prominent role of Science and Technology collaboration in the quality development of the BRI. This is because scientists can look to a new paradigm through scientific collaboration.

My department played a critical role in immediately putting the CAS management ideas into practice. With international S&T community, we organized the first International Symposium on the Belt & Road. That brought together about thirty institutional members and roughly four hundred scientists. There were discussions centered around different topics, like natural disasters, prevention and mitigation of climate change, studies about biodiversity, and education and capacity building for a better future. There was also discussion about how we could

ANSO focuses on promoting scientific awareness, technological inclusion, knowledge sharing and capacity enhancement for combating desertification in the Belt and Road countries. (ANSO's website, 2020)

use the best scientific developments for a solution to address problems like drinking water and making life sustainable, and ensuring that we would have a robust variety of seeds to grow even under the impact of climate change.

ANSO emphasizes concrete actions, aiming to address problems rather than just produce strategic analysis and studies. But of course, strategic analysis is essential, too. This emphasis can gradually build up ANSO's international impact.

Our collaboration partners from overseas say "The Belt & Road Initiative does give a paradigm shift in terms of enhancing international collaboration". A lot of scientists want to use the opportunity to enhance the collaboration in their areas but of course for the general public good.

The Beijing Declaration contains three elements. The first element is to give a more prominent role of science and technology in the quality development of the Belt & Road. The second is to rely on international scientific collaboration for the constructive development of the Belt & Road. Third, we need to create some kind of platform or coordination mechanism to achieve synergy and cooperative effects and we can promote international collaboration for the benefits of green and sustainable development. "Green" and "sustainable" were keywords in the first Symposium. You see, to develop a quality Belt & Road, you have to be sustainable and green.

Delegates and representatives from twelve international institutions, universities, and international organizations, including CAS, held a meeting in Islamabad. We discussed and drafted the ANSO's statures. We did not have a good sense about how to create an international organization at the time. I did not realize how complicated it would be, but of course, and thanks to my previous engagement with The World Academy of Sciences (TWAS), InterAcademy Panel (IAP). We worked it out with international partners' assistance and came up with the draft of ANSO's statures. Then we circulated it to the institutions that participated in the first symposium. Of course, this is a very long and challenging process. Basically, you need to talk with all the stakeholders, you have to be as transparent as possible.

Many issues require a shared solution for the common future of humanity. These issues include climate change, resource problems, natural disasters, infectious diseases, and food security. What is ANSO's foresight in this context? How does ANSO support the Belt and Road Initiative for science-based solutions?

Jinghua Cao: We realized that we need to create an international science organization that emphasizes concrete actions. Our vision is to promote to promote the realization of the United Nations' Sustainable Development Goals (UN SDGs) and build a community for the whole of humankind with a shared future under the principles of the BRI drawn discussions. That's our aim! ANSO emphasizes concrete Science, Technology, Innovation, and Capacity building actions (STIC), aiming to address concrete problems rather than just producing strategic analysis and studies. But of course, strategic analysis is essential, too. This emphasis can gradually build up ANSO's international impact. So, we also engage in strategic studies, science policy analysis, advising the government and societies for science based decision-makings. The ANSO voice and influence are heard in the rest of the world.

We emphasize in our society how important it is to use solidarity and collaboration to achieve our goal. For example, if you don't wear a mask, you not only affect yourself but also others, including your neighbors, your relatives, and friends. So it's imperative to wear one. So that's why I would see that discipline is needed to address some of the challenges.

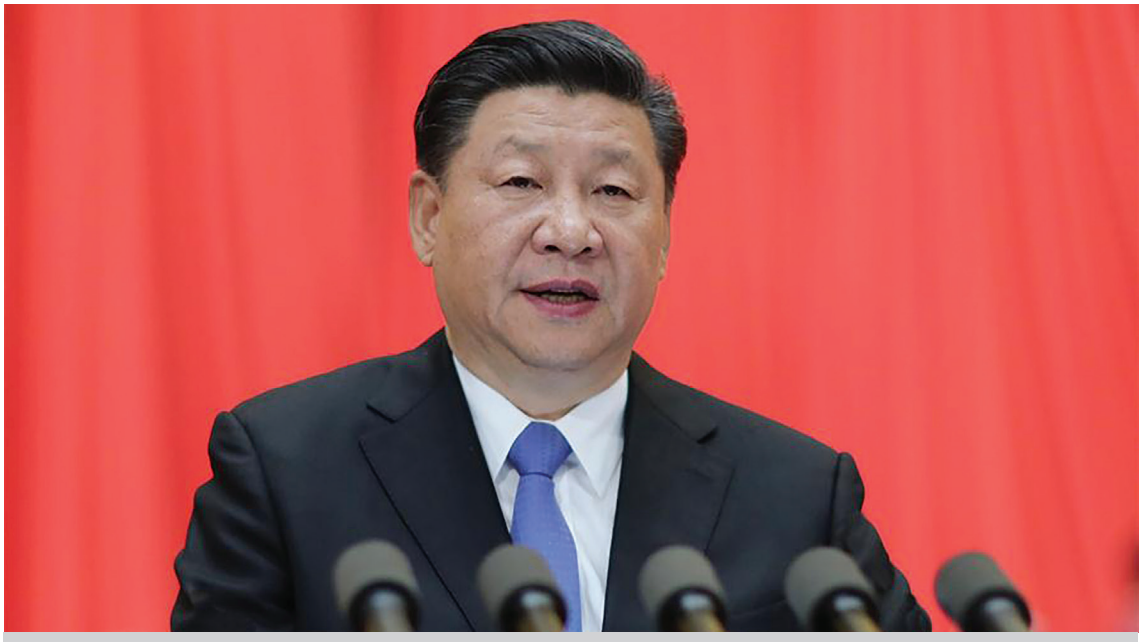
We designed our studies to be released to the rest of the world. We have also provided some strategic advice to my government on how to R&D develop a vaccine for public good under the pandemic, how can we turn a vaccine into a globally needed product, how we should intensify efforts to protect biodiversity conservation to global groups and how to prevent the occurrences of invasive species.

In terms of science-based advice, we are very proud to say that health has been a primary priority in our agenda even before the outbreak of the pandemic.

We conduct strategic studies because we can benefit from the contributions of scientists in China and international partners and some of the CAS academicians. We also have a few science ambassadors from selected overseas countries. They can help us promote green/sustainable concepts to promote global efforts to address climate change.

We see that ANSO provides an essential framework for scientific cooperation, especially for the Belt and Road nations. President Xi said, "Science has no (geographical) boundaries, but scientists have their homeland." What are the effects of President Xi and the Chinese Communist Party's programs on ANSO's projects?

Jinghua Cao: Let me answer this from two perspectives. One is that ANSO was created under the general framework of the BRI's proposal.



Chinese President Xi Jinping addresses the opening of the 19th Meeting of the Academicians of the Chinese Academy of Sciences in Beijing, capital of China, May 28, 2018. (Ju Peng/ Xinhua)

As I mentioned earlier, as the largest national science research organization, it would not be right for CAS to not play a role in this most prominent international collaboration proposal ever made by China. Look at the Belt & Road! The BRI is intended to add value to the global community, to create a better world, to create a community of the whole of humankind with a shared future to address our problems and achieve development. If you look at the issues and challenges we face, you would acknowledge the need to emphasize development, meanwhile, we should also emphasize green and sustainable development.

Putting together scientists with a worldwide vision will also resolve issues in their own homeland. I think that's a very wise idea and we encourage our scientists to contribute to the rest of the world.

I look at the UN SDGs as a publicly, globally accepted concept. I would say the Belt & Road is one of the best exercises in actively advancing the UN's actions for sustainable development. The BRI puts a lot of concrete actions in achieving globally designed objectives. It is a grant proposal, and it aims to a better world. The BRI also gives many wonderful opportunities for Chinese scientists to be interactive with global scientists to address global commonalities, common challenges such as climate change, environmental protection, and energy challenges. CAS has to be involved.

Of course, President Xi's thought also gives clear instructions that ANSO should be heading to green sustainable core development.

Gladly, through hard efforts, we got a letter of congratulations from President Xi at the launch of ANSO. President Xi indicated that in the letter, such collaboration enhances our policy capacity around the world, and addresses some of the common challenges that we all face. He, therefore, advises enhancing the role of the ANSO member institutions to address this challenge together. He pointed out some of the directions that ANSO should go in: BRI's construction is the road of green/sustainable development, the road of innovation, and the road of health. I have to say that ANSO's vision and objectives are clearly in line with UN SDGs, too. For the Chinese scientists, President Xi advises them not only to think about problems in China but we should also care about the rest of the world. Of course, we'll have to care about problems and challenges in our own home countries, so they are combined into a global attitude with home attitude. You can contribute to addressing the challenges of your country. You can also contribute to addressing global challenges. Putting together scientists with a worldwide vision will also resolve in their own homeland. I think that's a very wise idea and we encourage our scientists to contribute to the rest of the world. We're also told that things from other countries will work with both sides together to address global challenges.

One of the prominent studies supported by ANSO is the Multi-Model-Integrated Subseasonal-to-Seasonal Prediction and Application in Disaster Risk Reduction (MISSPAD). Could you inform us about MISSPAD, its activities, and networks?

Jinghua Cao: ANSO-MISSPAD is an important project that provides timely and effective weather and climate forecasting services. It offers regular academic seminars and short-

term training courses to improve the capability of forecasting disasters such as floods, droughts, high temperatures, cold waves, and typhoons. MISSPAD aims to protect people's lives and property in the Belt and Road countries and reduce losses from natural disasters. It has released more than ten newsletters, which made forecasts for the following seasons for Central Asia, South Asia, Southeast Asia. It has done excellent work predicting the spring drought in Southeast Asia, the typhoon season, the summer rainfall pattern, and the Arctic sea ice extent. ANSO-MISSPAD also works with partners to issue early warnings of extreme climate events.

I can give you an example of how it works. On September 3, 2020, a fully loaded oil tanker caught fire and lost power near the east coast of Sri Lanka. This tanker was 330 meters long and a huge crude oil carrier chartered by the Indian Oil company. Immediately after the accident, the ANSO-MISSPAD team launched the emergency forecast of Indian Ocean cyclones and ocean currents. The team provided the prediction results for relevant organizations and rescue teams in Sri Lanka. They also informed the ships nearby via media of the latest rescue situation and weather forecast to keep away from the sea areas in advance and pay attention to the changes of wind direction and ocean currents. The team was acknowledged by the Sri Lanka government and the Chinese Embassy in Sri Lanka. This incident highlighted the critical role MISSPAD plays

ANSO Collaborative Research Areas (ANSO website, http://www.anso.org.cn/programmes/flagshipProject/research/)

in international scientific cooperation and disaster prevention in the Belt and Road regions.

Could you give us information about other ANSO collaborative research that addresses sustainable development? How can health, food security, green technology, and energy corridors be improved based on ANSO-led projects?

Jinghua Cao: ANSO led collaborative research places emphasis on S&T cooperation and partnerships between ANSO Members and partners in areas of high importance for green and sustainable development. The 2020 call for ideas and suggestions for ANSO led collaborative research focused on four priority areas: Environmental challenges, agriculture & food security, health, well-being, and green technology. 75 proposals from ANSO members have been received with the participation of research institutes and universities in the BRI region. The ANSO Cross-cutting Platform includes the Health Corridor, Food Security Corridor, Green Technology Corridor, and would be developed Energy Corridor, which are developed to integrate various scientific research, innovation, and technology, and encourage tech transfer that benefits green development and human well-being.

Here are examples of the two corridors from the ANSO Cross-cutting Platform: The ANSO Food Security Corridor is set up to safeguard regional and global food security by improving agriculture science's research capacity and implementing the related advanced technology in the BRI regions. This platform extended in-depth cooperation and research for natural disaster prediction, hybrid rice and wheat, food productivity assessment, high-efficiency irrigation, and insect pest control.

One of the programs is Investigation and Monitoring of Agricultural and Forestry Pests in the Interior of Central Asia. This activity will carry out investigations on agricultural and forestry pest resources, collect specimens and samples of pests and assist the foreign partners in building the resource database of pest samples. The DNA barcode sequence of pests will be obtained to construct the DNA barcode database and form the rapid identification system of important harmful pests based on DNA barcode technology. The pest monitoring network will be established in Central Asia's interior based on China's mature pest monitoring technology and equipment to export biological control technology and products. It will demonstrate their applications in Uzbekistan, Kazakhstan, Tajikistan, Turkmenistan, and other countries. Through technical training and joint implementation, professional technical teams and young scientific researchers for Central Asia will be cultivated.

What about the Health Corridor?

Jinghua Cao: The ANSO Health Corridor is one of the flagship platforms focusing on technology transfer on Health Products, Clean Water, Low-Cost Medical Care, and Medicines & Vaccines. This platform puts a significant effort into setting up innovation-based enterprises to help high-quality development by integrating resources from different stakeholders. Regarding clean water technology, ANSO is promoting activities under the ANSO Health Corridor, for example, Feasible Technologies and Strategies for Safe Drinking Water in Southeast and South Asian Countries.

RCEES aims to establish collaborative research with distinguished scientists and experts to jointly develop feasible and sustainable drinking water purification technologies and integrated facilities for residents.

Drinking water safety is a big issue and a grand challenge for social development and human well-being in the "Belt and Road" countries. In the past ten years, the Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (RCEES) has made significant progress in technology invention and implementation for rural areas, foreign-aid projects promotion, and international networks built-up. This ANSO activity aims to establish collaborative research with distinguished scientists and experts from Burma, Nepal, Sri Lanka, and Bangladesh to jointly develop feasible and sustainable drinking water purification technologies and integrated facilities for residents. Additionally, it will help establish the ANSO regional network in the water and environment field for sustainable cooperation among the Southeast and South Asian countries and accelerate knowledge transfer and experience sharing under the ANSO framework.

We are curious about ANSO's examples of international cooperation in combating COVID-19. Has ANSO been effective in vaccine development and phases of clinical research and data processing on vaccines' effects on communities

Jinghua Cao: As an international science organization, ANSO attaches great importance to knowledge, information, communication, and dissemination. Very early on, almost one month after the outbreak of the pandemic, Chinese scientists developed the DNA sequencing information of the COVID-19.

ANSO has its own communication channel to quickly disseminate genome information to the rest of the world through our network or our newsletters. The President of ANSO gave specific emphasis on that. We need to release this information and share it with the rest of the global community as quickly as possible because that is valuable information for the development of testing kits, vaccines, and drugs. So, we did play a very effective role in disseminating knowledge.

In terms of the active development of vaccines and drugs, ANSO is an international scientific organization. We rely on research institutions and universities outside of international labs. We assisted our scientists in achieving several partnerships, for instance, with Brazil. We supported each other's efforts to create quick testing kits. They have achieved a lot of progress. We also help our institute in Shanghai, Shanghai Institute of Materia Medica, to create a partnership in developing drugs against the virus. Through that partnership, they identified a unique local drug with Uzbekistan. Uzbekistan quickly approved it for emergency use.

I'm proud to say that ANSO has played a major role in conducting the third phase in clinical trials of protein-based vaccine developed by CAS, Institute of Microbiology, and China's Anhui Zhifei Longcom Vaccine company. We reached 7,000 subjects already during Phase trials. And Phase III clinical trials are going on in Uzbekistan. We also conducted the trial in Pakistan. ANSO is playing a role in the communication and organizing of trials. We

Scientists conduct clinical researches for vaccine against COVID-19. (CGTN, 2020)

had a role in organizing over 20 different webinars to locate good international partnerships to carry out the third phrase clinical trials of that vaccine candidate.

It is an effort to show we have another public vaccine candidate not only for the benefit of China but also for the rest of the world. The advantage of this vaccine is that it can be transported and stored at an average temperature from 2 to 8 ˚C. Still, the mRNA vaccines produced by Pfizer or Moderna can only be transported and stored at low temperatures. Pfizer needs -18 ˚C, and Moderna needs -20 ˚C. It is very hard to use them unless you have a facility. Arrangement of logistic requirements is very tough, especially for developing countries. So ANSO tries to share and promote alternatives.

ANSO believes health and diseases are a big issue; we think that ANSO should play a more critical role. We are engaging with the Bill Gates Foundation to develop vaccines not only for COVID-19 but for other infectious diseases. We can have a more prominent role in developing some of the vaccines that humankind needs.

In addition to vaccines, ANSO organized several major international conferences discussing the numerous scientific developments and achievements in the development of testing kits, drugs, and vaccines.

We see that China is relatively more experienced and more predictive in combating the pandemic than Western countries. One of the remarkable events of ANSO, especially before the pandemic, is the International Conference on Silk-road Disaster Risk Reduction and Sustainable Development. What can you say about the scope and outcomes of this conference?

Jinghua Cao: The Belt and Road countries' environments vary across regions, and there are frequent natural disasters like earthquakes, floods, and droughts. These factors threaten the

regional development and peoples' livelihood. According to United Nations data, the disaster losses in the Belt and Road countries are twice more than the world average. Clearly, there is an urgent need to promote international cooperation in disaster risk reduction and sustainable development along the Silk Road. It was crucial and necessary to hold this conference. It aimed to enhance the Belt and Road Countries' resilience against natural hazards and their ability to secure peoples' livelihood. We brought together over one thousand leading scientists, researchers, and scholars along the Silk Road countries to exchange their experiences and research results about disaster prevention and sustainable development.

ANSO-DRR's goal is to build an international platform for joint research and sharing information on natural disaster studies. It also includes resource development, ecological protection, disaster mitigation, sustainable development, and personnel training.

This conference's most outstanding outcome is the founding of the Alliance of International Science Organizations on Disaster Risk Reduction (ANSO-DRR). Its goal is to build an international platform for joint research and sharing information on natural disaster studies. It also includes resource development, ecological protection, disaster mitigation, sustainable development, and personnel training. In the future, ANSO-DRR will promote international cooperation in disaster risk reduction along the Silk Road, advance the implementation of the Sendai Framework for Disaster Risk Reduction and the Sustainable Development Goals 2030. Hopefully, it will contribute to the construction of a Community of the shared future for mankind.

ANSO-DRR now has nearly thirty members and successfully held many training courses about disaster prevention along the Silk Road. It has provided crucial support for the risk analysis and disaster reduction among the Belt and Road countries. Its influence is growing stronger worldwide

ANSO's support for scientific and academic education is known mainly by graduate students and young academics. What is ANSO's support for graduate students, junior researchers, and young academics?

Jinghua Cao: I admit that the pandemic has had adverse impacts on some ANSO programs. Otherwise, we would have launched more young mobility programs. For instance, we designed a program to share the ample scientific facilities of China for scientists all around the world, primarily young scientists from developing countries. China has lots of large science facilities, like particle physics, giant telescopes, and the Five-hundred-meter Aperture Spherical Radio Telescope in Shanghai.

China has a large number of research facilities we want to share with the rest of the world for research and innovation, not only with Western countries but also with our neighbors and developing countries such in the Five-hundred-meter Aperture Spherical radio Telescope (FAST), Experimental Advanced Superconducting Tokamak (EAST) and so on. Young scientists in their early career in science, trying to find research partnership opportunities are welcomed to apply for the program. Senior scientists worldwide will also be invited to carry out first-class scientific projects on our facilities.

The First ANSO Young Scientists Forum held in Hangzhou on November 9th, 2019. (ANSO, 2019)

We have another program for young scientists who graduated from CAS institutes as previous PhD students. After completing their PhD, they want to return to their homeland, they may join a university in Kenya, in Turkey, in South Africa. We want to provide them with some of the best minds. They have to be very scientific and show tremendous potential to be career scientists. We want to create funding to help them get connected with home institutions and with mentors and collaborators from China. This will create a long-term international partnership for specific countries and the needs of science continue to push scientific development in particular areas. ANSO is willing to act as an extended value-added platform of the existing CAS international collaboration. Within CAS, they have an international collaboration department. ANSO is designed initially for collaboration with developing countries.

CAS has an extended international collaboration portfolio with many programs that encourage international scientist mobility for both young and seniors.

We heard that ANSO is creating a technology transfer platform between developing nations. Could you give more details about this platform?

Jinghua Cao: To answer that question, the best way is to investigate ANSO's work or strategic priorities. We have a range of tools to achieve

our region and objectives at home. We hope that funding can also come from our collaborators a little bit. That will make a big difference instead of only just one way of funding. If some local institutions can contribute a little bit of the financing to a particular product, that's the thing we welcome the most. Look at the five elements of strategic priorities of ANSO, like climate change and biodiversity conservation, which support ANSO's portfolio and why ANSO is a big science organization. That is science-based, but also very relevant to achieving a better life.

Firstly, understanding the current capacity for research is essential for significant scientific applications that must be calculated in common. Second, addressing country-specific challenges like pollution and especially lake pollution is important for drinking water. Countries from Central Asia to Africa need help to get drinking water. The third is the capacity for construction. The fourth is a science-based solution for facilities. And the last that you referred to in this question is technology transfer. There are technologies that offer solutions for certain local needs in some of the developing countries within the BRI frame. We are also interested in bringing some of the solutions, particularly science-based solutions for the BRI countries.

CAS has relationships with about 500 high tech companies. The organization in place is effective, but we still haven't created the international tech transfer chapter. It is on our agenda. For the science agenda, you can organize many meetings; you can do whatever, but in technology, it is a little different, and if you don't organize in the right way, you will not achieve your purpose. You will lose the confidence and trust of the other side. We are currently creating a city tech transfer platform with a branch of the Beijing Municipal Government. We hope that we can collect resources and network with talents across the country under the ANSO platform.

Thank you very much for your time, Prof. Cao. Is there anything else that you would like to add?

Jinghua Cao: Let me add two aspects. ANSO is one of the two professional organizations that are approved by the Chinese government and registered to the Ministry of Civil Affairs. The other one is the Belt and Road International Lawyers Association (BRILA). BRILA targets at promoting legal cooperation. In natural sciences, ANSO is the only international science organization officially approved by the Chinese government and registered as NGO. We feel that we have a bright future. We need a lot of people to enhance ANSO, including journalists and the scientific press. If you have good ideas, you can contact to us and we will welcome it.

My last word is, when you build an infrastructure, you need people. Infrastructures are the bones of a person, but you also need flesh; you need muscles to hold a person together. ANSO is trying to contribute to the soft tissue of the BRI.

We build the aerial Silk Road

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BEIJING DECLARATION*

Issued at the First International Science Forum of National Scientific Organizations on the Belt and Road Initiative (Nov. 7-8, 2016)

TO ADDRESS DIVERSE DEVELOPMENT challenges and to promote the common prosperity of all nations, Chinese President Xi Jinping in 2013 proposed the Silk Road Economic Belt and the 21st Century Maritime Silk Road. This initiative –the Belt and Road (B&R)– is a forward-looking vision for international cooperation and shared development that spans three continents and their contiguous oceans and seas. It has received a broad positive response, with strong support from over 120 countries and a large number of international organizations. Key achievements include the establishment of the Silk Road Fund; the development of fast-train railways; the expansion of trade and business; a deepening of communication on policy and enhanced exchanges between people and cultures.

The countries in the Belt and Road have diverse culture, history, natural environments; they have different economies and social policies. But, they also face a spectrum of shared major challenges from development itself to sustainable development. To address these challenges, science, technology and innovation (STI) must play a strong central role. National academies, regional scientific, research and technological organizations and scientists along the Belt and Road must therefore deepen cooperation in a sustained and systematic way to address these challenges. They should establish strong scientific basis for shared and sustainable development.

To strengthen mutual understanding, common interests and aspirations, the leaders and representatives of over 20 national and international scientific organizations from the Belt and Road regions, and around 350 Chinese and international scientists and experts, convened in Beijing on November 7–8, 2016. This was the first International Science Forum of National Scientific Organizations for the Belt and Road Initiative. The Forum was jointly organized by the Chinese Academy of Sciences; the National Academy of Sciences of the Republic of Kazakhstan; the Kyrgyzstan Academy of Sciences; the Tribhuvan University of Nepal; the Pakistan Academy of Sciences; the Polish Academy of Sciences; the Russian Academy of Sciences; the University of Ruhuna, Sri Lanka; the Academy of Sciences of the Republic of Tajikistan; the Uzbekistan Academy of Sciences; the International Centre for Integrated Mountain Development (ICIMOD) and The World Academy of Sciences (TWAS) for the advancement of science in developing countries.

*The text is retrieved from ANSO website: http://www.anso.org.cn/about/history/

To advance peace and prosperity, delegates and experts held extensive discussions on various topics in the spirit of the Silk Road, embodying the timeless values of peace and cooperation, openness and inclusiveness, mutual learning and mutual benefit, all to advance prosperity and peace.

Based on the consensus reached, the participating organizations wish to make the following statement:

1. Strengthen cooperation in science, technology and innovation (STI) for the promotion of shared development

Science, technology and innovation are major drivers for social economic development and should be the priority areas for cooperation in the Belt and Road development. The collective national academies, national and regional research organizations are an important scientific force that can support the development and should play a leading role to bring broad benefits to all nations. National and regional scientific organizations should enhance their efforts to mobilize and unify scientists and experts from different disciplines to cooperate on the major needs and common scientific challenges for the realization of green, quality and sustainable development. Particular attention should be given to the involvement of young scientists as well as adequate representation of women scientists. We will ensure conduct of responsible science and endeavor to provide strong support to science-based policy making.

2. Build a platform of co-innovation and a long-term mechanism for STI cooperation

National and regional scientific organizations along the Belt and Road commit to establishing a long-term effective Belt and Road cooperation mechanism that aims to facilitate bridge and organize cooperative research and innovation, strategic advice, policy communication, and capacity building in science and education for common benefits.

We agree to form a working group (secretariat) to support the operation of the mechanism, and to establish an alliance of international scientists of the Belt and Road to support and carry out international cooperation. We also commit to holding the Forum every two years as part of the mechanism. All of these actions mentioned above are to be developed under the principles of equity and equality, willingness and mutual benefit and with adherence to processes promoting joint discussion, collaboration and sharing.

3. Focus on major challenges and organize related international programs

Taking advantage of our multi-disciplinary and regional features, we commit to supporting and organizing research programs in areas of strategic importance to the Belt and Road construction.

The Belt and Road Initiative aiming at shared development harmonizes the fundamental interests of the international community and adds a new positive force to peace and development in the world. National and regional scientific organizations, scientists and experts from different fields need to strengthen cooperation by sharing of information and joining their efforts together in the supply of continuous and strong scientific support to the shared development and common prosperity.

Science-Based Solutions for a Shared and Sustainable Future in the Belt and Road Initiative

ŞİİR KILKIŞ
Assoc. Prof.
Earth System Science, TUBITAK / METU

Şiir Kılkış holds her Ph.D degree from KTH Royal Institute of Technology. She graduated from Georgetown University as the gold medalist in Science, Technology, and International Affairs with magna cum laude. She serves as a Lead Author in the Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report. Kılkış works as senior researcher and advisor to the President at The Scientific and Technological Research Council of Turkey. As Associate Professor in Energy Systems Engineering, she lectures on sustainable development in the Earth System Science Program of METU. Based on her research work, she takes place among the world's top 2% scientists in the areas of energy, environmental science, and emerging/strategic technologies. In her research, she developed the SDEWES Index, novel net-zero district concepts, and the Rational Exergy Management Model to curb carbon dioxide emissions. She attended the First Young Scientists Forum that was organized in Hangzhou, China being assigned as an ambassador of the Alliance of International Science Organizations.

E-mail: siir.kilkis@tubitak.gov.tr

https://orcid.org/0000-0003-3466-3593

ABSTRACT

Addressing common challenges for a shared and sustainable future in the Belt and Road region requires significant contributions from science, technology, and innovation. Green technologies, smart energy systems, and sustainable urbanization are among the central points of emphasis in the development plans of China and Turkey. Based on the Beijing Declaration, the Alliance of International Science Organizations was launched to support the region with science-based solutions. This study compares a sample of countries in this alliance based on research capacity as well as selected indicators under the Sustainable Development Goals. An original approach is then developed to compare knowledge production patterns across linkages in the goals based on combined searches that are visualized with chord diagrams. The results indicate the goals that are receiving more focus within knowledge production, including sustainable cities. Expected increases in urbanization are compared leading to the year 2050, and collaborative research projects that are supported by the alliance are discussed in connection with their contributions for sustainable development alongside new scientific interactions. The article concludes with evidence-based observations regarding research capacity in the Belt and Road region and opportunities for further strengthening solutions based on science, technology, and innovation now and in the decades ahead.

Keywords: Belt and Road, science, Sustainable Development Goals, technology, urbanization

SCIENCE, TECHNOLOGY, AND INNOVATION have particular importance for the Belt and Road Initiative and in addressing common challenges for a shared and sustainable future. This context increases the necessity for research collaboration and provides new opportunities for developing solutions towards addressing multiple aspects of energy, environment, health, welfare, and economy simultaneously (BRIQ, 2020) with minimal or no compromise. In such a path, cross-disciplinary cooperation is essential to support a dynamic understanding of socio-ecological systems so that it is possible to navigate, manage and achieve coordination between multiple objectives at the interface of society and nature (Lu et al, 2021). Only through such cooperation will it be possible to support decision-making to ease resource use and climate change impacts while increasing synergies among system objectives for sustainable development, particularly goals for the year 2030 (Lu et al., 2021).

Common Aspirations for a Shared and Sustainable Future

In China, the Fourteenth Five-Year Plan for National Economic and Social Development is covering the years 2021-2025 while supporting longer-term goals for the year 2035. The principles of "innovation, coordination, greenness, openness, and sharing" will have a central role in this path forward (Xinhua News Agency, 2020). The Plan is sustaining and elevating an emphasis on high-quality development with technology self-sufficiency in frontier fields, including advanced manufacturing and integrated circuits (Wong, 2020). Additionally, climate change is becoming a central priority based on green and low-carbon development. Carbon emissions are set to peak before 2030 towards carbon neutrality by 2060 (Xinhua News Agency, 2020), which would support pathways with sustainable development in climate change scenarios.

Energy that is clean, low-carbon, safe, and efficient will take place among important areas that will be supported towards this goal. Moreover, an innovation-driven development strategy is being pursued while strengthening basic research and promoting interdisciplinary integration, including through common technology platforms. Accelerating strategic emerging industries, including new materials, green technologies, and infrastructure for smart energy systems is being targeted. Long-term goals for 2035 include new types of urbanization and green production for more sustainable development towards an ecological civilization that is centered on people and harmonious coexistence with nature. Resource utilization efficiency, as well as high-quality development for the Belt and Road region is further emphasized among the 60 proposed points (Xinhua News Agency, 2020).

Climate change becomes a central priority for the China's 14th Five-Year Plan based on green and low-carbon development. (Zhou Guoqiang/ China Daily)

In Turkey, the Eleventh Development Plan, which covers the years 2019-2023 towards the hundredth year of the foundation of the Republic of Turkey, upholds the vision of "producing more value and sharing more fairly for a stronger and prosperous country" (Presidency of the Republic of Turkey Presidency of Strategy and Budget, 2019a). The five pillars of the plan are based on achieving a strong economy, competitive production and productivity, highly qualified human resources and strong society, livable cities and sustainable environment, and good governance. The pillar of competitive production and productivity includes research, development (R&D) and innovation, critical and emerging technologies, prioritized sectors and development areas as well as directions for the science and technology system. In addition, emphasis is placed on the Belt and Road Initiative, especially the aspect of an active role in logistics.

The emphasis on livable cities and sustainable environment is placed in a way that also considers the continued importance of environmentally aware urbanization, the challenge of climate change, food security, and the efficient utilization of water. In this respect, the Presidency of Turkey has also officially issued the adoption of a national strategy and action plan that supports an integrated perspective towards livable and sustainable cities that add value to human welfare and provide maximum energy efficiency (Presidency of the Republic of Turkey, 2019).

The last pillar on good governance includes an emphasis on the Sustainable Development Goals (SDGs) that is being monitored based on a dedicated mechanism together with all responsible institutions (Presidency of the Republic of Turkey Presidency of Strategy and Budget, 2019b). There is a sound basis for collaboration on common aspirations for a shared and sustainable future, as foreseen for the Belt and Road region.

Directing R&D and Innovation for Sustainable Development

The Beijing Declaration that was adopted by the national scientific organizations of the Belt and Road Initiative has emphasized the role of science, technology, and innovation in leading the way to a shared and sustainable future (CAS, 2016). In this landmark development, the importance of strengthening cooperation, involving young scientists and building long-term cooperation was also seen as vital aspects of this endeavor. Based on the Beijing Declaration, the Alliance of International Science Organizations (ANSO) was established to support science-based solutions to common challenges within the Belt and Road Initiative. As a collaborative effort, ANSO has focused on addressing major challenges through R&D and innovation in multi-disciplinary approaches. The governing board of ANSO currently involves 9 institutions, including the Chinese Academy of Sciences, with 28 founding member institutions, including the Scientific and Technological Research Council of Turkey (ANSO, 2020b).

According to the most recent statistics, R&D personnel in full-time equivalents (FTE) has reached 4.8 million, with R&D as a share of gross domestic product (GDP) 2.23% in China (National Bureau of Statistics of China, 2020). In addition, researchers in FTE per million inhabitants are 1224.8 (UN, 2021). An important aspect of achieving the goals and targets for a shared and sustainable future will be based on directing this significant potential towards sustainability impacts in China and the collaborating countries in the Belt and Road Initiative. In the context of the SDGs, indicators that are being monitored for all countries include the renewable energy share in total final energy consumption (FEC), the energy intensity level of primary energy in megajoules per constant GDP, and indicators for environmental management, including electronic waste recycling (UN, 2021).

TUBITAK joined ANSO in 2018 as a founding member. (Source: TUBITAK website)

Table 1 provides a comparative view of indicators that are related to the R&D capacity for a sample of countries with ANSO member institutions, while Table 2 involves indicators that are related to a renewable and resource-efficient future for the same sample. For the purposes of this manuscript, the ANSO country sample is taken based on countries with the most R&D personnel among countries with governing board institutions in addition to Turkey based on the founding member institution. In total, 7 countries are included in Tables 1 and 2, namely China, Russia, Turkey, Thailand, Pakistan, Hungary, and Kazakhstan in the order of FTE R&D personnel.

Based on Table 1, the countries in the sample involve a total of over 6 million FTE R&D personnel with contributions of between 16,053 and 758,462 R&D personnel from countries other than China (UNESCO, 2021; TÜİK, 2020; National Bureau of Statistics of China, 2020). When scaled according to population, the values range between 335.6 and 2921.5 researchers in FTE per million inhabitants, with 1224.8 and 1379.4 researchers per million inhabitants in China and Turkey, respectively (UN, 2021). When contrasted to the total value of final goods and services, the expenditure on R&D as a share of GDP ranges between 0.12 and 2.23 where the lowest and highest values in the sample represent between a 1.44 and at most an 18 fold difference (UNESCO, 2021; TÜİK, 2020; National Bureau of Statistics of China, 2020). These indicators also support the SDG on industry, innovation, and infrastructure (SDG9).

One of the challenges is to enable R&D and innovation capacity to be mobilized and coordinated to support progress for sustainable development effectively (Kılkış, 2016). For this reason, the purposeful direction of R&D and innovation for a shared and sustainable future is of great importance for the successful mobilization of the available capacity. From the perspective of sustainable development, Table 2 represents the current values for certain indicators that are linked to the SDGs with a particular focus on affordable and clean energy (SDG7) as well as responsible consumption, and production (SDG12). Based on these values, the share of

Table 1. Comparison of Indicators for R&D Capacity.

ANSO Country Sample	SDG9		
	R&D personel (FTE)	Researchers (FTE) per million inhabitants	R&D as a share of GDP (%)
China	4,800,100	1224.8	2.23
Russia	758,462	2821.5	0.99
Turkey	182,847	1379.4	1.06
Thailand	138,644	1350.3	1.00
Pakistan	101,437	335.6	0.24
Hungary	45,566	2921.5	1.55
Kazakhstan	16,053	666.9	0.12

Note: Data are based on (UNESCO, 2021; TÜİK, 2020; National Bureau of Statistics of China, 2020; UN, 2021) for the most recent year.

Table 2. Comparison of Indicators for Various SDGs

ANSO Country Sample	SDG7			SDG12
	Renewable energy in FEC (%)	Renewable energy production (GWh)	Energy intensity (MJ/GDP)	Electronic waste recycling (kg/cap)
China	12.77	1,811,174	6.06	1.14
Russia	3.25	193,392	8.33	0.70
Turkey	11.41	97,771	3.03	1.82
Thailand	22.69	42,667	5.13	N/A
Pakistan	41.40	40,670	4.41	N/A
Hungary	14.33	3,753	4.24	6.98
Kazakhstan	1.62	14,318	8.19	0.56

Note: Data are based on (UN, 2021; IRENA, 2020).

renewable energy in FEC ranges between 1.62% and 41.40%, with 11.41% in Turkey and 12.77% in China (UN, 2021). The total renewable energy production ranges between 3,753 and over 1.8 million gigawatt-hours (IRENA, 2020). The amount of energy that is used to produce a unit of economic value or the energy intensity ranges between 3.03 and 8.33 megajoules per GDP based on the values in Table 2 (UN, 2021). While data is not available for all countries, the amount of electronic waste that is recycled ranges between 0.70 and 6.98 kg per capita (UN, 2021). R&D and innovation that is linked to improving these and other indicators for sustainable development will be instrumental in realizing a shared, sustainable future.

Comparison of Knowledge Production Patterns for the SDGs

Various efforts have been put forth to evaluate progress towards the SDGs, including those with a focus on China. Xu et al. (2020) had focused on determining the change in an SDG Index score during the timeframe of 2000 to 2015 even before the SDGs were adopted. One of the scores with the greatest improvement was determined to be the impressive climb in the values for SDG9 in China. Another study focused on 15 countries along the Belt and Road in Central and Eastern Europe with the advantage of determining the level of coordination across society, economy, environment, implementation, and cooperation (Huan et al., 2021). Among the 15 countries, Tajikistan and Uzbekistan were found to have a higher urgency for progressing towards the SDGs with sustainable progress in comparison to those of the other countries (Huan et al., 2021).

Beyond such analysis, however, any comparison that links knowledge production across the SDGs, which is of utmost importance for directing the R&D and innovation capacity for sustainability, has not been conducted. This manuscript primarily addresses this gap by providing a method to compare knowledge production patterns across the SDGs with a focus on the linkage between SDG9 and the other goals. Similar to the comparisons that are provided above, this analysis is conducted for the representative ANSO country sample with a focus on supporting a shared and sustainable future

across the Belt and Road region as a whole in line with the Beijing Declaration.

The approach that is developed in this study to compare knowledge production patterns in the context of the SDGs is quantified by using combined keyword searches based on the keywords that are identified for 16 of the goals (SCOPUS, 2021). The search results for knowledge production for pairs of SDG9 and each goal are then transferred into chord diagrams for a visual comparison of the knowledge production pattern of each analyzed country. All connections in the chord diagram are sized according to the relative dominance of a given connection. For comparison, the results for the same keyword combinations are analyzed beyond the Belt and Road region for the world.

As already indicated above, SDG9 on industry, innovation, and infrastructure has a direct target for supporting R&D and domestic technology development. Within this target, progress is measured based on expenditure on R&D as a share of GDP and human resources in R&D (UNESCO, 2021). For this reason, the chord diagrams are established based on a combined search for SDG9 and the other SDGs that allow focusing on two SDGs together in each search for every country. Figures 1 and 2 provide the knowledge production patterns across SDG9 and the other SDGs for the world and 7 ANSO countries. In total, the knowledge production of the countries in the sample is estimated to represent at least 21% of the total knowledge production for the SDGs across all countries in the world.

Based on the patterns that take place in the first chord diagram in Figure 1, knowledge production in the world is primarily focused on topics that address both SDG9 and SDG8, the latter of which focuses on decent work and economic growth. Additionally, SDG8 focuses on inclusive and sustainable economic growth with targets and indicators on material footprint. SDG11 on sustainable cities and communities is the next most focused combination with SDG9. These are followed by SDG7 on affordable and clean energy, as well as SDG12 on responsible consumption and production. The top 5 combination of goals with SDG9 based on knowledge production also includes SDG3 on good health and well-being.

Greater R&D and innovation with the cooperation of countries in the Belt and Road can be directed for transforming related advances in knowledge production into solutions for the region.

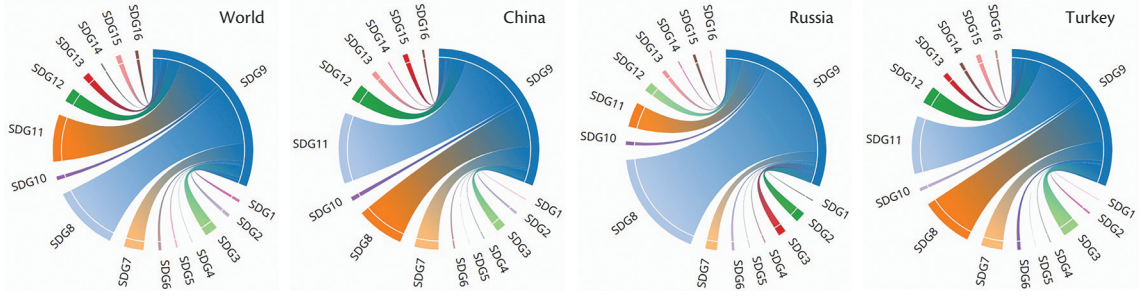
In contrast, the chord diagram for China in Figure 1 indicates that the knowledge production pattern in the context of the SDGs is directly led by the combination of SDG11 and SDG9, which underlines the importance of R&D and innovation for supporting sustainable urban areas in this part of the world with rapid urbanization taking place. This combination has additional importance for China given that the urban population is projected to grow annually by 1.78% and the annual average rate of change in the urban share of the total population is estimated to be 1.58% between the years 2020 and 2025 (UN DESA, 2019). The topics that are the most researched in this linkage include urban transportation, urban planning, and urban

growth. The next combination where knowledge production is focused is at the intersection of SDG9 and SDG8 as also emphasized at the world level. Next, SDG7 and SDG12 that is further important for supplying clean energy to urban areas as well as sustainable consumption and production closely follow by as important areas of knowledge production. In this area, the most researched topics include energy utilization, sustainable manufacturing, and environmental pollutants.

For Russia, the knowledge production pattern is largely dominated by the linkage of SDG9 with SDG8, with the most important topics of research being those that are related to economic development and sustainable development from a management sciences perspective. Linkages between SDG9 and the other goals are relatively less dominant while the knowledge production pattern that represents the linkage of SDG2 on zero hunger and SDG3 on good health and well-being take place at levels that are more similar to SDG7 on affordable and clean energy than those that are observed in other countries.

Knowledge production in Turkey in the context of linkages with SDG9 is led by SDG11 in a way that is similar to the knowledge production pattern of China. The share of the urban population is already 76.1% of the total population and continued increases to the year 2050 are expected (UN DESA, 2019). As already discussed above, one of the pillars of the Eleventh Development Plan is based on livable cities and sustainable environment. The most researched topics in this linkage include urban transport, urban planning, decision making, and geographic information systems. Areas of knowledge production that are also emphasized based on the results of the chord diagram for Turkey in Figure 1 are SDG8 as well as SDG7 and SDG12 that could provide support for enabling an impact toward resource efficiency and renewable energy. Life cycle assessment, renewable energy and recycling take place within the research topics under this linkage. Moreover, SDG3 on good health and well-being is among important areas of knowledge production in combination with SDG9. Based on these results, greater R&D and innovation with the cooperation of countries in the Belt and Road can be directed for transforming related advances in knowledge production into solutions for the region.

Figure 1. Knowledge production patterns across the SDGs for the world, China, Russia, and Turkey.



The knowledge production pattern of Thailand and Pakistan when approached from the linkage of SDG9 with the other SDGs based on the relevant chord diagrams in Figure 2 both lean towards SDG8 that is followed by SDG11, SDG7, and SDG12. In both countries, SDG13 on climate action also has a relatively greater role with topics including greenhouse gases and urbanization. In Hungary, knowledge production in the crossroads of SDG9 and SDG13 is among the prominent areas while those with SDG8, SDG11, SDG12, SDG7, and SDG3 are among other areas with relatively more knowledge production. In comparison to the knowledge production patterns of the other countries, SDG15 on life on land that involves natural habitats receive relatively greater attention. Among the comparisons in Figures 1 and 2, the knowledge production pattern of Kazakhstan when viewed based on the linkage of SDG9 with the other SDGs has a large dominance of SDG8 while SDG2 on zero hunger receives the next highest priority. The topics that are the most researched in this area include agro-industrial complexes and food security.

For additional comparison in the context of SDG11 that is emphasized across multiple countries among the ANSO sample countries, Table 3 provides the percentage of the population residing in urban areas, which are estimated with shares between 37.2% in Pakistan and 76.1% in Turkey in 2020 (UN DESA, 2019). By mid-century, these shares are estimated to increase with a range between 52.2% in Pakistan and 86.0% in Turkey (UN DESA, 2019) with the greatest increases of 18.6% in China and 18.0% in Thailand between 2020 and 2050 based on single projections for each country. Knowledge production which is connected to the linkage of SDG9 and SDG11 for innovative solutions to sustainable urbanization will be an area that requires continued attention given increases in urbanization in all countries. It is foreseen that a shared and sustainable future will be possible through scientific and technological cooperation for sustainable urbanization that is also supported by multiple other goals, including SDG7, SDG12 and SDG13 for clean energy, resource efficiency as well as climate action.

Figure 2. Knowledge production patterns across SDGs for Thailand, Pakistan, Hungary, and Kazakhstan.

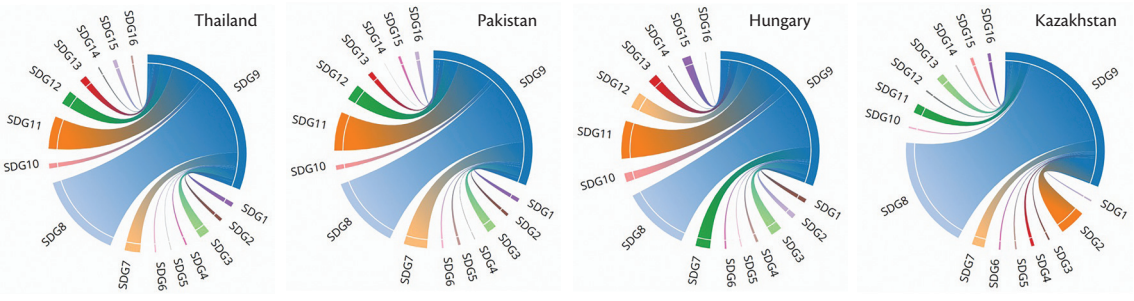


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Table 3. Comparison of Indicators for the Urban Population Share.

ANSO Country Sample	Percentage of the Population Residing in Urban Areas (2020-2050)				
	2020 (%)	2030 (%)	2040 (%)	2050 (%)	Total Change in Share (%)
China	61.4	70.6	76.4	80.0	18.6
Russia	74.8	77.1	80.3	83.3	8.6
Turkey	76.1	80.2	83.4	86.0	9.8
Thailand	51.4	58.4	64.4	69.5	18.0
Pakistan	37.2	40.7	45.9	52.2	15.0
Hungary	71.9	75.1	78.6	81.8	9.9
Kazakhstan	57.7	60.0	64.1	69.1	11.4

Note: Data are based on (UN DESA, 2019).

Collaborative Research and Interactions through ANSO

Existing knowledge production patterns towards sustainable development represent a vast capacity to address common challenges for a shared and sustainable future. In the implementations of the Beijing Declaration, collaborative research that is being supported by ANSO has focused on areas of common challenges such as agriculture and food security, water resource and water security, air pollution and human health, climate change, and others as well as the transformation of science and technology achievements (ANSO, 2020a). The collaborative research areas include both scientific research and human well-being orientations. Special attention is also given during the evaluation of the collaborative research projects for addressing one or more SDGs towards the vision of a shared and sustainable future. The SDGs that are addressed by the collaborative research projects are briefly overviewed to underline the research directions that are currently being pursued.

Based on a focus on safe drinking water to support health and well-being, another project is jointly developing purification technologies for clean drinking water and the removal of pollutants in underground water.

Currently, multiple collaborative research projects have focused on contributing to science-based solutions that advance SDG2 on ending hunger (ANSO, 2020a). One of the collaborative research projects is launched to contribute to this goal through agricultural monitoring that supports food security using such techniques as crop yield modeling and resource mapping. Another project that focuses on SDG2 is developing a system for green cultivation technology based on new carbohydrate formulations to support food security and safety while reducing the use of chemical pesticides and increasing crop yield.

With a focus on health and well-being (SDG3), pre-clinical studies of a new antimalarial drug are the focus of another project in collaboration with partners from China, Sri Lanka, and Kenya. Based on a focus on safe drinking water to support health and well-being, another project is jointly developing purification technologies for clean drinking water and the removal of pollutants in underground water. At the intersection of two SDGs, the project further supports SDG6 on clean water and sanitation. Membrane technologies that are developed in another project are also supporting the same goal for safe and affordable clean drinking water in Belt and Road countries.

Another collaborative research project that is supported by ANSO is advancing the atmosphere observation network for environmental and climate research, while another research team is focusing on promoting low-carbon and sustainable development. Among others, one collaborative research project is exploring sub-seasonal and seasonal weather and climate forecasts to enable pathways for protecting food security, the environment, and human development from natural disasters. In comparison, these projects are increasing knowledge for supporting specific targets within the first three SDGs on reducing poverty, hunger, and improving health and well-being in various ways as well as increasing scientific and technological sup-

A technician inspects solar panels at a photovoltaic farm in Hami, Xinjiang Uygur autonomous region. (Cai Zengle/China Daily, 2021)

port for both SDG11 and SDG13 on sustainable cities, communities, and climate action.

With a focus on terrestrial ecosystems in the scope of SDG15 and its interactions with the other goals, another project is providing approaches for ecological monitoring and conservation while providing recommendations for risk prevention. Another team is advancing the monitoring of agricultural and forestry pests based on DNA barcode technology (ANSO, 2020a). Yet another collaborative project is focusing on minimizing the occurrence and spread of antibiotic resistance genes based on the interaction of water, soil, and plants to protect the environment as well as public health.

As with other collaborative research projects that address multiple SDGs, research teams have been focusing on urban air pollution control technologies based on photocatalytic nanomaterials against haze from biomass burning in rural areas, green chemical products for disinfection against the pandemic, and a multi-global navigation satellite system (GNSS) for autonomous vehicles. One of the collaborative research projects with research partners from China, Turkey, and Belarus focuses on remote sensing satellite image applications to address local development needs. Another collaboration is based on an advanced synchrotron light source facility to support the basic sciences in such research areas as biology, environmental and earth science, physics, chemistry, and material science that supports SDG9.

UN Sustainable Development Goals

As existing and new collaborative research projects are ongoing, it must be emphasized that there is still great potential for establishing additional research collaboration in support of a shared and sustainable future, including through the interaction of young and experienced scientists. The common challenges of the future require unprecedented collaboration. For this purpose, ANSO organized the First Young Scientists Forum and hosted world-renowned scientists in Hangzhou, China with a focus that included green and sustainable development, health and life sciences, and emerging technologies. The forum together with a Science and Technology Cooperation Conference was attended by more than 500 representatives from about 30 countries around the world (ANSO, 2019). The sessions of the First Young Scientists Forum particularly addressed the role of basic sciences for supporting sustainable development as envisioned by ANSO and potentials for the future. The perspectives included those on recent trends in gene discovery and new initiatives for the use of big earth data. This also includes CASEarth to support the SDGs (Guo et al., 2021), particularly SDGs involving food systems, urban systems, and the global environmental commons.

Within the role of basic sciences for sustainable development, the session contributions also included an emphasis on thermodynamic principles for supporting the planning of sustainable communities. An approach for matching renewable energy supply sources with different energy demands based on the useful work potential of energy or exergy was shared with examples from an original net-zero target (Kılkış, 2014). This approach was further applied to a related case study analysis in the Qingshan Lake District in Hangzhou, China (Lu et al., 2014). In the case study, the transition path involved district

China aims for carbon neutrality by 2060. (CGTN, 2021)

energy systems with solar, wind, and bioenergy with varying shares in summer, winter, and mid-seasons. Urban areas involve linkages across the SDGs (Kabisch et al., 2019), and increasing the utilization of renewable energy sources can provide important benefits for the climate (Lin & Zhu, 2019) and urban inhabitants for better air quality. Most recently, research communities are also generating scenarios under localized conditions for the Shared Socioeconomic Pathways, including scenarios for multiple cities in the Beijing-Tianjin-Hebei Region with and without sustainable urbanization conditions (Yang, Yang, & Wang, 2020). Improved urban land use and spatial planning are also recognized for avoiding the conversion of cropland and avoiding the reduction of carbon sinks (Xu, Zheng, & Zheng, 2019).

Science and Technology for a Shared and Sustainable Future

The ability of the research ecosystem to address common needs for sustainable development requires strong research capacity and coordination to provide a purposeful direction towards supporting greater sustainability based on science, technology, and innovation. In the Belt and Road region, such a purposeful direction is being provided based on the science-based initiatives of ANSO to support a shared and sustainable future as emphasized in the Beijing Declaration. The analyses that are provided in this article provide evidence-based observations for an important research capacity that is being mobilized and can even be mobilized more strongly in the future to support the SDGs across the Belt and Road region. The knowledge produc-

tion patterns based on the linkage of SDG9 with the other SDGs as put forth in this study represent original analyses that are visualized with chord diagrams to compare the distribution of research focus across the countries in the sample. Additionally, discussions on the connection between the collaborative research projects of ANSO and the SDGs have represented the ongoing efforts of the research community to support a shared and sustainable future. Potentials for future collaboration opportunities between China, Turkey, and countries in the Belt and Road Region include new collaborative research projects as well as strengthening the interactions between ongoing projects for supporting a common impact towards sustainable development across multiple SDGs.

In the near future, an emphasis on multidisciplinary integration and common platforms in the new timeframe of the Fourteenth Five-Year Plan in China can provide additional opportunities for related developments in the Belt and Road Region. Such a common platform can also support science-based solutions for sustainable urbanization given that significant increases are foreseen for urban areas, including in the countries that are analyzed in this manuscript. In the timeframe of the Fourteenth Five-Year Plan, it is evaluated that emphasis on smart energy systems and peaking of emissions towards climate-neutrality represents a potential for significant support for climate mitigation that can be further strengthened with the collaborative research mobilization of the Belt and Road region. The clear direction of ANSO with an emphasis on science, technology, and innovation in support of the SDGs provides an important basis for collective action now and in the decades ahead for a sustainable future.

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Xi Jinping: "Science Has No Borders, but Scientists Have A Motherland"*

On September 11, Xi Jinping, President of the People's Republic of China hosted a symposium of scientists in Beijing and delivered a speech.

TODAY, WE ARE HOLDING A SYMPOSIUM for scientists to listen to your opinions and suggestions on promoting innovation-driven development and accelerating the pace of scientific and technological innovation during the "14th Five-Year Plan" period and beyond. The scientists and science and technology workers attending today's symposium come from scientific research institutes, universities, and enterprises, and are involved in basic research, and applied research. There are also foreign scientists working in China.

Just now, in combination with your respective research fields, you have put forward many valuable opinions and suggestions on deepening the reform of the scientific and technological system and promoting scientific and technological innovation and development. Relevant parties are responsible to study and absorb them carefully. Now, in conjunction with your speeches, let me make some comments.

1. Fully understand the major strategic importance of accelerating scientific and technological innovation

Since the 18th Party Congress of the Communist Party of China, we have attached great importance to scientific and technological innovation and insisted on taking innovation as the primary driving force for development. Through the collective effort of the whole society, our country's scientific and technological undertakings have made historic achievements and seen historic changes. Major innovations are emerging, and some cutting-edge fields have begun to enter and lead the stage. Our technological strength is

*The original text in Chinese is retrieved from Xinhua website: http://www.xinhuanet.com/politics/2020-09/11/c_1126483997.htm. Translated by BRIQ. *Note: The text is titled by BRIQ.*

Chinese President Xi Jinping, chairs symposium attended by scientists in Beijing, capital of China, Sept. 11, 2020 (Yao Dawei / Xinhua).

moving from the accumulation of quantity to a qualitative leap, from the breakthrough of points to the improve ment of system capabilities. During the fight against the new crown pneumonia epidemic, a vast number of scientific and technological workers carried out scientific research in many important fields such as treatment, vaccine research and development, prevention, and control. They provided strong support and made major contributions to the overall promotion of epidemic prevention and economic and social development. I take this opportunity to express my heartfelt thanks to the scientific and technological workers!

The world today is undergoing major changes not seen in a century. Our country's development faces a domestic and international environment of profound and complex changes. Our country's development during the 14th Five-Year Plan period, as well as in the long term, is raising ever more urgent requirements for accelerating scientific and technological innovation. First of all, accelerating technological innovation is needed to promote high-quality development. Building a modern economic system, promoting quality change, efficiency change, and power change all require strong scientific and technological support.

Second, accelerating scientific and technological innovation is needed to achieve a high-quality of life for the people. At present, the main social contradiction in our country has been transformed into a contradiction between people's growing needs for a better life and unbalanced and inadequate development. To satisfy the people's yearning for a better life, more scientific and technological innovations that involve people's livelihood must be introduced.

Third, accelerating scientific and technological innovation is necessary to build a new development pattern. To promote the domestic cycle, we must adhere to the main line of supply-side structural reform, improve the quality and level of the supply system, and create new demand

with new supply. Technological innovation is key. To unleash domestic and international dual circulation requires scientific and technological strength to ensure the safety and stability of the industrial chain and supply chain.

Fourth, accelerating scientific and technological innovation is necessary to successfully start the new journey of building a modern socialist country in an all-round way. From the initial proposal of the "four modernizations" to the present proposal of comprehensively building a modern socialist country, the modernization of science and technology has always been an important part of our country's modernization.

The key is to improve the scientific and technological innovation ecosystem, stimulate innovation and creativity, and provide scientists and scientific and technological workers.

Now, our country's economic and social development and the improvement of people's livelihood require more scientific and technological solutions than ever in the past, and it is even more necessary to enhance the primary driving force of innovation. At the same time, in the face of fierce international competition and against the backdrop of rising unilateralism and protectionism, we must take a path of innovation that suits our national conditions. In particular, we must put the improvement of original innovation capabilities in a more prominent position and strive to achieve more "from zero to one" breakthroughs. It is hoped that the majority of scientists and scientific and technological workers will shoulder their historical responsibilities and persist in facing the frontiers of world science and technology, look toward the main economic battlefield, look toward the major needs of the country, look toward the people's lives and health, and continue marching towards the breadth and depth of science and technology.

2. Accelerate the resolution of some key issues restricting the development of scientific and technological innovation

Our country has a large number of scientific and technological workers and large-scale R&D investments. It initially has the conditions to compete on the same stage with the international advanced level in some fields. The key is to improve the scientific and technological innovation ecosystem, stimulate innovation and creativity, and provide scientists and scientific and technological workers. They set up a stage to display their talents and make scientific and technological innovation achievements emerge continuously.

First, uphold demand-orientation and problem-orientation. The selection of scientific research topics is the first problem that must be solved in scientific and technological work. I have often said that the selection of research direction should be demand-oriented, starting from the urgent national needs and long-term needs of the country, truly resolving practical problems. Engels said: "Once a society has a technical need, this need will push science forward better than ten universities."

At present, our country's economic and social development, improvement of the people's livelihood, and national defense construction are confronting many practical problems that must be resolved. For example, in agriculture, we rely heavily on foreign countries for many seeds, and the cultivation and processing technology of agricultural products is relatively backward. In some areas, agricultural non-point source pollution and heavy metal pollution in cultivated land are serious. In industry, some key core technologies are controlled by others, and some key components, parts, and raw mate-

rials rely on imports. In terms of energy resources, the degree of dependence on foreign oil has reached more than 70%. Oil and gas exploration and development, and the development of new energy technologies are insufficient; the spatial distribution of water resources is unbalanced, all are causing many problems. In terms of society, the aging of our country's population has continued to deepen, the people's requirements for a healthy life have continued to rise, and the lagging technology development in biomedicine, medical equipment, and other fields has become increasingly prominent. We must push forward the technologies that can rapidly push through and solve problems promptly. For technologies that are strategic and require long-term success, we must deploy them in advance.

Second, integrate and optimize the allocation of scientific and technological resources. For scientific and technological innovation, the optimal allocation of scientific and technological resources is crucial. The success of the "Two Bombs and One Satellite"[1] depended on a group of leading talent, and our country's powerful organizational system. We have a large number of scientists, academics, and world-class scientific researchers and engineers. We must pay close attention to the construction of the innovation system, optimize the combination, and overcome the disadvantages of fragmentation, inefficiency, and duplication. We need a batch of talented scientists who effectively leverage scientific research resources. It is necessary to give full play to the main role of enterprises in technological innovation, promote the concentration of innovative elements in enterprises, and promote the in-depth integration of production, education, and research. It is necessary to give full play to the advantages of our country's socialist system that can concentrate its efforts on major tasks, optimize the allocation of advantageous resources, and promote research on key core technologies in important fields. Several national laboratories should be established, and the existing state key laboratories must be reorganized to form a laboratory system in our country. It is necessary to give play to the important role of universities in scientific research, mobilize the enthusiasm of various scientific research institutes, give play to the advantages of abundant talents and orderly organization, and form a strategic force.

Xi Jinping: "We must put education in an ever more important position, comprehensively raise the quality of education, and focus on fostering students' innovative mentality and innovative abilities." (Xinhua, 2019)

Third, persevere in strengthening basic research. Basic research is the source of technological innovation. Although our country's basic research has made significant progress, the gap with the international advanced level is still obvious. The root cause of many "bottleneck" technical problems that our country faces is that basic theoretical research cannot keep up, and the source and underlying issues have not been clarified. On the one hand, basic research

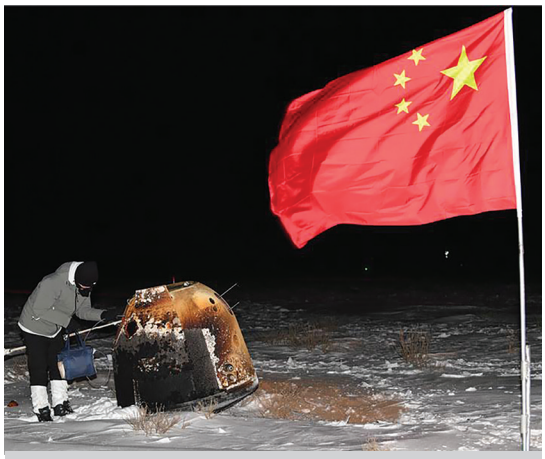
1 Editor's Note: Two Bombs and One Satellite is a Chinese nuclear and space project conducted during the Mao Tse-Tung period in 1960s. Through this project, China tested its first atomic bomb in 1964 and its first hydrogen bomb in 1967. In 1970, China became the fifth country to launch its own satellite.

must follow the laws of scientific discovery, driven by curiosity to explore the mysteries of the world and encourage free exploration and full exchanges and debates. On the other hand, it must be driven by major scientific and technological issues to abstract theoretical issues from major applied research. We must further explore the laws of science, so that basic research and applied research promote each other. It is necessary to clarify the direction and development goals of our country's basic research field and continue to work for the long term.

Talent is the first resource. The fundamental source of national scientific and technological innovation lies in people.

To increase investment in basic research, first of all, the state financial investment must increase, and at the same time, it is necessary to guide enterprises and financial institutions to increase support in appropriate forms, encourage the society to invest in multiple channels through donations and fund establishments, expand funding sources, and form a continuous, stable investment mechanism. For scientific research units and enterprises that have carried out effective basic research, necessary policy support should be given in terms of finance, banking, and taxation. It is necessary to create a good scientific research ecology that is conducive to basic research, establish a sound scientific evaluation system and incentive mechanism, encourage scientific research personnel to emancipate their minds, make bold innovations, and allow scientists to concentrate on research. It is necessary to run first-class academic journals and various academic platforms, and strengthen domestic and international academic exchanges.

Fourth, strengthen the education and training of innovative talents. Talent is the first resource. The fundamental source of national scientific and technological innovation lies in people. It takes a decade to grow a tree, but a century to cultivate a person. We must put education in an ever more important position, comprehensively raise the quality of education, and focus on fostering students' innovative mentality and innovative abilities. We must strengthen the build-up of basic disciplines such as mathematics, physics, chemistry, and biology; encourage higher education institutions meeting conditions to vigorously set up basic research and interdisciplinary courses and specializations; strengthen undergraduate training in basic disciplines; and explore models for continuous training between undergraduate, graduate, and doctoral levels in basic disciplines. We must strengthen the training of top-notch students in basic disciplines, build foundations in disciplines such as mathematics, physics, chemistry, biology, etc., and guide the most excellent students to dedicate themselves to basic research. It is necessary to strengthen basic research in colleges and universities, plan out the construction of cutting-edge science centers, and develop new research-oriented universities. It is necessary to respect the law of talent growth and the law of scientific research activities to cultivate a group of strategic scientific and technological talents, leading scientific and technological talents, and innovative teams with international standards. We must attach great importance to the growth of young scientific and technological talents so they can become the main force of scientific and technological innovation. It is necessary to gather first-class talents from all over the world, attract high-end overseas talents, and provide internationally competitive and attractive environmental conditions for overseas scientists to work in China.



Xi Jinping: "We need to be more proactive in integrating into the global innovation network and enhance our technological innovation capabilities."
(Wang Jiangbo/China Daily)

Fifth, relying on reforms to stimulate the vitality of scientific and technological innovation. Our country's science and technology team has great innovation potential, and the key is to effectively release this potential by deepening the reform of the science and technology system. Transforming government functions is an important task of scientific and technological reform. Many of our industrial supply chains need technological solutions. Only the thousands and thousands of scientific and technological workers and market players who are fighting on the front line can provide such solutions. What our government must do is create a good environment for them, and provide basic conditions, playing a good organizational and coordination role. It is necessary to speed up the transformation of science and technology management functions, and shift more energy from dividing money, dividing materials, and determining projects to determining strategies, guidelines, policies, creating an environment, and improving services. We must accelerate the advance of scientific research institute reform, entrust higher education institutions and scientific research bodies with greater autonomy, give leading innovation talent greater decision-making powers over technological pathways and funding use, and firmly eliminate "only papers, only job titles, only CVs, and only awards." It is necessary to integrate the financial research investment system and change the state of divided, small, and scattered departments. We will comprehensively study and consider the issue of strengthening the overall coordination of scientific and technological forces raised by you.

Sixth, strengthen international scientific and technological cooperation. International cooperation in science and technology is a major trend. We need to be more proactive in integrating into the global innovation network and enhance our technological innovation capabilities through open cooperation. We must implement a more open, inclusive, mutually beneficial, and shared international science and technology cooperation strategy.

On the one hand, we must persist in doing our affairs well, continue to improve our capacity for independent innovation in science and technology, build a "long board" in some areas of advantage, and consolidate the foundation for international cooperation. On the other hand, it is necessary to promote international scientific and technological exchanges and cooperation with more open thinking and measures. Under the current situation, it is necessary to pragmatically promote international scientific and technological cooperation in the field of global pandemic prevention and control, and public health, and carry out research cooperation in the fields of drugs, vaccines, and testing. It is necessary to focus on common issues such as climate change and human health to strengthen joint research and development with scientific researchers from various countries. It is necessary to gradually liberalize the establishment of international science and technology organizations in our

country and foreign scientists to hold posts in our country's science and technology academic organizations so that our country will become a broad stage for global scientific and technological open cooperation.

Science has no borders, but scientists have a motherland. The historic achievements of our country's scientific and technological undertakings are the result of generation after generation of scientists who have dedicated themselves to serving the country.

3. Forcefully carrying forward the scientist's spirit

Scientific achievements are inseparable from spiritual support. The spirit of a scientist is a precious spiritual wealth accumulated by scientific and technological workers in long-term scientific practice. Since the founding of New China, a vast number of scientific and technological workers have set up monuments of scientific and technological innovation in the motherland, and they have also created a unique spiritual temperament. In May last year, the Party Central Committee issued the "Opinions Concerning Further Carrying Forward the Scientist's Spirit, and Strengthening Work Style and Learning Style Construction," which required to vigorously promote the patriotic spirit of minding the motherland and serving the people, and the innovative spirit of bravely climbing the peak and being the first to pursue truth, the pragmatic spirit of rigorous scholarship, the dedication spirit of being indifferent to fame and fortune, dedicated research, the spirit of gathering wisdom to tackle key problems, the spirit of unity and cooperation, and the spirit of educating people willingly and rewarding. The majority of scientific and technological workers must shoulder the important task of scientific and technological innovation entrusted by history. Here, I will emphasize patriotism and innovation.

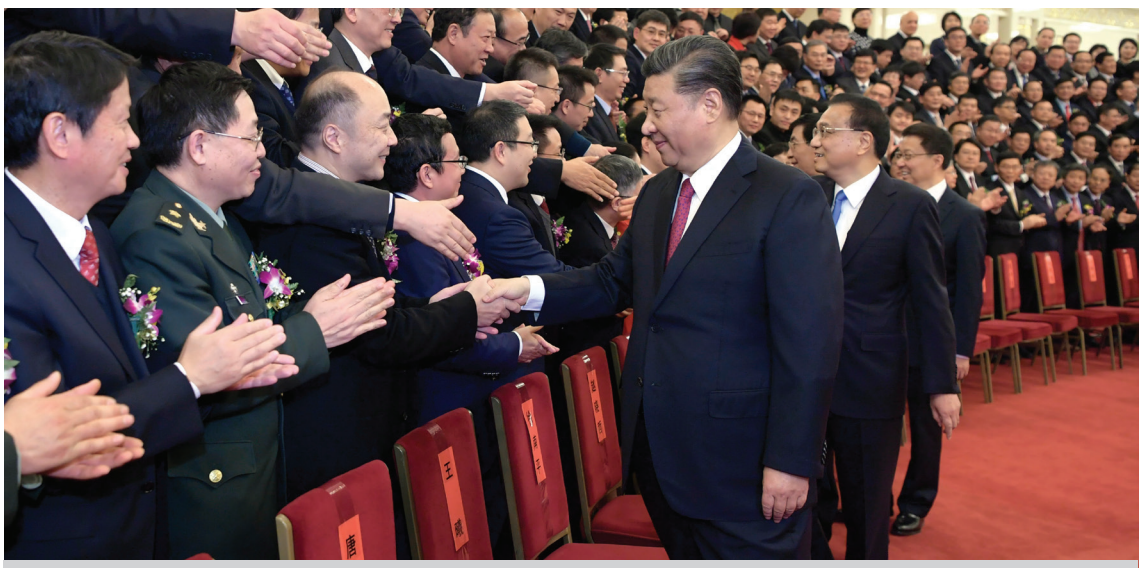
Science has no borders, but scientists have a motherland. The historic achievements of our country's scientific and technological undertakings are the result of generation after generation of scientists who have dedicated themselves to serving the country. From Li Siguang, Qian Xuesen, Qian Sanqiang, and Deng Jiaxian to a large number of outstanding scientists who grew up after the founding of New China, such as Chen Jingrun, Huang Danian, and Nan Rendong, they are all models of patriotic scientists. Hope that the majority of scientific and technological workers will not forget their original intentions, keep their mission in mind, uphold the national and people's interests first, inherit and carry forward the excellent qualities of the older generation of scientists in caring for the motherland and serving the people, carry forward the "Two Bombs and One Satellite" spirit, actively undertake to bear the heavy burden of historic responsibility, and merge their scientific pursuits into the magnificent undertaking of building a modern Socialist country.

Technological innovation, especially original innovation, requires the capability of creative thinking, strict evidentiary methods, non-worship of academic authority, not blindly following existing theories, daring to challenge boldly, build concrete evidence earnestly, and experiment constantly. Originality generally comes from hypotheses and conjectures. It is a complex process of continuous observation, thinking, hypothesis, experiment, verification, and induction, rather than simple induction. The creativity of assumptions and conjectures is crucial. Einstein said: "Posing a question is often more important than solving a problem." If it is not chosen correctly, even with great energy it is difficult to produce positive results. The vast number of scientific and technological workers must have the ambition to be creative, dare to propose

new theories, open up new fields, explore new paths, and work hard on originality. It is necessary to produce more high-level original results to contribute to the continuous enrichment and development of the scientific system. Scientific research, and especially basic research, often start from scientists' curiosity to investigate the profound mysteries of nature. In practice, all scientists achieving prominent achievements rely on perseverance, curiosity, a sense of dedication, and a life-long exploration to achieve their cause. Studies have shown that scientists' advantages are not only based on intelligence but more importantly, focus and diligence. After long-term exploration, they form an advantage in a certain field. It is necessary to encourage scientific and technological workers to concentrate on their scientific research, study diligently, do not seek vanity, and do not consider fame or fortune. It is necessary to widely publicize the vivid deeds of scientific and technological workers who dare to explore and devote themselves to science. Curiosity is human nature. The guidance and training in scientific interests must be started from childhood to ensure a better understanding of scientific knowledge and grasp of scientific methods, creating a large batch of young cohorts equipped with scientific potential.

Party committees and governments at all levels and leading cadres at all levels must earnestly implement the Party Central Committee's decision and deployment on technological innovation, implement the innovation-driven development strategy, respect labor, knowledge, talent, and creativity, follow the laws of scientific development, and promote scientific and technological innovation results that are constantly emerging, and transformed into actual productivity. Leading cadres must strengthen the learning of new scientific knowledge and pay attention to global technological development trends.

Marx said: "There is no smooth road in science. Only those who are not afraid of hard work and climb steep mountain roads can hope to reach the culmination of glory." I believe that our country's scientists and technology workers have the confidence, have the determination, and have the capability to climb the peaks of science, and properly contribute to realizing the great rejuvenation of the Chinese nation and the building of a community with a shared future for mankind!



Chinese President Xi Jinping meet with representatives of the award winners before an annual ceremony to honor distinguished scientists, engineers and research achievements at the Great Hall of the People in Beijing, capital of China, Jan. 10, 2020. (Li Xueren/Xinhua)

Scientific Collaboration along the Silk Road

UĞUR MURAT LELOĞLU
Assoc.Prof.
Geodetic and Geographic Information Technologies Department, Middle East Technical University

Ugur Murat Leloglu has obtained his BSc. MSc. and PhD. degrees from Electrical-Electronics Engineering Department of Middle East Technical University. He worked for the Scientific and Technological Research Council of Turkey from 1991 to 2012 on computer vision, remote sensing and space technologies. During this time, he took part in projects in France and the United Kingdom. Currently, he is working at the Geodetic and Geographic Information Technologies Department of Middle East Technical University on earth observation and remote sensing as associate professor.

E-mail: leloglu.um@gmail.com

https://orcid.org/0000-0002-8584-7301

ABSTRACT

The Belt and Road Initiative (BRI) is an immense development program announced by the Chinese government in late 2013, which knitted around trade routes. Since scientific and technological cooperation is an integral part of BRI, the Alliance of International Science Organizations (ANSO) was established in 2018 as a non-governmental organization. In this work, conditions for effective cooperation in science and technology among countries are discussed first. Then, the research ecosystem's current situation is analyzed in terms of the number of scientific articles and trends while some results from the literature on international collaboration patterns are reviewed. Considering the current situation, scientific cooperation mechanisms are reviewed, and it is argued that ANSO can serve as a networking tool or seed for a future organization and that an inter-governmental body is necessary for the long run. After a short comparison with the Framework Programmes of the European Union, basic principles on which such a body should be established are discussed. A "fair return" principle, availability of flexible contribution options and, simplified bureaucratic procedures are proposed. Mechanisms to avoid the creation of a dominant core that can cause a brain drain in the long term are also recommended following the balanced and inclusive spirit of BRI. Then, a set of criteria is proposed for the choice of cooperation areas, and the research areas suggested in the literature are discussed under the light of these criteria.

Keywords: Belt and Road Initiative, innovation, inter-governmental organizations, science policy, scientific collaboration

Introduction

Belt and Road Initiative at a Glance

The Belt and Road Initiative, or BRI for short, is an immense development program announced by the Chinese government in late 2013. The program is knitted around trade routes, including the historic Silk Road, that are generally aligned in an East-West direction, and includes investment in the construction of railways, highways, and ports. As stated by Chin and He (2016), the original 65 countries envisioned by China's International Trade Institute have more than 62% of the world's population, 30% of the world's GDP, and 38.5% of the land area. Considering that 140 countries signed a Memorandum of Understanding (MoU) with China within the framework of BRI, the project's impact is even more far-reaching. It is announced not only as an infrastructure investment and trade network project but also an open, inclusive, and balanced joint development model that would boost economic growth in the whole region.

The Science Component of BRI

The historic Silk Road, trade routes between the East and the West of Eurasia, was active from the 2nd Century BCE. Not only trade goods but also ideas, religions, art, and techniques were exchanged. Many Chinese inventions like the compass and irrigation techniques reached Europe via the Silk Road and catalyzed the development of Western Civilization, while China imported techniques from the World as well, mostly through the same route. BRI is a huge collaborative effort covering a much larger area. Naturally, science and technology are also an essential dimension of this program. With its broader definition today, the Silk Road may again be a circulatory system for the spread of science and technology.

International scientific collaboration increases the overall efficiency of the innovation system either through better use of resources through optimal allocation or increasing the impact of the conducted research. It also helps with cultural and economic integration. To discuss how scientific and technical cooperation can be facilitated among the BRI countries, the "First International Science Forum of National Scientific Organizations on the Belt and Road Initiative" was organized in 2016. The "Alliance of International Science Organizations," ANSO, founded by 37 institutions including the Chinese Academy of Sciences (CAS), was inaugurated in 2018 as a non-governmental organization for international cooperation in science and technology.

The current mechanism of ANSO for collaboration are a) master of science and PhD. scholarships in China sponsored by CAS, b) awards, c) short training courses hosted by Chinese institutions, d) collaborative research activities, and e) associations for joint activities on chosen subjects related to the environment, development and human well-being (ANSO, 2021a).

There are also several other international organizations that promote scientific and technical cooperation, such as the academic networks of the University Alliance of the Silk Road and the University Alliance of Belt and Road.

Contribution of This Work

Although everyone agrees on the necessity of scientific and technical cooperation as part of BRI, the mechanisms to promote the cooperation have only recently started to emerge. In this paper, after the conditions of effective international cooperation in science, technology, and innovation are briefly discussed, the big picture is drawn on three axes: First, the current level of the innovation ecosystem and its trends are analyzed through an elementary bibliometric analysis. Secondly, the results from the study of Gui, Liu and Du (2019) are summarized to depict existing collaboration patterns and their trends. Thirdly, the language problem is briefly visited.

Considering the current situation, possible cooperation mechanisms are discussed. The role of ANSO is crucial in initiating multilateral research and providing a platform to discuss the future of the "BRI Research Area," but it is argued that an inter-governmental umbrella organization is necessary for the long run. Comparisons with various institutions are also provided, and the basic principles of such an organization are discussed. Hopefully, this paper can initiate more discussions about the future of the joint innovation system and contribute to the creation of a long-term vision for the scientific collaboration dimension of BRI.

Current Situation of BRI Countries

Conditions for Effective International Scientific Cooperation

It is important to understand which factors inhibit effective scientific and technical cooperation among countries and which ones facilitate them to be able to propose realistic cooperation schemes. Gui, Liu and Du (2019) summarized the factors that determine the possibility of collaboration in science with a vector of proximities, namely, geographical, cognitive, social, organizational, and institutional proximities, as well as with the existence of a common language, earlier relationships even in the form of colonialism, size of the economies, the capacity for innovation, networks of the partners, and administrative issues.

A common language is an accelerating factor in international technological collaboration. The common language can be the native language or a second language taught in the education system.

Ge, Dollar and Yu (2020) stated that "improved regulatory quality, political stability, government effectiveness, and rule of law" are indicators for institutional quality, which facilitates the companies' participation into global value chains in the BRI countries. These factors probably encourage scientific and technical cooperation as well.

First of all, the existing research ecosystem in a country determines its ability to take part in international activities to a large extent. Powerful scientific institutions well-integrated with industry that creates products and services via research and development activities ensure the creation of added value through cooperation.

Another important factor is the geographical proximity of candidate partners. However, its importance is getting weaker with recent developments in Information and Communications Technology (ICT), which accelerated considerably with the COVID-19 pandemic. On the other hand, the ICT connectivity in Central Asia is insufficient (Kunavut, Okuda and Lee 2018). Hence it can be a limiting factor for this area located in the geographical center of BRI.

As pointed out by Montobbio and Sterzi (2013), a common language is an accelerating factor in international technological collaboration. The common language can be the native language or a second language taught in the education system.

Political stability is also a very important factor for international cooperation. Conflicts reduce capacity in multiple ways, and recovery may take a very long time after the end of the conflict. Diversity in culture, economic and scientific development levels, languages, etc. may also be roadblocks, but it is possible to overcome such difficulties and, in certain cases, they can even be used as an advantage.

Current Situation

In this sub-section, only the current research capacities of chosen countries, existing collaboration patterns, and the situation with languages will be briefly visited. Firstly, the level of current research capacity is measured for some BRI countries. The number of articles from the "Scientific and technical journal articles" database of the World Bank (World Bank, 2021) is used as an indicator of the research capacity for convenience, although a composite metric derived from a larger set of indicators is necessary for a detailed analysis. Even though 140 countries signed MoU with China, and hence joined the BRI Initiative in some sense, we limit this analysis with chosen countries in Asia and over major roads on the east-west axis, that is, Armenia, Azerbaijan, Bangladesh, Belarus, Brunei, Cambodia, China, Georgia, India, Indonesia, Iran, Iraq, Kazakhstan, Kyrgyzstan, Malaysia, Mongolia, Myanmar, Nepal, Pakistan, Russia, Tajikistan, Thailand, Turkey, Turkmenistan, Uzbekistan, and Vietnam. Central Europe and the Baltics, the United States, and the World categories from the database are also included for comparison purposes.

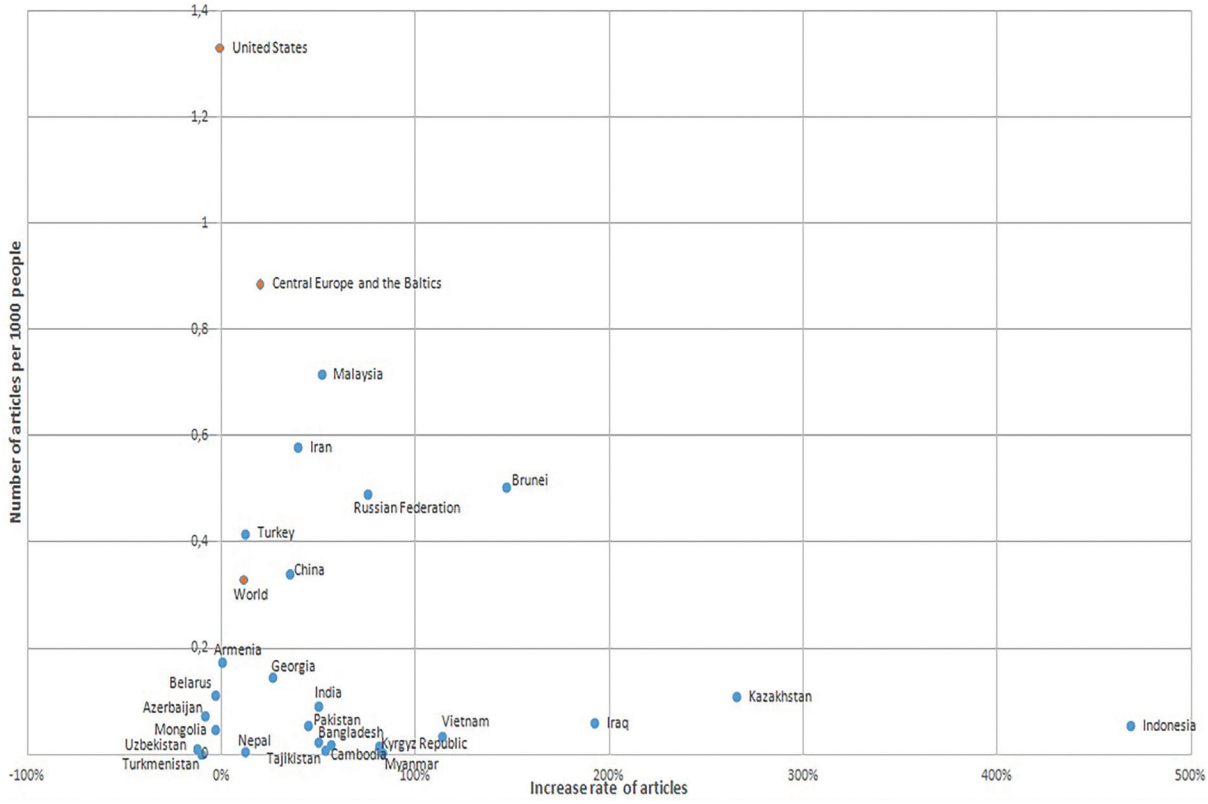
For the chosen countries, two parameters are calculated. The first one is the number of articles per 1,000 people for 2018 that shows the

current research capacity. The second parameter is the percentage increase in the number of articles, from the 2009-2013 average to the 2014-2018 average, which shows the trend. A scatter plot of the parameters is shown in Figure 1. Figure 2 shows the same data, but the axes are changed so that the cluster near the origin can be seen clearly.

The first observation in Figure 1 is that the average number of articles per 1,000 people is much lower when compared to the US or Central Europe and the Baltics. However, the rate of increase tells a different story because some countries are rising quite fast while the US and Europe look like they have reached a plateau.

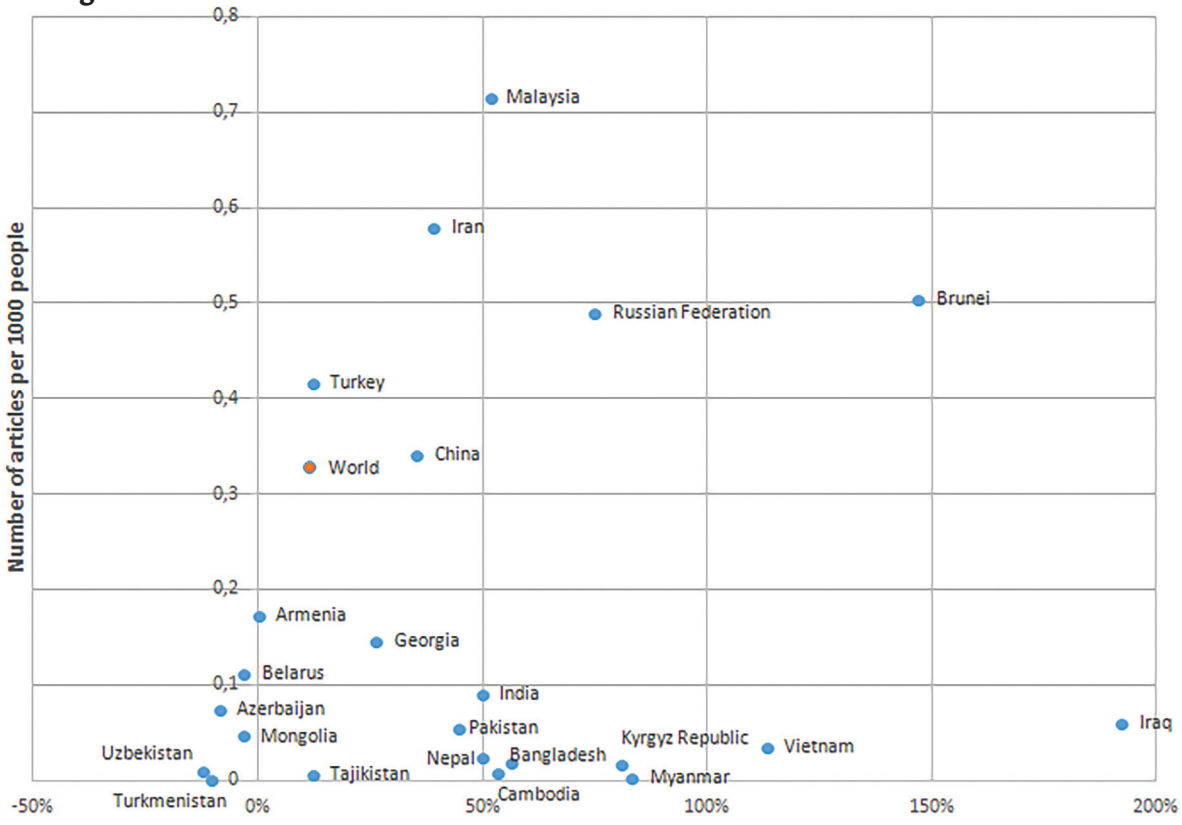
In Figure 2, a cluster around the origin is observed. This group with a low number of articles and small and sometimes negative trends will probably require special cooperation mechanisms. There is also another group with an increasing number of articles, although current levels are low. This group naturally has good potential for increasing their international collaboration.

Figure 1. Publication Performance of Chosen Countries



Note: Scatter plot of chosen countries or country groups as a function of the number of articles per 1,000 people and the rate of increase of the number of articles.

Figure 2. Publication Performance of Chosen Countries



Note: It shows the central part of Figure 1.

Finally, a cluster around the World average or slightly higher can be identified that are composed of relatively large countries, i.e., China, Iran, Malaysia, Russia, and Turkey. This group can serve as engines of scientific cooperation by playing the role of local hubs.

In the elaborate study of Gui, Liu and Du (2019), a detailed bibliographic analysis is performed for the 65 BRI countries using internationally co-authored articles. Firstly, they show that the cooperation among these countries has increased significantly from 2000 to 2018, and the network is significantly decentralized. Secondly, the topology structure shows that Russia, Poland, and China are core countries with star-shaped links, that is, connections with a large number of countries. However, China is taking over the main center status from Russia. Collaborations of Turkey, Iran, and Poland are also increasing. When the spatial distance is examined, they discover collaborations between countries with large separation are sparse, and most collaborations are between neighboring countries, but long-distance collaborations are increasing. The core-periphery analysis of Gui, Liu and Du (2019) reveals that there is a de-centralization trend and the core countries are China, Czechia, Hungary, Poland, Russia, and Turkey in 2018. Analysis of the networks also shows that China replaces Russia as the center of the largest sub-network while two other sub-networks emerge. One is an Eastern Europe network around Poland, and the other is an Arab network around the Saudi Arabia-Egypt axis.

A common language is an accelerating factor in international technological collaboration. (CGTN, 2018)

The language diversity among the BRI countries can be an important roadblock. One large cluster in the area is the former Soviet countries group in which Russian was the lingua franca, and higher education was mostly in Russian. Although Russian is still spoken by most of the educated people, the number of Russian speakers is decreasing in non-Russian countries (Pavlenko 2008). China is promoting Mandarin Chinese via scholarships in China and other mechanisms. For example, Masood (2019) explains how Mandarin becomes an optional language choice in Pakistan. However, Chinese is very far from being the lingua franca of BRI. The obvious choice is English for cooperation programs for the foreseeable future. Although the existence of former British colonies in the region like India and Pakistan is facilitating this option, the proportion of English speakers as a second language is very low in most of the area, including Central Asian countries.

Possible Mechanisms for Effective Scientific Cooperation

We can classify the cooperation mechanisms as bilateral or multilateral according to the number of parties involved. It is also possible to classify mechanisms as symmetric or asymmetric based on the nature of the cooperation. In some cases, there is a dominant party of cooperation, and in other cases, the relation is more balanced. How the cooperation is funded can also characterize the cooperation. Most bilateral scientific collaboration agreements are project-based, and each party covers its own expenses. In multilateral cooperation, the parties can form a pool from which the joint projects are funded based on merit, or a "fair return" principle can be adopted. This kind of cooperation, which requires strong commitments from the governments, is established through inter-governmental agreements.

For the case of the fair return, the European Space Agency can be a good example. Each member country contributes to the pool with a certain percentage of its gross domestic production (GDP), and there are complicated mechanisms to ensure that each country receives benefits proportional to its contribution in the long run.

For the other kind of cooperation, The Framework Programmes for Research and Technological Development of the European Union can be considered as a good example. It can also be a good template for future cooperation among BRI countries because it is one of the largest regional cooperation programs, if not the largest, with its budget of 188 billion Euros from 1984 to end of 2020, excluding the upcoming Horizon Europe programme (Reillon 2015). There is no explicit rule to ensure that the returns from the program match the contribution

of a country, and the funds are distributed based on competition.

When we consider current cooperation mechanisms among BRI countries, the most significant ones are implemented by ANSO, whose members are very heterogeneous, including universities, science academies, research funds, and centers. According to the 2019 Annual Report of ANSO, the 2019 budget was around 0.5 million USD. This structure is very convenient for networking and as a platform to discuss how to create more structured inter-governmental bodies that can fund larger-scale projects and other collaborative actions. Over time, the core started by ANSO should evolve to a program similar to European Framework Programmes. However, the circumstances of BRI countries should be considered to be able to have an efficient and working mechanism.

First of all, a "fair return" policy is necessary to avoid friction due to the possible unfair distribution of the funds.

The European countries have a long list of factors that make scientific collaboration among them easier. Existing economic and political integration process under the umbrella of European Union, sharing the same geographical area and cultural background, high economic development level, being well-connected both digitally and physically, speaking mostly languages from the same language family are only some of them.

In the BRI area, some economic, political, or security alliances are forming (like the Association of Southeast Asian Nations or Shanghai Cooperation Organisation), but they cover only part of the area. Geographically as well as culturally, some BRI countries are very far from others. Most of the BRI countries are developing economies. Physical connections through the motorway, railroad, and maritime road networks are being established along with the Digital Belt and Road, but the construction is in its early phase. A large variety of languages are spoken with radically different writing systems.

Despite these difficulties, it is possible to establish a mechanism similar to EU Framework Programmes if some principles are adopted. First of all, a "fair return" policy is necessary to avoid friction due to the possible unfair distribution of the funds. Secondly, instead of forcing contributors to allocate a certain percentage of their GDP, they should be allowed to start with small contributions. The main idea is to create win-win situations that will encourage governments to contribute more funds to be able to get more from the created value. In the beginning, this should be even easier because the projects will focus on "low-hanging fruits" first if a competitive environment among projects can be established. The "BRI Research Area" will probably start with a fraction of the countries involved in BRI; hence the rules for new members should be clear from the very beginning. There might be an overlap between "European Research Area" and "BRI Research Area", which will be an opportunity for a group of countries who will be able to benefit from both Worlds.

Of course, the selection of projects with competition and the "fair return" principle might be conflicting and may require complicated operation rules. Additional rules are necessary to encourage cooperation from distant countries, to avoid local clustering, and help better integration. Also, the number of participants to joint projects should be forced to be large because,

as indicated by Guerrero Bote, Olmeda-Gómez and de Moya-Anegón (2013), the gain in impact increases with the number of countries involved. The emergence of a dominant core should also be avoided because, first of all, the main idea is to have an inclusive and balanced model. A dominant core may even lead to brain drain in the long run. Masood (2019) gives an example of how China tries to prevent brain drain into China. However, preventing brain drain should be a primary concern for the whole design of the mechanisms because losing very scarce human resources would be detrimental to the development goals of many small nations.

In multilateral cooperation, the parties can form a pool from which the joint projects are funded based on merit, or a "fair return" principle can be adopted. (Chinadaily, 2021)

On the other hand, as another conflicting requirement, the funding mechanisms should be kept simple. In the Eight Framework Programme, the European Commission simplified the administrative procedures based on the preceding Framework Programmes' experience. Wang, Chen and Guo (2018) also point out the difficulty of project management in such multinational cooperation schemes and emphasizes the necessity of supervision mechanisms so that the system operates efficiently while ensuring optimum use of resources and increasing overall cooperation gain.

The choice of the research areas is paramount for the success of collaboration mechanisms. The principles and decision procedures for the research areas should be fixed at the beginning but the major areas and sub-fields should be updated every several years, similar to the Framework Programmes. Due to the self-organizing nature of collaboration (Wagner and Leydesdorff 2005), scientists and other shareholders will maximize the impact of the research within each sub-field. Details of research areas are discussed in the following sub-section.

The involvement of the private sector and specifically small business in the research and development projects deserves special attention since the private sector is an important driver of economic growth and job creation. The instruments designed within the Framework Programmes can again be a good template, but they will need to be tailored for the much more complicated BRI landscape.

The Asia-Pacific Space Cooperation Organization (APSCO), established in 2005 as an inter-governmental organization (Yan 2021), may serve as an example, and conclusions can be drawn from the experience. It was not established in the context of BRI, but it is still relevant as an example, and the definition of the geographic extend overlaps considerably with the BRI countries. The working principle of APSCO is similar to that of ESA. The contribution of a

country is calculated according to its economic development level and GDP per capita using a formula, and a fair return principle is adopted. Nevertheless, Yan (2021) states the problems in the implementation of that principle and underlines that organizational development is still necessary. Nie (2019) also emphasizes the difficulty of implementation of the fair return principle and discusses the legal difficulties of integrating APSCO into the BRI paradigm. We can infer from the discussions by Nie (2019) and Yan (2021) that the organization should have the flexibility to adapt to the changing circumstances.

Cooperation Areas

Before determining possible cooperation areas within the BRI framework, we need to decide on the criteria for evaluation of the candidate areas:

- Problems related to phenomena covering large geographical areas require international cooperation; hence research addressing such problems should be preferred.
- Research that has a large potential to turn into commercial activities or sustainable services should be preferred to support development.
- Areas in which the contributing countries have human resources or other resources should be preferred.
- Research that will help mitigating problems created or aggravated by the implementation of BRI should have priority.

ANSO describes the special focus areas of collaborative research as follows: "Scientific Research Orientations: Climate Change and Adaptation, Natural Disaster, Water Resource and Water Security, Air Pollution and Human Health, Ecosystem and Biodiversity, Combating Desertification, Energy Security, S&T Policy and Strategy on Sustainable Development, and Big Data." and "Human Well-being Orientations: Agriculture and Food Security, Public Health, Poverty Alleviation, Disaster reduction, and Technology Transfer." (ANSO, 2021b).

Research on the environment and climate change stands out as an important and indispensable research area as the World faces a deepening crisis right now, and the BRI area is not immune to it.

In the global context, Yang, et al. (2016) suggested scientific work on "smart cities, industrial transformation, pollution control, oceanic resources exploitation … (and) clean energy". They also recommended better use of remote sensing for monitoring natural resources. On the other hand, Barakos and Mischo (2018) suggested scientific and industrial collaboration in rare earth elements in the framework of BRI. Liu (2015) proposed several research subjects in the domain of geography, like geopolitical studies or foreign direct investment theories.

Research on the environment and climate change stands out as an important and indispensable research area as the World faces a deepening crisis right now, and the BRI area is not immune to it. On the contrary, most of the area is arid and semi-arid and hence more vulnerable to climate change (Li et al., 2015). Also, the consequences of the implementation of BRI may worsen the existing environmental problems (Ascensão et al., 2018; Hughes et al., 2020).

Energy is another indispensable research area, which is closely coupled to the environmental problem. The BRI is a development pro-

gram, and development without energy is not possible. Hence, research on clean energy is essential.

Water and agriculture are also critical problems that require research and development efforts. Binlei (2020) showed empirically that cooperation in agriculture creates substantial benefits through spill-over effects. The scientific component will enhance these effects.

Earth observation and remote sensing is a cross-cutting area that serves environmental, climate change, water and agriculture-related research among others. Digital Belt and Road (DBAR) (Guo et al., 2017) is a structure that serves this purpose and can be integrated into the higher-level organization in the future. ICT is a cross-cutting area as well. Especially, big data, artificial intelligence, and robotics research will catalyze all the research areas mentioned above. Digital Silk Road (Guo et al., 2018), which is a part of the BRI, will facilitate the research in this area.

The above items are not exhaustive and more areas can be identified. Although social sciences are beyond the scope of this study, it is clear that collaboration in social sciences, specifically history, archeology, linguistics, anthropology, geography, economics and international law, will serve the goals of the BRI program.

Conclusions

In this paper, a vision for the future of the BRI innovation system is proposed. After visiting the conditions of effective international scientific and technical cooperation and briefly analyzing the current situation, the mechanisms for fostering collaboration are discussed. The main conclusion is that ANSO and similar organizations should evolve into an intergovernmental organization that will create the "BRI Research Area." For such an organization, the following principles are proposed:

- A "fair return" principle should be adopted.
- In the selection of projects, a competitive mechanism should be used.
- Flexible contribution options that will allow the countries to increase their contribution over time should be available.
- The rules for acceptance of new members should be designed to facilitate the organization to grow.
- The emergence of a dominant core should be avoided.
- The administrative procedures should be kept as simple as possible.
- The involvement of the private sector, and especially that of small businesses, should be encouraged.
- Some of the important research areas are environment and climate change, energy, water, and agriculture. Earth observation, big data, artificial intelligence, and robotics are cross-cutting areas.

However, the subject is very large and cannot be covered in the volume of a single paper. Hence, more discussion is necessary on various platforms, and each element should be analyzed in detail from different perspectives.

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The Black Sea: A Sea of Energy, Prosperity, and Peace

BİROL KILKIŞ
Prof. Dr.
OSTIM Technical University

Birol Kilkis was born in 1949 in Ankara. He received his Ph.D. in Mechanical Engineering with high honors from Middle East Technical University. He graduated in 1972 with an honors degree from von Karman Institute for Fluid Dynamics in Belgium - a NATO Research Center. He completed his M.Sc. in 1973 and Ph.D. in 1979. Dr. Kilkis, who received the Science Encouragement Award from TUBİTAK in 1981, retired from the METU Mechanical Engineering Department as a professor in 1999. Currently, Dr. Kilkis is a member of ASHRAE Building Performance Metrics Steering Committee and member of the ASHRAE Research Journal Sub-Committee. ASHRAE elevated him to the grade of Fellow in 2003 due to his outstanding services and he has been named distinguished lecturer. In 2008, he received the Distinguished Service and Exceptional Service awards from American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE). He is the author of more than 500 papers in numerous journals and proceedings on a large variety of topics and has several patents pending on green buildings, solar trigeneration, heat pump coupled cogeneration, and low-exergy HVAC systems. Dr. Kilkis was appointed to the Executive Committee of the European Union Solar Thermal Technologies Platform in 2015. Since his commencement of this duty in 2018, he became the Vice-Chair of the Renewable Heating and Cooling Committee (RHC). He also served the Turkish Society of HVAC and Plumbing Engineers in the capacity of President between 2017 and 2019.

E-mail: birolkilkis@hotmail.com

https://orcid.org/0000-0003-2580-3910

ABSTRACT

This paper discusses the potential role of the Black Sea in establishing a wider, more sustainable, environment-friendly, and interdisciplinary platform for innovative solutions with international cooperation among the Belt and Road Nations. Although this platform concept is based on two hydrogen research centers, one in China and the other in Turkey, with satellite centers along the entire Belt and Road, the benefits are discussed to fall out to a very wide spectrum of technological developments focusing on renewable energy, transportation, and welfare. The paper also argues the local benefit of cleaning the sea from harmful and dangerous concentrations of H_2S gas by the close collaboration of the six countries around the Black Sea.

Keywords: Black Sea, BRI, exergy, hydrogen economy, renewable energy

WITH THE EVER-INCREASING CLIMATE warming urgency and depletion of known fossil fuel reserves, decision-makers and energy strategists are concentrating on new alternative fuels such as abundant renewable and waste energy sources, which used to be ignored due to their low quality (exergy). Exergy is the useful work potential of a quantity of energy. These alternatives are becoming the most important assets of our future. However, industry, transport, and agricultural sectors require high-quality sources of energy, which rely on fossil fuels. This conflicts with the necessity of using alternative energy sources as widely as possible. One of the emerging technologies that can resolve this conflict is the renewables-based hydrogen economy.

By using lower-quality renewables like solar energy to generate hydrogen from water provides a zero-carbon fuel, which has higher quality than natural gas. Black Sea countries are very fortunate in this respect because the seawater is exceptionally rich in H_2S gas that may be split into hydrogen and sulfur using abundantly available off-shore renewable energy sources like wind, wave, and solar. The Black Sea has alarmingly high levels of H_2S awaiting useful applications to reduce simultaneously environmental and human risks.

This article focuses on the production of hydrogen gas and its transport to land on a ship powered by wave, sun, wind and also by hydrogen. Additionally, it will be discussed the hydrogen city project which uses coal and geothermal energy resources in the region based on Sinop city sample as well as its economic, environmental and political advantages.

The Black Sea: A Potential Hub for Energy and Peace

The Black Sea is one of the world's largest inner seas with an area of 432,000 km^2, a maximum water depth of 2,200 meters, and a water volume of approximately 534,000 km^3. (Ertan, 2020; Kılkış, 2020). *The Commission on the Protection of the Black Sea Against Pollution* depicts the Black Sea quite soundly by describing it as the most isolated sea from the rest of the World's Oceans, with a catchment ratio[1] of over six. Such a high catchment ratio makes it very critical for landside activities, non-coastal countries, and sea pollution. Its characteristic geomorphology with exceptionally high H_2S concentrations

1 Catchment ratio is the amount of land area with respect to the sea surface area, which contributes water to that sea by rivers flowing to that sea.

has resulted in a very thin upper layer of about 150 meters to support marine life (Ertan, 2020; Kılkış, 2020). The situation is worsened by other ecological mistakes, like partly discharging the municipal wastewater of the city of Istanbul using the bottom current of the Bosporus to the Black Sea.

The Black Sea, H_2S Reserves, and Special Advantages

The Black Sea Region has a four-pronged advantage, namely:

1- Wind and Wave Energy Abundance

2- Abundant H_2S reserves for H_2 and S, which are equally important for the environment and industry

3- Low Salinity for Sea Water Electrolysis

4- Relatively Stable Politics.

There are well-defined and well-agreed upon continental shelves of the six countries around the Black Sea. This makes the area much more stable and free of military skirmishes as long as the 1936 Montreux Convention about the natural straits of Bosporus and Dardanelles holds and the man-made Canal Istanbul project is suspended, which may be vulnerable to foreign military aggression for free passage of warships and submarines, especially to unnecessary but planned NATO interventions that possibly will make the region much less stable. The energy potentials of the Black Sea are not limited to natural gas and hydrogen but also offer gas hydrides in large amounts (Ertan, 2020). Moreover, it is clear that interests will be towards the Black Sea due to reducing hydrocarbon energy in the Middle East which does not have another energy resource. In all these respects, the Black Sea with such a diversity of abundant resources is the second Middle East, which only has fossil fuel reserves and keeps adding international conflicts in the region each day. The only way to prevent these kind of threats is to share this abundant resources with coastal countries by conducting joint projects.

H_2S Potential

The Black Sea is one of the world's largest H_2S reservoirs. The total reserves are estimated at between 28-63 billion tons (between $41x10^{12}$ and $92x10^{12}$ m^3) (Ertan, 2020; Kılkış, 2020). Assuming a retrieval ratio of just 50% and considering that there are six countries with continental shelves, the Turkish share is estimated between 7 and $15x10^{12}$ m^3 of hydrogen. (Ertan, 2020; Kılkış, 2020). Hydrogen has an exergy-based calorific value of almost three times more than natural gas (Kılkış, 2020). Therefore, on a natural gas equivalence comparison, the natural gas-equivalent net reserve for Turkey will be about 21 to $45x10^{12}$ m^3 of equivalent natural gas. This is almost 65 times more than the recently discovered Tuna-1 (Sakarya) natural gas reserve (Kılkış, 2020).

Furthermore, the yearly increase of H_2S gas reserve in the Black Sea is annually increasing by a rate between 4-9 million tons/annum (Ertan, 2020). Again, taking the lower estimate, this annual H_2S gas increase in the Black Sea is about nine times more than the Tuna-1 reserve. In other words, if H_2S gas is not used by renewables to produce hydrogen, Turkey will be missing nine natural gas reserve-equivalent energy reserves every year, which is a much cheaper-to-produce zero-carbon fuel. Furthermore, if H_2S gas with a self-ignition temperature of 505 K (232°C), highly volatile and combustible, is not removed from the sea stock, its great and irreversible

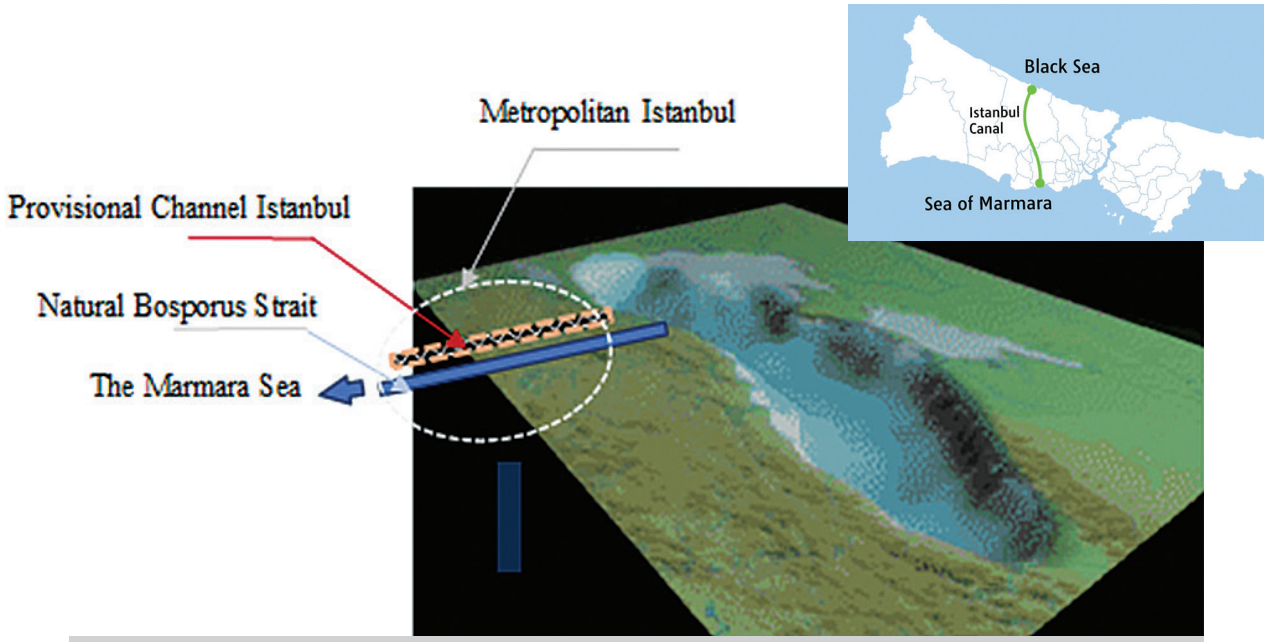


Figure 1: The Black Sea Bathymetry

threat to the population and the environment, marine life, and humanity will keep increasing. In a NATO ASI Book, edited by Veziroğlu and Tsitskishvili, several authors present the Black Sea as an important and potentially carbon-free energy reserve due to its high H_2S concentration in the seawater (Veziroğlu & Tsitskishvili, 2013). H_2S may be claimed onshore, off-shore, or below the seabed systems, even by using a deep-sea platform that utilizes a decommissioned submarine (Petrov et al., 2011). The Black Sea Hydrogen Sulfide Workshop (BSHSW) concluded that a common platform for concerted research including environment, energy, economy, and the overall feasibility, must be established by the surrounding countries, with a pilot system (Petrov et al., 2011; Yazıcı, 2013). A complete survey about the potential H_2S to hydrogen production in the Black Sea was also carried out (Yazıcı, 2013; Haklıdır & Kapkın, 2005).

Potential Threats of the H_2S Concentrations in the Black Sea

Figure 1 shows the unique sea bed bathymetry. The shelf depth is between 0 to 160 meters. In terms of concentration, Black Sea contains a very large amount H_2S gas that any ocean or sea has not and this concentration increases every year.

The Current Situation

The connection from the Black Sea to the Marmara Sea is a narrow, natural waterway, named the Bosporus, which plays a vital role in the entire ecosystem. There are two counter flows, one above the other which do not mix in the Bosporus, namely an upper flow towards the Marmara Sea and a bottom flow from the Marmara Sea to the Black Sea. The cooler upper flow transports fresh and less salty water (average is 19‰), mainly from rivers like the Danube river to the Marmara, then to the Aegean Sea, and the Mediterranean Sea.

This flow refreshes the Mediterranean Sea, which is saltier (38‰). The warmer bottom flow transports the saltier water coming from the southern seas to the Black Sea. This is a perfect hydrodynamic balance, which has existed for thousands of years and keeps the Black Sea about 30 cm to 60 cm (mainly depending upon the season) above the Marmara Sea. The thin upper layer of marine water (about 200 meters) supports the unique biological life in the Black Sea ecosystem. The deeper and more dense water layers are saturated with hydrogen sulfide, that over thousands of years, accumulated from decaying organic matter in the Black Sea.

Provisional Canal Istanbul

The most potentially dangerous human activity is the recently planned Canal Istanbul, which is to be artificially opened almost parallel to the existing natural waterway, the Bosporus. Figure 2 is an estimate of the predicted early events after Canal Istanbul. The H_2S-rich layer might be hydrodynamically sucked in towards the Canal Istanbul and will jet flow through the small nozzle under the pressure of the potential energy from the Black Sea due to the difference in height of the surface levels of the two seas. Surface velocities in the Canal initially may exceed 14 knots (29 km/h). This flow will move high H_2S concentrations up to the surface level, thereby exposing all the flammability, explosive, and toxic dangers to the environment and the nearby settlements. The total potential energy that currently exists is about 0.8x103 terajoule (TJ). This potential energy did not find a route through the Bosporus, because of the well-balanced surface and bottom currents. If Canal Istanbul is going to be opened, this potential energy is estimated to be gradually released through the Canal.

Therefore, it is an urgent issue to dilute the H_2S gas concentration in the Black Sea itself without expanding the threat to the city of Istanbul and its surroundings and further down towards southern countries and seas.

H_2S gas -if decomposed to H_2 and S- is a great energy source, much better than natural gas and other fossil fuels if handled and utilized properly by using collocated renewable energy sources readily available in the Black Sea, namely wind, solar, and wave energy. In this case, all the activities must be in the Black Sea with minimal or no disturbance to the H_2S layer. This requires no hydrocarbon explorations with drilling activities and no hydrocarbon exploitation with off-shore gas platforms, all of which involve electromechanical actions penetrating through the H_2S layer. This limitation also includes off-shore wind

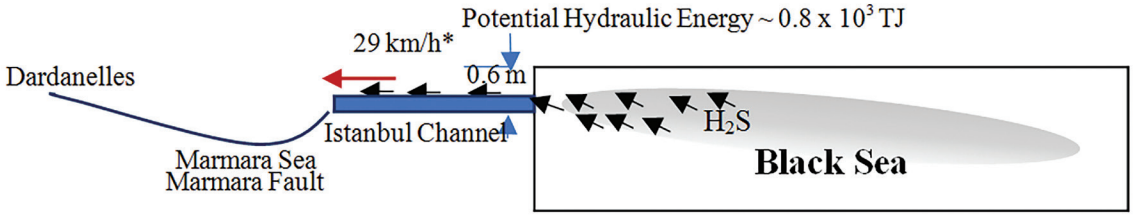


Figure 2: H_2S Overflow Risk to Istanbul and the Marmara Sea through the Provisional Canal Istanbul The figure is not to scale) ©B. Kilkis *At the Initial Stages of the Canal Operation.

turbines with rigid foundations to the seabed, which may disturb the natural water flows below the surface. In this respect, the most recent decision of hydrocarbon explorations in the Black Sea needs to be reconsidered until the H_2S problem is solved below a safer level. After all, natural gas or oil has CO_2 content and release net additional moisture to the atmosphere, both of which speed up global warming. Hydrogen is a clean-burning, very high calorific value gas with minimal global warming footprint compared to fossil fuels, and water is the only output. It may be argued that hydrogen combustion also emits moisture, but this water release results from the closed water loop, which uses the original quantity of water consumed for decomposing it to hydrogen. So, the net moisture release, with twice the greenhouse effect, compared to CO_2 emissions, is nearly zero, provided that it is generated from natural reserves and renewable energy sources.

Hydrocarbon Economy versus Hydrogen Economy

-Natural Gas Explorations. Recently, natural gas explorations, both in the Mediterranean Sea and the Black Sea, are increasing. Ship engines having much longer piston strokes, generally use marine diesel oil (MDO). Onboard the exploration ships, as with all other ships in the stock, this type of fuel is used with limitations on NO_x and particulate emissions both for steering the ship, for its domestic uses, drilling for pilot and natural gas wells.

The drilling process, as well as all domestic demands, mainly consumes electricity by using the same type of marine diesel oil in electric generators and only a few ships use combined heat and power (CHP), or trigeneration units for domestic cooling purposes. When the natural gas reserves are found, another off-shore gas platform extracts the natural gas and prepares for shipment by ships, by fixed or semi-floating pipelines to the shore using pumps, all of which consume part of the exploited natural gas. On the other hand, caution must be taken for handling hydrogen to prevent leakages during storage, transport, and use.

Hydrogen economy in the Black Sea has no drilling costs because no drilling is necessary to reach the H_2S concentrations at the sea.

As a result, both natural gas or any other hydrocarbon fuel exploration ships and off-shore gas platforms will be responsible for global warming in terms of CO_2, SO_x, NO_x, particulate emissions, as well as moisture. On the contrary, H_2S exploration and rational utilization of hydrogen after generating from on-board renewables in a complete hydrogen economy (both on the seaside and the landside) will be almost a zero-hydrocarbon application.

-Business as Usual Scenario: Hydrocarbon Economy. Hydrocarbon exploitation activities like natural gas exploration, drilling, exploiting, transferring, and consuming the fuel in the built environment have average rational use of the quality of energy sources value of 0.2 (world average) (Kılkış, 2020). Considering both direct and avoidable CO_2 emissions, due to quality destructions in such applications, the off-shore CO_2 emissions responsibility higher than the hydrocarbon reserves will be about 1 kg CO_2 for each kW-h.

-Hydrogen Economy Scenario. The hydrogen economy on-board a conceptual hydrogen mother ship will be self-sustaining with nearly zero environmental footprints, excluding the embodiments of the system and equipment. Hydrogen economy in the Black Sea has no drilling costs because no drilling is necessary to reach the H_2S concentrations at the sea, except

small-radius cruises of the mother ship to follow the maximum concentration and optimum depth within the sea shelf of every nation bordering the Black Sea.

Costs and Environmental Impact of Natural Gas Exploration Compared to H_2S: Cost of Hydrogen Ships

The only major cost is the specially designed and constructed hydrogen ship. There is no need for deep-sea electromagnetic and sonic exploration shipbuilding costs, no pilot drilling and production well drilling costs. The operation costs of the hydrogen platform are comparably low. The only CO_2 responsibility is minor exergy destructions related to onboard activities.

Black Sea Wave Energy and the Black Sea Composite Map

For renewable energy, H_2S, Water, and Hydrogen Nexus, it must be noted that the Exergy-Maximum H_2S Exploration Field lies within the Turkish continental shelf. Marine Renewable Energies and the Black Sea topic has been also of interest to the EU. For wave energy east of the Turkish Black Sea, lignite and geothermal reservoirs on the land close to the shore are also in the same area on the land side (Sinop and Zonguldak Provinces). For wind energy though, along the middle region of the Turkish coastline, the Black Sea has the highest potential. The potentially optimal region is shown by the square box in Figure 3. This box is within the Turkish continental shelf. Solar energy insolation level, In, which is around 500 W/m_2, is not too feasible in the Black Sea.

Hydrogen Ship with 100% Renewables for the Black Sea

General Concept and Layout

Figure 4 shows a not-to-scale plan view of the hydrogen ship, which has a semi-catamaran hull.

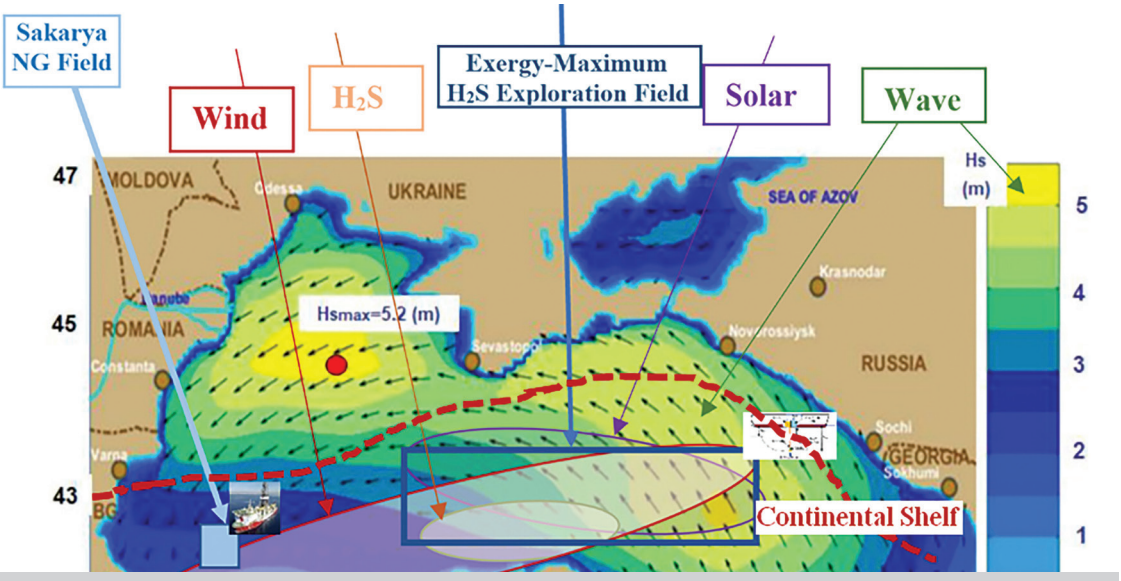


Figure 3: Composite map of renewables overlaid with wave energy for exergy-maximum H_2S exploration field. The Figure also shows the most recently discovered natural gas field by TPAO with 320x109 m^3 reserve. (Announced on August 21, 2020)

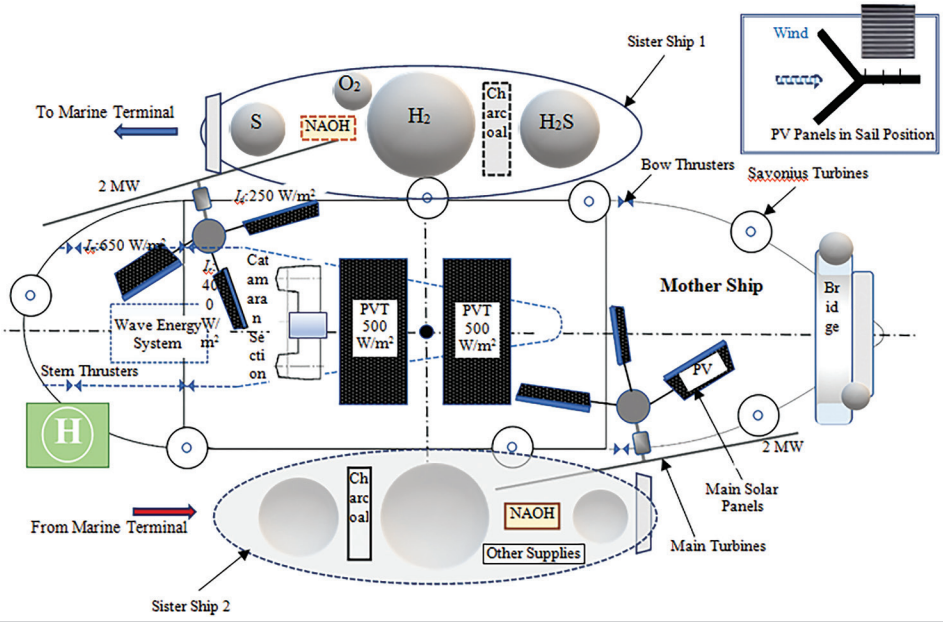


Figure 4: On-board, all hydrogen, all renewable semi-catamaran energy ships for hydrogen and sulfur production in the Black Sea [Patent Pending]. The figure is not to scale ©Birol Kilkis

For each mother ship, there are two sister hydrogen ships for transporting hydrogen, sulfur, oxygen, and H_2S to the landside through their marine terminals. The set of these sister shuttle ships has separate H_2, H_2S, O_2, and S tanks and supply material chambers. They shuttle between the mother ship and the marine terminals alternatively as hydrogen-sulfur transfer ship and logistics ship on their return to the mother ship. One ship stays with the main ship while it is charged with hydrogen and sulfur. When the second shuttle ship arrives back with supply material like charcoal and other chemicals, it departs and the cycle continues (Kılkış, 2020).

All ships can navigate and operate independently on their hydrogen power. Each mother ship of comparable size to the Fatih exploration ship has two main twin-blade wind turbines with fixed axes. They are mounted on the ship such that their moments are canceled at the center of gravity of the mother ship. Twin-blade wind turbines are noisier on the land and they have not been preferred. However,on the seaside noise is not a problem for the coastal regions. Savonious type of turbines on the starboard and port side of the deck complement the wind energy system. There are embedded pressurized-air tanks inside the hollow, tubular main wind towers to store pressurized air derived from the wave energy system, by which an air turbine is driven for generating electricity. Thus, the hybrid 100% renewable energy system has also a fourth dimension, namely mechanical energy storage. The wave energy system is located in a vertical position on the catamaran section of the hull. It is a vertical, piston-crank mechanism type of air pumping system and operates only when the mother ship is at a stop or at a dead-slow motion. Otherwise, it is retracted up to eliminate

drag during normal cruising. Main solar panels track the sun, rotating around the towers. On each tower of the wind turbines, there are three main PV panels mounted symmetrically at 120° between them. They can rotate together around the tower and they can independently adjust their azimuth angles, controlled by a central control system. As an emergency case during cruising, these PV panels may be positioned such that two of them act as a wedged sail (See the inset in Figure 4). During the nighttime when solar energy is not available, panels are brought to a vertical position for cruising by sailing. During daytime, solar panels are adjusted to their optimum inclinations, considering the mechanical wind-sailing effect versus maximum DC (direct current) power generation from the sun, if wind energy is available and cruising is required. They may also be rotated for steering the ship. Under normal operations, one PV panel tracks the sun in azimuth, the second one tracks the reflected sunshine from the sea, and the third one tracks the ambient solar light. Two additional horizontal PVT panels are laid on the deck. These also provide low-temperature heat for domestic uses (Kılkış, 2020).

Another option is to lay additional PV cells on the inner roof of the catamaran end facing the sea surface to absorb reflected sunlight. As a precaution to helicopter pilots, their approach line versus sun glare from solar PV panels alongside standard wind turbine lighting must be applied according to international aviation regulations. All ships operate on DC mains (Kılkış, 2020).

The electrical exergy demand of the circulation pump for waste heat retrieval at the bottom of the wind turbine tower must be less than the exergy of the waste heat retrieved. A computer-controlled adjustment of pumping flow rate is necessary for this kind of application.

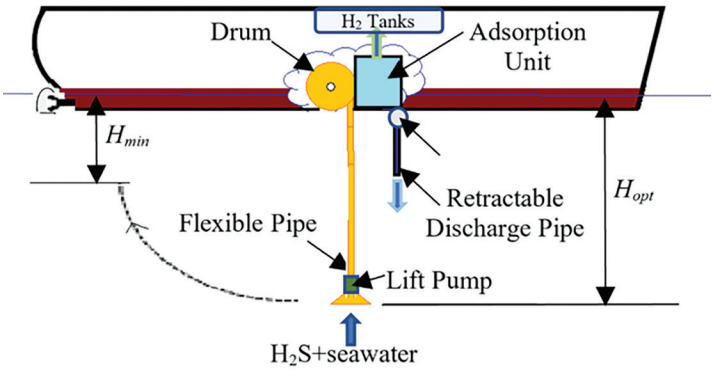


Figure 5: Flexible and retractable H_2S claim system of the mother ship. The figure is not to scale ©Birol Kilkis

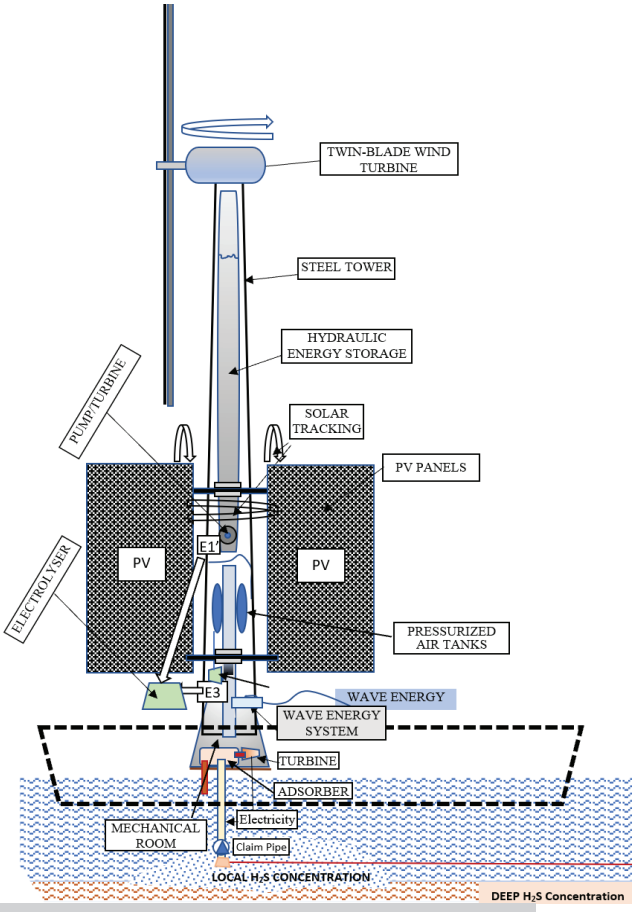


Figure 6: Hydrogen city integrated, off-shore renewable energy system for Black Sea H_2S reserves (Artist`s conception, Patent Pending): 100% renewable energy system principles. The Figure is not to scale ©Birol Kilkis

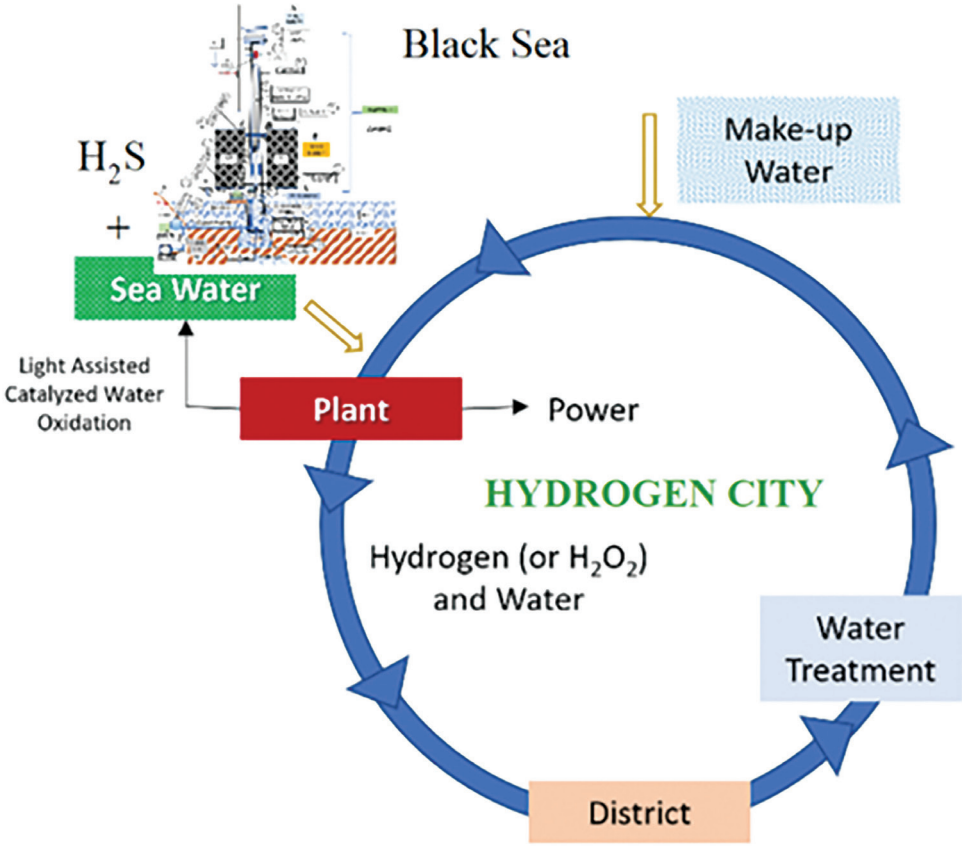


Figure 7: Land and sea cooperation for complete water nexus ©B. Kilkis

In wintertime, the heat generated in the nacelle may be used to warm the electromechanical system only. Fuel cells generate electricity from hydrogen, while the waste heat can be utilized for onboard domestic uses. The specially designed or retrofitted hydrocarbon exploration vessel is driven by electric power, which is supplied collectively from fuel cells, renewable energy systems, and CHP units, which are also driven by hydrogen energy. Hydrogen-fueled CHP is a backup for power and domestic heat demands in the ship.

Hydrogen energy is generated in two steps, namely by electrolysis of seawater and absorption of H_2S+seawater. This system with H_2 storage tanks makes the solar, wave, and wind energy collocation on the mother ship, which is shown in Figure 4. A flexible piping system with a lift pump(s) rises H_2S+seawater mixture from the optimum claim depth for maximum concentration. Optimum depth is adjusted by both winding the flexible tube around a drum and also bending it with an adjustable pull rope as shown in Figure 5. The optimum claim depth,

Hopt is adjusted by a combination of winding or unwinding the flexible pipe and at the same time swiveling it backward or forward. The discharge is made by a deployable discharge pipe with its dedicated pump. Figure 6 shows the wind turbine tower with four functions. Depending upon year-round climatic conditions, exergy-based techno-economic feasibility, size of the ship, etc. additional DC power may be obtained by thermoelectric generator (TEG) elements and/or organic rankine cycle (ORC) turbines by utilizing the heat generated in the nacelle of the wind turbines by electro-mechanical drives.

Land Side

Coupled with biogas, wind turbines, PVT panels, geothermal, and lignite for hydrogen, the hydrogen city completes the hydrogen economy circle with almost-zero carbon emissions responsibility.

The Black Sea and Belt and Road Connection

The Black Sea has an important role in the Belt and Road Initiative in several aspects. First of all, the Black Sea -not only in terms of hydrogen technology but in terms of all energy types and forms- will act as a scientific and innovative crucible, and a role model for the world, for strengthening the economies of the countries along the Belt and Road by centralizing the focus on coordinating and strengthening research and

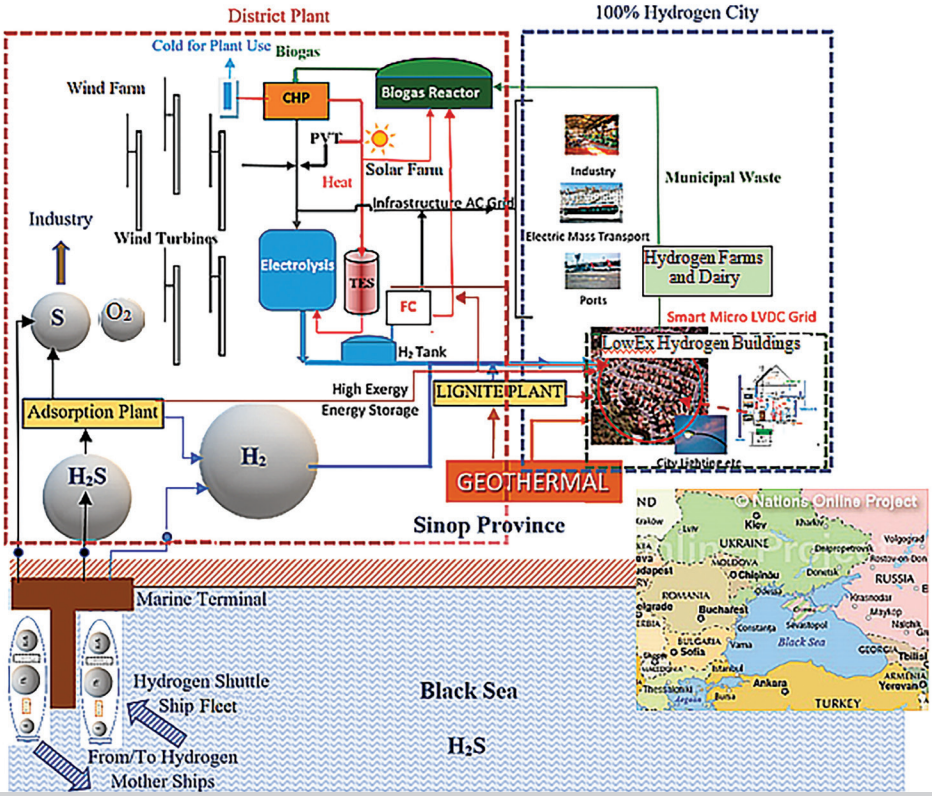
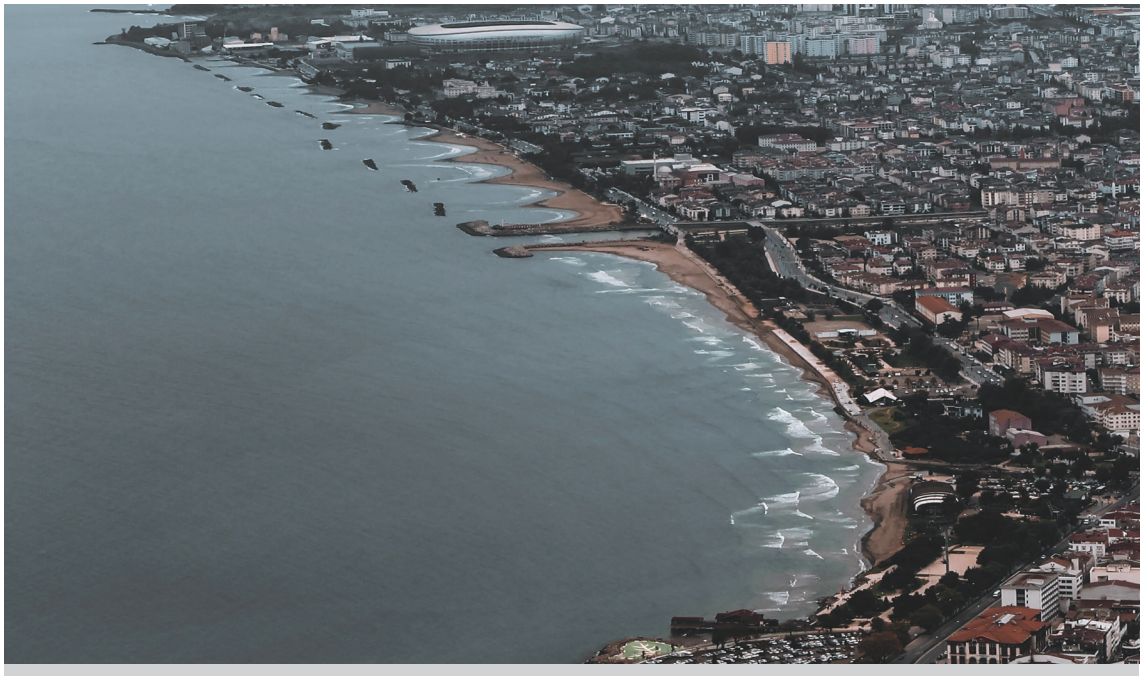


Figure 8: Land and sea cooperation for hydrogen economy ©2020B. Kilkis

innovation regarding renewable energy systems in an orchestrated manner while global warming agents are reduced. Such a monumentally productive task will be facilitated by the new Hydrogen Energy Center to be open in China in the near future. This center will be paired with the Sinop Hydrogen Research Center. These centers, in good coordination will accelerate the decarbonization efforts in all forms of energy. For example, China is considering replacing coal, wood, and lignite use in homes of Northern Climates with wind energy-driven electric heating. This idea was critically reviewed earlier because the direct electricity-to-heat conversion is not rational among other integrated solutions of better ways of utilizing wind power. As in this example, these new centers will lay the foundations of teaching and discussion grounds in such a manner that hydrogen storage may be more feasible to utilize wind power, including heating at the end of the energy utilization chain, including farming, and light industry.

On the other hand, China and all other Central Asian countries are rich in geothermal energy. These centers may develop innovative solutions by combining and linking all the Belt and Road countries with their renewable assets and expertise about geothermal, solar, and wind power. By doing so, they can share the wealth, and develop clean cities as exemplified above in this paper regarding the Hydrogen City of Sinop. As already shown in Figure 8, this city concept is not all about hydrogen but all about an optimum and rational combination of local renewables and fossil fuel resources like geothermal, solar, wind, biogas, wave energy (if available), and local industry, all facilitated by cogeneration, fuel cells, heat pumps, and circular hydrogen economy.



Hydrogen in the Black Sea is not just hydrogen but is an important eye-opener and catalyst for the Belt and Road Collaborative actions to be taken for its sustainable and continuing future. (Source: Pexels website)

China and all other Central Asian countries are rich in geothermal energy. These centers may develop innovative solutions by combining and linking all the Belt and Road countries with their renewable assets and expertise about geothermal, solar, and wind power. (CGTN, 2018)

In the future, the new Center in China may also get involved in the hydrogen-nuclear relationship and boron as a safety and energy storage medium. Turkey for example is already exporting boron by using the railroad link to China over the Belt and Road Initiative. Geothermal energy may also provide lithium more cleanly in deep wells for electric mobility, including electrical mechanization of farms in all Central Asian countries as well as Turkey, and beyond. Freight trains, transport trucks from one end to the other may be electrified with renewable energy. Even ordinary jet fuel may be produced by a combination of hydrogen and certain local industrial wastes (Ertan, 2020). This is also important for future regional and international airports linking all countries in the Belt and Road region from far east to west using their existing air transport fleet without any need for modification of the planes. At the same time, the Black Sea will open an exemplary Belt-Road as an innovative web of land, rail, sea (Black Sea and Caspian Sea), air (with strategically located new airports), and rivers (the Danube for example) spanning across the two continents, namely Asia and Europe, and even beyond. The Black Sea will be the last but the most important link of this web of economics, environment, clean cities, health, and wealth. At the same time, six Black Sea countries may find this web useful for fur-

thering more peaceful share of resources, technology, and research. The Black Sea link concept may also be combined with the Five Seas Strategy, which may further expand the Belt and Road Initiative to Southern Latitudes by sea.

To the understanding of the Author, hydrogen in the Black Sea is not just hydrogen but is an important eye-opener and catalyst for the Belt and Road collaborative actions to be taken for its sustainable and continuing future.

Conclusions

• If hydrogen and hydrocarbon economies are simultaneously mobilized at an optimum mix, much more power and national pride without international conflicts may be achieved.

• Hydrogen economy in the Black Sea will also reduce the potential risks of this combustible and flammable H_2S gas at no cost as a bonus for the hydrogen economy.

• No oil platform costs and operating expenses, no drilling and seismic exploration expenses.

• Much cleaner cities with nearly-zero-carbon emissions.

• Hydrogen infrastructure will use the existing natural gas infrastructure with about one-third of the natural gas capacity, leading to less maintenance and repair costs. A 20% mix of hydrogen by volume to the existing natural gas lines will save about 60% natural gas and proportionate savings of operating and maintenance costs, while the same exergy demand compared to natural gas is satisfied without any energy compromise.

• If money continues to be the first in the agenda of politicians and economists, then the following argument holds:

The hydrogen economy is the most sustainable, cheap, and environmentally safe solution, especially for the Black Sea countries.

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From the "Silk Road of Health" to the "Community of Shared Future for Human Health" in a Post-COVID-19 World

YANG CHEN
Asst. Prof.
Department of History, Shanghai University

Yang Chen is Assistant Professor in the Department of History of Shanghai University's College of Liberal Arts and Executive Director of the Center for Turkish Studies at Shanghai University. He has published two books about Turkey and several papers in journals such as World Religious Culture West Asia and Africa Arab World Research and China Social Science Today. His main areas of research are political Islamic movements in Turkey, party politics in Turkey, Turkey's foreign policy, and China-Turkey relations.

E-mail: ycwf2008@163.com

http://orcid.org/0000-0002-4840-6427

ABSTRACT

The COVID-19 pandemic has exposed many problems and challenges for global public health governance, but the lack of leadership is one of the most serious. To fight against the pandemic, China proposes to the international community a brand-new concept of the "Community of Shared Future for Human Health" and contributes Chinese wisdom and solutions to global health governance. At the bilateral level, China will actively strive for cooperation among major countries in fighting the pandemic. At the regional level, it will use the "Silk Road of Health" as a starting point to enhance health cooperation with countries in the "Belt and Road" Initiative. At the global level, China will actively promote the construction and reform of global health governance mechanisms.

Keywords: community of shared future for human health; COVID-19; global public health governance; Silk Road of Health

THE HISTORY OF HUMANITY'S STRUGGLE against disease is a major part of the history of civilization. From the Black Death in Europe in the 14th century, to smallpox in North America in the 16th century, to the Spanish Flu outbreak in 1918, to the COVID-19 pandemic that ravaged the world in early 2020, the struggle between humans and various epidemics has never stopped. Although human beings have achieved the final victory in each struggle with the plague, it has paid a huge cost of life. Smallpox killed 300 million people in the 20th century alone. Even in the 21st century, with technological development and medical advancement, sudden public health events can still lead to huge casualties. The 2009 outbreak of H1N1 influenza in Mexico and the United States caused more than 280,000 deaths (Xu, 2020). As of February 15, 2021, a total of 109,351,012 people have been diagnosed and 2,408,045 people have died due to the COVID-19 pandemic. Many countries are still on a growth trend (Real-time, 2021).

This COVID-19 pandemic is the rarest global public health crisis that mankind has encountered in the past 100 years and also generated a global governance crisis, which poses a huge threat to the life and health of mankind as well as to the world economy even worse than the Great Depression in the 1930s (Dan & Mei, 2021). This reflects two major issues. One is that non-traditional security threats, such as major infectious diseases, may occur more frequently in the future and bring more challenges than traditional security threats. The second is that the international community's response to major infectious diseases is full of problems and global public health governance is seriously lagging behind the current situation and urgently needs to strengthen.

For China, this pandemic is a major public health emergency that has the fastest speed of spread, the widest range of infections, and the most difficult prevention and control since the founding of the People's Republic of China. Fortunately, it took China only a month to curb its spread, two months to control the daily new cases within single digits, and about three months to obtain decisive control of the disease in Wuhan City and Hubei Province. Later, China has also successively won several battles to wipe out concentrated epidemics in local areas (Ping, 2020a). With the large-scale use of vac-

cines, China's anti-epidemic measures have become more efficient. To summarize, the successful experience of China is that it has continually practiced the concept of "People First" and "Life First", proposed to the international community a brand-new concept of the "Community of Shared Future for Human Health", and contributed Chinese wisdom and Chinese solutions to global health governance.

The Main Challenges of Global Public Health Governance

The COVID-19 pandemic spread to about 200 countries and regions around the world in just a few months since the beginning of 2020, becoming the most serious security threat facing the international community since World War II. To deal with such unprecedented challenges, the world should sincerely work together, but the actual situation is that the ineffectiveness of global public health governance raises serious concerns regarding the "governance deficit" and the shortcomings of this system. Specifically, these defects are as follows:

First, global public health governance is becoming increasingly difficult nowadays. In recent years, with the accelerating exchange of people across borders, the deterioration of the ecological environment, and the uneven and unstable character of international development, the global spread of infectious diseases has further intensified. Some ancient viruses have resurrected and mutated, and some new diseases reappeared one after another at an unprecedented speed. However, humans' awareness of these viruses is slow, and the detection, clinical treatment, and vaccine research and development require long-term efforts, which makes it difficult to effectively prevent and control them. It can be said that the threat posed by the spread of the virus is even greater than the consequences of any terrorist act (Min, 2020).

In recent years, with the slowdown in the economic development of developed countries and the increase in domestic problems, trade protectionism, unilateralism, and populism in some developed countries have become increasingly prominent, and their willingness and ability to invest in global governance have decreased.

Second, there is a vacuum in the leadership of the global public health governance system. The global public health governance system brings together many agents such as international organizations, non-governmental organizations, and multinational companies. However, due to the lack of strong leadership, there is more competition between agents than cooperation, policy coordination is lacking, and the inability to share information has worsened (Feng, 2020). For example, although the World Health Organization (WHO) is a United Nations agency responsible for health affairs, which has 194 member states as part of the most authoritative and professional international organization in the field of global public health security, many Western countries claimed that it has not played a positive role in the fight against COVID-19 due to problems such as insufficient authority and shortage of funds (Yong, 2020a).

Third, the willingness and ability of some Western powers to participate in global public health governance have declined significantly. Most of the main participants, promoters, and

leaders of global public health governance are developed countries in the West, and they provide a large amount of medical and health assistance to developing countries. However, in recent years, with the slowdown in the economic development of developed countries and the increase in domestic problems, trade protectionism, unilateralism, and populism in some developed countries have become increasingly prominent, and their willingness and ability to invest in global governance have decreased, which is not helpful to resolve the global "governance deficit" (Zheng, 2020). In particular, since the Trump administration took office, it has been holding high the slogan of "America First", emphasizing that everything should be based on the interests of the United States, and is unwilling to assume due responsibilities as a great power that is so good at flip-flops and withdrawals, which brings a major negative impact to global governance.

Fourth, the global leadership of emerging countries has not yet formed. Since the beginning of the 21st century, emerging economies and developing countries have risen in groups, and their voice and influence in international affairs and global governance have continued to increase, but they still do not have global leadership in the unbalanced international system. Their efforts to promote the supply of global public health products are not yet high enough to reach the heights reached by developed countries, thus creating a dilemma, which is that capable countries do not want to participate in global health governance, and willing countries do not have enough capacity to participate in global health governance.

Fifth, the international community's understanding of human security is seriously lagging behind the current situation. With the advancement of globalization, security issues have become more and more complex, and non-traditional security issues have become increasingly prominent. However, in recent years, "high-level politics" such as competition among major powers and geopolitical competition has not only become more intense, but have also become increasingly fierce, while their attention and resources on "low-level politics", especially global public health, have become less and less, and the actions have become more limited. However, under the context of the COVID-19 pandemic, the importance of "low-level politics" is significantly increasing and the battle between humans and viruses has become the main priority of world politics today. In the future, the devastating harm to humans is likely to be non-traditional security issues like global infectious diseases, climate change, energy and environment, terrorism, network information security, data security, and security of deep sea, polar regions, and outer space (Ye & Li, 2020).

WHO is the most authoritative and professional international organization in the field of global public health security. (Liu Qu / Xinhua)

Building a community with a shared future for human health is the prerequisite, foundation, and inevitable path for building a community with a shared future for mankind.

In the face of the COVID-19 crisis, no country can stand alone. Just as Joseph S. Nye said, if the hegemony that once held a leading position has neither the will nor the ability to provide the necessary global public goods, and the emerging powers are unable to provide it, it will cause a vacuum of leadership in the global governance system, which will lead to a global security crisis, and thus fall into the "Kindleberger Trap" (Nye, 2017). The international community expects major powers to exert leadership and influence and provide global health public products through effective multilateral mechanisms. As the most powerful country in the world, the United States should have coordinated global anti-epidemic actions by exerting its global leadership, but, instead, it retreated into narrow isolationism and nationalism. This is the root of the COVID-19 crisis.

To Build the "Community of Shared Future for Human Health": A Chinese Concept

Global public health governance requires new ideas and consensus. Under the COVID-19 pandemic, China has proposed the concept of building a "community with a shared future for human health". This new concept of cooperation is a vivid manifestation of China's practical actions to build "a community with a shared future for mankind", which is of increasing significance during the COVID-19 pandemic.

China is an advocate and practitioner of the concept of "a community with a shared future for mankind". On March 23, 2013, President Xi Jinping put forward to the international community the major initiative of "community of a shared future for mankind" for the first time at the Moscow Institute of International Relations. As he argues, "the degree of interconnection and interdependence among nations has increased unprecedentedly, [and] human beings live in the same global village, in the same time and space where history and reality meet, and become a community of destiny" (Lei, 2020a: par.1). In September 2015 and January 2017, President Xi Jinping explained the concept to the international community at the United Nations headquarters in New York and Geneva respectively, which is highly compatible with the spirit of the "United Nations Charter". Later, this concept was included in the resolutions of the UN Economic and Social Council, the Security Council, the First Committee of the UN General Assembly, and the Human Rights Council, and has been widely disseminated and arouses increasing attention.

After 7 years, on March 21, 2020, President Xi Jinping expressed his desire to "build a community of shared future for human health" for the first time in a telegram of condolences to French President Macron regarding the COVID-19 pandemic. On May 18, at the opening ceremony of the 73rd World Health Assembly video conference, Xi Jinping put forward an initiative to jointly build a community of shared future for human health, which has attracted continuous attention at home and abroad (Sheng, 2020).

For one thing, building a community with a shared future for human health is the prerequisite, foundation, and inevitable path for building a community with a shared future for mankind.

A China-Europe freight train loaded with anti-epidemic supplies departs from Yiwu, Zhejiang province, for Malaszewicze, Poland. (Gong Xianming/China Daily)

The global spread of the COVID-19 pandemic shows that compared with global issues such as climate change and terrorism, public health crises such as infectious diseases will directly threaten human life, health and safety, and its challenges to the world are fundamental and long-term. Therefore, whether it is "a community of interests and responsibilities" or "a community of security and development", and whether it is "a bilateral or multilateral community" or "a community of shared future on any issue", health must be the primary consideration (Hong & Yue, 2020). If there is no human health, the meaning of any community with a shared future will be worthless. Therefore, we must advocate the construction of a community with a shared future for humanity, and it should start with global public health.

Moreover, the concept of a community with a shared future for human health has provided new ethical norms for the international community. Since the outbreak of the COVID-19 pandemic, there have been various statements that contradict human rationality and civilization, such as the "China concealment theory", "China misleading theory", "China responsibility theory", "China compensation theory", "inferior product export theory", and "mask diplomacy theory" (Wen, 2020). Some of these remarks are based on the arrogance of Western centrism, while others are based on old power politics and cold-war thinking. There are also certain remarks that uphold the zero-sum game idea, and some insist on racism and xenophobia. Such statements run counter to the core values of a

community with a shared future for humanity and is even more harmful than the virus.

Respecting the right to life and health of the people of all nations and ethnic groups in the world is a necessity. Therefore, the initiative to create a community of shared future for human health demonstrates China's respect for basic human rights.

The right to life and health has nothing to do with national boundaries, race, or social development level. Respecting the right to life and health of the people of all nations and ethnic groups in the world is a necessity. Therefore, the initiative to create a community of shared future for human health demonstrates China's respect for basic human rights and has contributed to getting rid of political system differences, transcending ideological differences, and promoting global political democratization and civilized development.

Western Accusations against China during the COVID-19 Pandemic

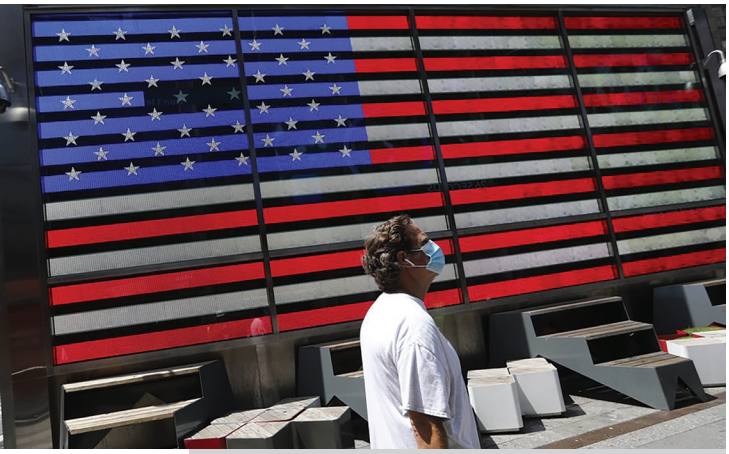
From the outbreak of the pandemic to the present, the relationship between China and the world, especially the United States, has roughly gone through the following four stages (Chen, 2020):

The first phase was from January 23 to March 9, when Wuhan was closed. During this period, China was the "epicenter" of the global pandemic. The Chinese people worked together to fight against the virus, and all friendly countries provided necessary assistance and support to China, while the United States was an exception. For example, U.S. Secretary of Trade Wilbur Louis Ross stated that the outbreak of the COVID-19 pandemic would hurt the Chinese economy and help jobs and manufacturing industry return to the United States (The U.S. Secretary of Commerce, 2020). Moreover, as the spokesperson said, the U.S. government had not provided any substantive assistance to China but was the first to withdraw its consulate personnel from Wuhan, the first to withdraw some of its embassy personnel, and the first to announce comprehensive restrictions on the entry of Chinese citizens, creating and spreading panic among the world (The Ministry of Foreign Affairs of the People's Republic of China, 2020). Of course, this was not to deny the generous assistance of the American people and some civil organizations to China.

The second phase was from the Chinese leaders' inspection of Wuhan from March 10 to April 7. During this period, the pandemic was under control in China, but it was spread rapidly throughout the world. China had also begun to support countries in fighting against the pandemic to return their previous goodwill. In contrast, the US federal government started to "rob" for purchasing faces masks and ventilators around the world whether it was its allies or local governments controlled by the Democratic Party (The United States, 2020).

The third phase was the unblocking of Wuhan from April 8 to April 26. On April 8, Wuhan was reopened, and China's war against the COVID-19 won a substantial victory. From this time on, China began its second round of assistance to the international community and at the same time began to export large amounts of medical supplies to the United States. While during this period, the United States started to target the World Health Organization, criticizing that it helped China to cover up data, and has

always praised China's achievements in fighting the pandemic and its contribution to the world. However, the allies of the United States have expressed their firm support for the WHO. For example, after the video conference of G7 leaders held on April 16, the White House stated that the meeting focused on "the World Health Organization's lack of transparency and long-term mismanagement, and the G7 leaders demanded a comprehensive reform of the World Health Organization". However, the other 6 countries participating in the meeting opposed Trump's rejection of the WHO and expressed strong support for it (Can, 2020).



The United States views public health issue from the perspective of security and politics, and uses the international public health system as a tool to maintain its own interests and hegemony. (Wang Ying / Xinhua)

The fourth phase started on April 27, when the U.S. Democratic Party launched an investigation into the Trump administration's withdrawal from the WHO. At the same time, the Chinese government criticized the U.S. Secretary of State Mike Pompeo for four consecutive days starting from April 27. He had made four major mistakes: first, he threatened to withdraw from the WHO and hinder the global fight against the pandemic. Second, he shifted the blame to China and deliberately incited hatred and confrontation. Third, he exerted "maximum pressure" on Iran, Cuba and other countries, leading to greater humanitarian disasters. Fourth, he stood idly by and disregarded the lives of the people in domestic pandemic prevention and control (Rare, 2020). After that, on May 4, the COVID-19 Global Pledge Conference was held online. The conference was co-hosted by the European Union, the United Kingdom, Canada, France, Germany, Italy, Japan, Norway, and Saudi Arabia. The European Union invested 1 billion euros. EU member states contributed 3 billion euros. Mr Zhang Ming, head of the Chinese Mission to the European Union, also attended the meeting and delivered a speech as a representative of the Chinese government (Representatives, 2020). On May 18, Chinese President Xi Jinping made a promise at the opening ceremony of the 73rd World Health Assembly video conference: "After the research and development of China's novel coronavirus vaccine is completed and put into use, it will serve as a global public product to achieve accessibility and affordability in developing countries" (Ping, 2020b). In contrast, the United States did not participate in this conference and on July 6, the US government announced its formal withdrawal from the WHO.

The United States views public health issues from the perspective of security and politics and uses the international public health system as a tool to maintain its interests and hegemony. Even during the emergency period of the COVID-19 vaccine production, the United States refused to participate in the COVAX (Covid-19 Vaccines Global Access Facility) on September 1, 2020. The extreme self-interest of the Trump administration reflects that the native national-

ism and national egoism of the United States are seriously threatening the overall international anti-epidemic, thus becoming the biggest unfavorable factor and produce serious negative effects on the international public health governance system.

China's Approach to Improve Global Health Governance

The question of how to solve the problem of the supply of global public health products is currently a major issue in global health governance. At present, the United States' lack of willingness and ability to promote global health governance means the end of the global health public product supply model dominated by hegemonic countries. Although China is currently the world's most populous country and the second-largest economy, it still does not have the strength to dominate the supply of global public health products. However, in the future, China should play a bigger role and contribute its approach to global health governance as an emerging power.

A batch of Sinovac vaccine CoronaVac donated by China arrived in the Philippines on Feb. 28, 2021, the first COVID-19 vaccine to reach the Southeast Asian country. (Xinhua, 2021)

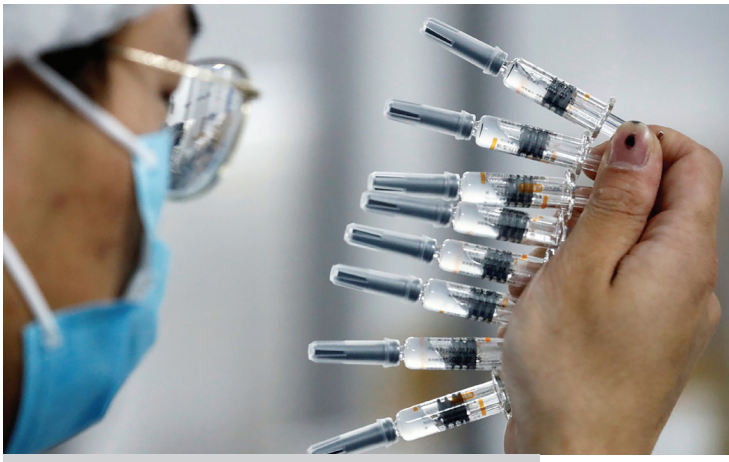
First, at the bilateral level, China will actively strive for cooperation among major countries in fighting the pandemic. So far, four response models have emerged around the world to fight against the pandemic, namely the life first model (China), the limited prevention and control model (South Korea, etc.), the economic priority model (the United States), and the laissez-faire model (the UK, etc.). Although the COVID-19 pandemic has been brought under control in China, the price paid is also high, especially the economic price. Therefore, the anti-epidemic strategies adopted by each country are based on differences in social values, political systems, social structures, public health governance systems, and governance capabilities, and there is no obvious distinction between advantages and disadvantages. Although the impact of the pandemic varies from country to country, its final containment is subject to the "cask theory", that is, the epidemic will only disappear after the most severe country is contained. Therefore, great powers need to build consensus and strengthen cooperation and unity, instead of mutual suspicion, mutual accusations, and each does what they think is right.

Since the outbreak of the COVID-19 pandemic, the Western countries' accusations and suspicions against China have never been stopped. From China's perspective, for the health of all humanity, it still needs to embrace hope to join hands with these Western countries. After all, the United States is still in the leading position of vaccines research, diagnosis and treatment experience sharing, and medical equipment supply chain. Back to history, during the Cold War, although the United States and the Soviet Union were rivals in the fields of geopolitics and ideology, they still cooperated in the field of health and jointly participated in the smallpox eradication

campaign initiated by the WHO, which eliminated the smallpox virus from the world (Lei, 2020b). At present, China and the United States, which are so interdependent in the fields of economy, trade and security, should join hands to fight the epidemic, whether for self-interest or global public welfare. Only when both parties actively cooperate and govern together can they lead the international community to overcome the "Kinderberg Trap" of global health governance.

Second, at the regional level, China must use the "Silk Road of Health" framework as a starting point to enhance health cooperation with countries that are part of the "Belt and Road" Initiative. Global public health is a public good. The purpose of global health governance is to continuously and steadily provide more global public health products. For a long time, China has played the role of a "public product consumer" in the international arena, but as China's strength continues to grow, China has begun to shift from the role of a consumer to a provider of public products. The Belt and Road Initiative is an active attempt by China to provide public goods to the world. In today's era when global public health products are crucial and severely scarce, China should see its role in this era and be more proactive and effective at providing global public health products (Hong & Chan, 2019). The "Silk Road of Health" can provide regional public health products. If China can release more goodwill to the international community in this way, it will prove to the world that a rising China is a promoter of world peace and development rather than a threat.

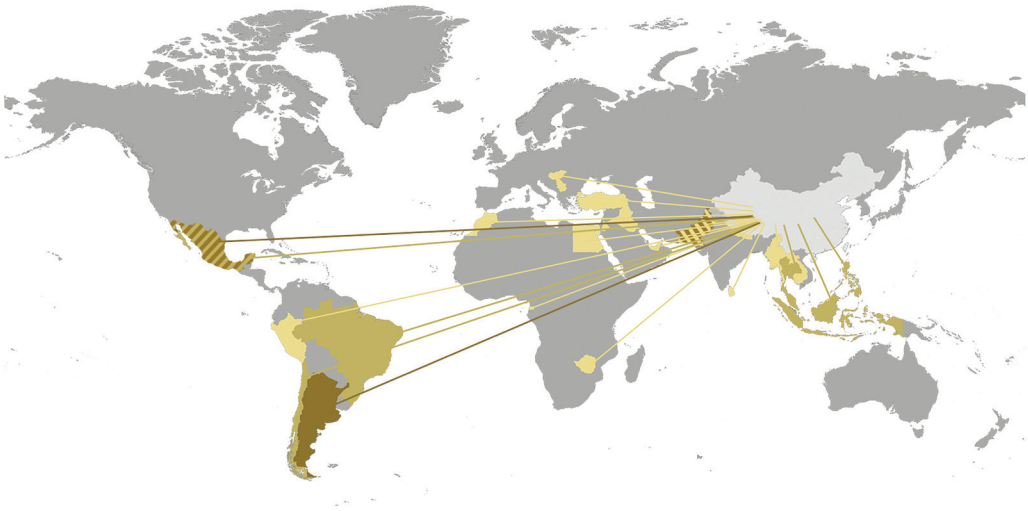
However, most Western countries' interpretations of the "Silk Road of Health" are based on Cold War zero-sum thinking. Some American scholars believe that China hopes to become a leader in the global health field, to replace the WHO, and to find new markets to advance global interests, thereby covering up the weaknesses of its domestic economy and population (Xiu, 2020). Judging from the performance of China in the COVID-19 pandemic, it has not only developed the concept of building a "community with a shared future for human health", but also put it into action. First, China has established a regional transnational emergency response mechanism under the framework of the "Belt and Road" to handle global public emergencies. Second, China has shared the pandemic information promptly, strengthened regional joint prevention and control cooperation and policy coordination, and provided point-to-point assistance to countries along the road with more severe epidemics. Finally, the "Belt and Road" global supply chain should be restored as soon as possible to ensure the supply of urgently needed medical supplies and daily necessities around the world (Ye & Li, 2020). The "Belt and Road" Initiative is a useful supplement to the current globalization, including "market globalization", "production globalization", and "capital globalization".



China joined the COVAX in October 2020 and stated that it would give priority to the supply of vaccines to developing countries. (China Daily, 2020)

Chinese vaccines distribution

A growing number of countries are now inoculating its populations with Chinese COVID-19 vaccines.



Sinopharm		Sinovac	CanSino
Serbia	Peru	The Philippines	Pakistan (Emergency use)
Hungary	Equatorial Guinea	Indonesia	Argentina (Clinical trials)
Turkey	Zimbabwe	Malaysia	Mexico (Emergency use)
Pakistan	Egypt	Brazil	
Brunei	Seychelles	Chile	
Cambodia	Morocco	Mexico (Emergency use)	
Laos	United Arab Emirates	Thailand	
Myanmar	Bahrain		
Nepal	Iraq		
Sri Lanka	Jordan (Emergency use)		

Note:
*Countries listed in the graphic have either bought Chinese COVID-19 vaccines or received vaccine donations from the Chinese government.
*CanSino vaccine has not been yet approved for general public use neither in China nor other countries.

CGTN

Source: CGTN, 16 February 2021

Third, at the global level, China will actively promote the construction and reform of global health governance mechanisms. The first item on the agenda is to fully support the World Health Organization's core position in the global health governance system. As the only global multilateral organization in the field of health security, the WHO gives full play to its function of global health governance, becoming the "promoter" of the concept of a community of shared future for global health security, the "coordinator" of global anti-epidemic cooperation, and the "provider" of global anti-epidemic norms and technologies (Yong, 2020a). Although the WHO still needs structural reforms, its concept is highly compatible with China's concept of building a community with a shared future for humanity, and China should continue to support it.

The second item is to continue to strengthen the role of the G20 in global health governance. The G20 covers the four major groups of countries: the developed countries represented by the United States, Europe and Japan, the BRICS countries, the medium powers, and international organizations. Because the composition covers a wide range and is highly representative, and the major powers in the world are included, the total economic volume accounts for 80% of the world, so that the cooperation between G20 members can have an important impact on the world politics (Yan & Bo, 2020). One of the purposes of developed countries' support for the establishment of the G20 is to allow emerging economies to share the responsibility of providing global public goods. According to this trend, global health governance has transformed from a "Western-dominated governance" to a "Western and non-Western co-governance" (Yong, 2020b), making it possible for developed and developing countries to jointly provide global public health products.

China actively participates in global public health governance with practical actions and takes the initiative to assume the responsibility of a major country within its capacity.

The third item is to encourage civil forces from all over the world to actively participate in global public health governance. In addition to international multilateral cooperation organizations such as the WHO, the G20, and the BRICS, various non-governmental organizations (NGOs), and individuals in the international community can also participate in the field of global public health. During this epidemic, the Bill and Melinda Gates Foundation, Jack Ma Foundation, and Alibaba Charity Foundation donated a large number of funds for research and development on vaccines and donated medical supplies such as facemasks, test kits, protective clothing, protective masks, and ventilators to many countries with severe epidemics (Yong, 2020c).

Conclusion

In this great fight against the COVID-19 pandemic, China has not only won precious time for the world to prepare for the pandemic with the most comprehensive, fastest, strictest, and most active anti-epidemic prevention and control measures but also clearly proposed and implemented the concept of "community of a shared future for the human health". Besides, China also actively participates in global public health governance with practical actions and takes the initiative to assume the responsibility of a major country within its capacity.

In response to the COVID-19 epidemic, the Chinese government donated US $20 million to the WHO. At the 73rd World Health Assembly, China again announced that it would provide "US$2 billion in international aid within two years" (China's, 2021) to support countries affected by the epidemic, especially the developing countries for the recovery of economic and social development. In October 2020, China joined the COVAX and stated that it would give priority to the supply of vaccines to developing countries, to avoid some of the more affluent countries from launching various restrictions on vaccine sales.

To protect the lives and health of 7 billion people around the world, the international community should establish a more complete global public health governance system to respond to various long-term or sudden global public health conditions. (Zhu Xingxin/China Daily)

China's good performance in the fight against the epidemic and its firm support and assistance to the WHO have also allowed the world to see the important role of developing countries in global health governance. Based on sharing anti-epidemic diagnosis and treatment experience and material assistance with more than 200 countries and regions, China has also established a global humanitarian emergency warehouse and hub, which has greatly improved the efficiency of global anti-epidemic material supply.

China has also promised to make the vaccine a global public product and share it with all countries in the world. It is the first WHO member state to make such a statement and has established a model for the construction of a human health community. Additionally, China will also help African countries to improve their disease prevention and control capabilities and suspend the debt repayment of the poorest countries. This reflects the significance of a common destiny for human health and reflects the responsibility of a major country.

The pandemic will end one day, but the warning it leaves for people is here to stay. To protect the lives and health of 7 billion people around the world, the international community should change its thinking, keep pace with the times in concept, show greater solidarity and cooperation in action, and establish a more complete global public health governance system to respond to various long-term or sudden global public health conditions.

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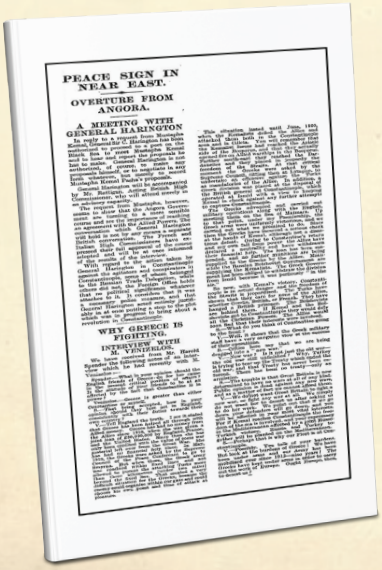
A HISTORICAL INTERVIEW WITH GREEK PRIME wMINISTER VENIZELOS*

ALİ ŞAHİN

Dr.

Institute of Atatürk's Principles and Revolution History, İstanbul University



PEACE SIGN IN NEAR EAST.

OVERTURE FROM ANGORA.

A MEETING WITH GENERAL HARINGTON

WHY GREECE IS FIGHTING.

INTERVIEW WITH M. VENIZELOS.

Dr. Ali Şahin completed his undergraduate education in Anthropology at Istanbul University and received his master's degree from the Institute of Atatürk's Principles and Revolution History at Istanbul University. Şahin earned his PhD from the same institute, with a thesis entitled "Left-Leaning Movements' Perception of the Turkish Revolution: From March 12, 1971 to September 12, 1980". Şahin is currently affiliated with the Institute of Atatürk's Principles and Revolution History. He has published articles on the recent history of Turkey and the history of political thought and contemporary intellectual movements. His latest book is entitled "The Great Divide of the Turkish Left: Atatürk, Kemalism, and the Turkish Revolution".

E-mail: alisahin@istanbul.edu.tr

https://orcid.org/0000-0002-4701-9695

* Çeviri: Selim Ayan

PEACE SIGN IN NEAR EAST.

OVERTURE FROM ANGORA.

A MEETING WITH GENERAL HARINGTON

In reply to a request from Mustapha Kemal, General Sir C. Harington has been authorized to proceed to a port on the Black Sea to meet Mustapha Kemal and to hear and report the proposals he has to make. General Harington is not authorized, of course, to make any proposals himself, or to negotiate in any form whatever, but merely to record Mustapha Kemal Pasha's proposals.

General Harington will be accompanied by Mr. Rattigan, Acting British High Commissioner, who will attend merely in an advisory capacity.

The request from Mustapha, however, seems to show that the Angora Government are turning to a more sensible course and see the importance of reaching an agreement with the Allied Powers. The conversation which General Harington will hold is not by any means a separate British conversation. The French and Italian High Commissioners have expressed their full approval of the course adopted and will be at once informed of the results of the interview.

With regard to the action taken by General Harington in Constantinople against the agitators and conspirators in Constantinople, some of whom belonged to the Russian Trade Delegation, while others did not, the Foreign Office holds that no political significance whatever attaches to it. It considers that it was a necessary police measure, and that General Harington acted entirely justifiably in at once putting a stop to the plot which was in progress to bring about a revolution in Constantinople.

WHY GREECE IS FIGHTING.

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We have received from Mr. Harold Spender the following notes of an interview which he had recently with M. Venizelos :—

Spender.—What in your opinion should the English friends of Greece do for her cause in the present critical position of affairs? Is the attitude of your friends to be at all affected by the fact that Constantine is in power?

Venizelos.—Greece is greater than either Constantine or myself.

S.—That being accepted, how in your opinion should they best act in England, consistently with their duties towards their own country?

V.—Tell England the truth. I see it stated that Greece has been helped all through with Allied money. Greece has had no money from the Allies since 1918, when she was given a joint loan of £30,000,000 by England, France, and the United States. Since then she has only been credited with the value of some war material left over from the Great War. She has had no financial help since. In May, 1919, the Greeks were asked by the Supreme Council of the Peace Conference to go to Smyrna. But when there, the Greek army was confined within fixed lines and not allowed to pursue the attacking Turks more than three kilometres [under two miles] beyond the fixed line. That created a very difficult situation for the Greeks, because the enemy could organize within our gaze and could choose his own point and time of attack at pleasure.

This situation lasted until June, 1920, when the Kemalists defied the Allies and attacked them both in the Constantinople area and in Cilicia. You will remember that the Kemalist forces had reached the Asiatic side of the Bosporus, and that they actually opened fire on Allied warships in the Bosporus. Farther south-east they reached the Dardanelles and they placed in jeopardy the freedom of the Straits. At that critical moment the Greeks were asked by the Supreme Council, sitting then at Lympne, to undertake an offensive against the Turks as mandatories of the Allies. In addition, a Greek division was placed at the disposal of the British general at Constantinople, which operated at Ismid with a view to keeping Kemal in check against any further attempts to capture Constantinople.

The Greeks advanced and carried out military operations along with the English, meeting them on the Sea of Marmara. Up to that point, under my Premiership, the Greek arms were uniformly victorious, and we carried out what we promised to do. Since then the Greeks have incurred a serious check at the hands of Kemal, although not a disastrous defeat. Owing to Constantine's return and my own fall from power the Allies have declared a neutrality and have withdrawn their financial help. The loan has been suspended, and no further munitions are being supplied to the Greeks by the Allies. Meanwhile the Russian Bolshevist Government are supplying the Kemalists. The Greek Government has been obliged to withdraw the division from Ismid because it was perilously "in the air."

So now, with Kemal's victory, Constantinople is in actual danger and the freedom of the Straits is jeopardized. The Turks have shown that they care for none of the Allies, whether Greeks, British, or French. They have hanged a British prisoner. The Bolshevists are behind them. If Kemal and the Bolshevists got to Constantinople they would defy all the Christian Powers. The Allies would soon find that their interests were involved.

S.—What do you think of Constantine going to the front?

V.—Well, it shows that the Greek military staff have a very sanguine view of the success of their operations.

S.—Critics here say that we are being dragged into a "new war."

V.—New war? Is it not just the old war—the old war still unfinished? Why, Turkey is trying to tear up the Treaty which ended the old war, and that Treaty has never been enforced. There has been no treaty—only an armistice.

S.—The trouble is that Great Britain is now determined to have no wars at all of any kind. Public opinion is dead against any new wars, and as a matter of fact we cannot afford them.

V.—We do not want Great Britain to fight a new war, or fight any war at all. We simply do not want her to desert us after asking us to do her work. We point out that if we go down your defenders will go down, and you will be affected in your most vital interests. For if Kemal reaches Constantinople the freedom of the sea is involved, and your supremacy in the Mediterranean affected by a joint Russo-Turkish victory. Russia and Turkey together will be planted on the Mediterranean.

S.—Perhaps that is why our Fleet is at Constantinople.

V.—Possibly. You talk of your burdens. But look at the burdens of Greece! We have been under arms and our Army has been mobilized ever since 1912—nine years! The Greeks have kept under arms in order to carry out the work of Europe. Ought Europe, then, to desert us?

The Times (London, England),
Friday, Jul 08, 1921; page.10; Issue 42767.

PEACE SIGN IN NEAR EAST OVERTURE FROM ANGORA A MEETING WITH GENERAL HARRINGTON

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THE PRESENT REVIEW ARTICLE AIMS TO provide a historical evaluation of an interview with Greek Prime Minister Venizelos, published in The Times during the years of the Turkish War of Independence.[1] This short interview is highly informative in terms of reflecting the political realities of the period.

The interview was conducted on July 8, 1921, as part of a report on the authorization of Sir General Harrington, Commander-in-Chief of British Forces in Istanbul, to meet with Ataturk[2]. In the interview, Venizelos explains the financial support Greece had received since the beginning of the war from the United States, Britain, and France. It is also clear that the will behind the Greek attack on Turkey came from Britain and other allied forces, described by Venizelos based on concrete events.

Looking at the political atmosphere in which the interview was held, the situation was as follows: After the First World War, the Paris Peace Conference convened on January 18, 1919 to determine the content of treaties to be applied to the defeated states. The Treaty of Sevres, which aimed to destroy the Turkish homeland, fell to the share of the Ottoman Empire. When looking at this conference and subsequent developments, it seems that Greece was the main actor in the negotiations on the sharing of Turkish territory.

Although Greece remained neutral in the First World War, it joined the war in 1917 after Britain offered the Greeks possible opportunities for territorial gains in the Near East. Britain thought that a Greece under its control would secure colonial roads in the East. As the first step in this policy, Greece invaded Izmir on May 15, 1919. The striking point here was that the Allied Powers declared in the first note that Izmir would be occupied by the Allied Powers and in the second by Greece on their behalf (Ertan, 2011: 84.). The Greeks first landed soldiers at Izmir and then began to advance into Anatolia with various excuses. Venizelos, who was in Paris during the conference period, also asked for the Allied Powers' permission to allow Greek troops to occupy places as distant as Ayvalik in the North and Aydin in the South. The Allied Peace Council was reluctant to allow Ayvalik's invasion by the Greeks, and instead limited the Greek expansion to Akincilar (Seljuk). Thus, the Greeks, who found support for invasion, began to advance from Izmir and captured Manisa on May 26, and afterward occupied Aydin on May 27, despite it being contrary to the decision of the Peace Conference. This was followed by the invasion of Turgutlu and Ayvalik on 29 May (Turan, 1998: 223).

1 This document was brought to our attention by Prof. Emin Gürses, a member of the BRIQ Advisory Board. We express our gratitude for thank Prof. Gürses' contribution.

2 In The Times, it is alleged that the subject of meeting with Harrington was brought to the agenda upon Atatürk's application. However, Atatürk explains in his work entitled The Speech (Nutuk) that a conscious distortion was made on this issue and that it was Harrington who wanted to talk to him. Atatürk emphasizes this situation in the letter he sent in response to the news that Harrington sent him (Nutuk, 1983).

In Western Anatolia, important successes were achieved with the first and second İnönü victories on behalf of Turkey, which were critical to the resistance of the National Forces Movement. The movement started under the leadership of the Reddi İlhak Society and then transitioned to the regular army. As a result of attacks by the Greeks with almost all their forces, the Turkish forces retreated, but, finally, the Battle of Sakarya and the Great Offensive ended the Greek occupation.

Eleftherios Venizelos was the Prime Minister of Greece during the Turkish War of Independence and one of the architects of Greece's Megali Idea. For this purpose, he took an active role in the plans of Western states, especially under the leadership of Britain against Turkey. Venizelos was not just any leader of Greek politics. He was one of the leaders of the Greek, Serbian, and Bulgarian alliance policy against the Ottoman Empire in the Balkans, along with the military administration of Greece since 1910. One of the most important accomplishments of this alliance was the accession of Crete to Greece. As a result of King Constantine's abdication during the first World War, Venizelos came into power with the support of the British and became a practitioner of British-led aggressive policies against Turkey.

Greece as an Eternal "Proxy" State

The concept of a "proxy war" has entered our political literature as a result of political developments and wars in the Middle East, Balkans, and the Caucasus in the 21st century. Under the US-Israel alliance, in particular, we see that various Sharia Salafist organizations have targeted Syria, Iraq, and Iran in our geography and have achieved varying results. However, "proxy war" is not a new phenomenon. History shows that states can also function as "proxies" as a result of the overlap of their "self" interests and objectives. Greece is the most typical example of a country that fights directly under the control of an imperialist state in Turkey's political history. As emphasized in this interview, Venizelos complains about not getting the support Greece wanted at the time when the war was victorious on the side of the Turks.

The thesis that the war of independence is a "Turkish-Greek war or a war against minorities" is expressed by some anti-Republican sections regularly. The interview with Prime Minister Venizelos and numerous other objective sources proves how unfounded this thesis is. The main subject here is Greece. As stated in this interview, the Greek state was in the role of an actor who realized the political aspirations of the West both in the years of the War of Independence and previous periods.

The rebellions that started with the nationalist movements affecting the whole world in an ideological context after the French Revolution not only led to the establishment of micro-scale nation-states in the Balkans in the 19th and early 20th centuries but also made these states act directly as the military and political instruments of Western imperialism in further political processes. In this respect, the Greeks had a dominant role in the weakening of the state and land losses in the Balkans from the Greek Revolt that started in 1821 and the Balkan War in 1912-1913, within the borders of the Ottoman state. On October 5, 1821, 12,000 people were killed in the massacres in the city of Tripolitsa from Turks, Albanians, Jews, and other nationalities in the uprising that started in the Peloponnese. Until the summer of 1822, the deaths, as a result of the Greek uprising, reached 50,000. (Sonyel, 2014: 208-209).

During the foundation of Greece, whose existence dates back to this period, the main imperialist states of the period, especially Britain, had

inititally objected to its statehood, especially in terms of gaining political influence in the Balkans and further breaking the existing power of the Ottoman State. After the Balkan Wars, however, the dimension of political and military relations with the Greeks was strengthened with the acquisition of power by the Greek state. After the Armistice of Mondros signed by the Ottoman Empire after the First World War, Greece appears to have taken part in British plans, especially in line with its own "Megali Idea" goal, along with the British, French, and Italian invasions.

For example, during this period, some developments regarding the role of the British gained importance after the Battle of Sakarya, one of the most critical stages of the War of Independence. After the Kars and Ankara treaties, contradicting those who think that the Turks cannot resist a major power like Britain, Atatürk argued, "India, Egypt and, other countries clearly practice an imperialist policy of oppression, and that Britain cannot trust Turkey, nor will it give up the goal of destroying this country."(From British archival documents, Sonyel, 2003: 2015).

The Constanly Resurfacing Thesis that the War of Independence Is A "Turkish-Greek War"

Since the beginning of Turkey's intensely rich intellectual life in the 1960s, discussions about the nature of the national liberation struggle continue. Baseless statements that the war of independence was a Turkish-Greek war, that the Turks never fought against the British, that the battles of Inonu never happened were expressed from time to time. As regards these theses, it is especially necessary to mention the name of Idris Küçükömer (for further information: Küçükömer, 1984).

These misguided statements were supported by theses such as that the Turkish Revolution was not a revolution and that Mustafa Kemal came to power with the support of the British. The proponents of these theses, intentionally or unintentionally, blur history by overshadowing historical facts through misguided interpretations. However, a hundred years can be seen as recent in the science of history, and proving a thesis about such a period is relatively simpler. Considering that those who put forward these theses are not even historians by profession, it should not be overlooked how desperate their attempts are. In this sense, this short interview with Prime Minister Venizelos proves the value of the work of Turkey's valuable historians such as Salahi Sonyel, Erol Ulubelen, and Bilal Şimşir based on British archival sources.

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Sevtap İnal *(Photography Artist)*

CHINA

Sevtap İnal started taking photography lessons with the establishment of Tarsus Photography Association in 2010. She has been an amateur photographer for 11 years. Receiving many national and international awards, İnal was also awarded the EFIAP title (Level of Excellence), one of the titles of the International Federation of Photographic Art (FIAP). She has two personal exhibitions entitled "From window of life" in the Mehmet Bal Art Gallery and "A sweet peace" in Tarsus Cultural Center. She is a member of the Board of Directors of Mersin Photography Association and serves as a volunteer in the education unit of the Association.

PAINTING

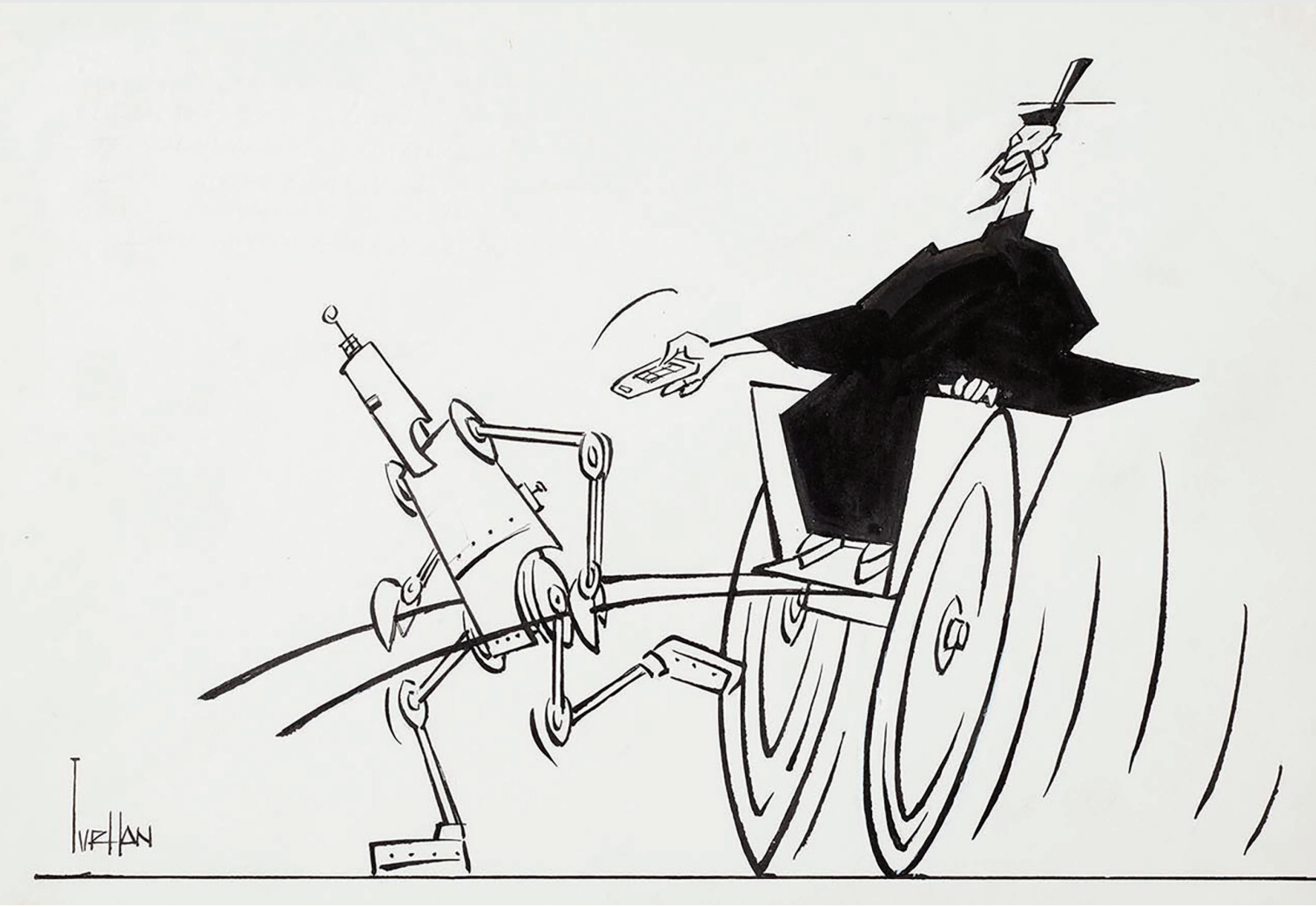
Uğur Durak *(Painter, Illustrator)*

LOVERS **Oil On Canvas (100x140 cm)**

Uğur Durak was born in Karabük in 1959. He wrote his first comic book in 1971. He started to work for the Doğan Kardeş Children's Magazine as a professional illustrator and one year later, he began to work with Gırgır Humor Magazine. In 1985, he lectured at the Köln Volkshochschule (Germany) on colors. In 1987, he graduated from Fachhochschule Köln (Frei Malerie) Department of Painting in Germany. Durak, held almost 40 caricature exhibitions, did long term art researches in London, Paris, Amsterdam, Köln, Barcelona, Milano, Bern and Berlin. His publications include 22 books and 3 journals which he was the editor-in-chief of. A social advertising campaign, which its all illustrations belong to him, was awarded the "Best in the World" award in the USA in 2004 (MAA Worldwide 2004 Globes Award – Best Cause or Charity Marketing Campaign). In 2020, he opened his second personal painting exhibition at Ma Art Gallery (Istanbul). Uğur Durak, who adopts an expressionist approach in his works, focuses on human-nature relations in his works.

CARTOON

Turhan Selçuk *(Cartoonist)*



Turhan Selçuk was born in Milas, Turkey in 1922. Selçuk's first drawings published in 1941, in the newspaper Türk Sözü. His drawings appeared in various journals and newspapers such as Akbaba, Milliyet, Akşam, Yön, Yeni İstanbul and Il Travaso which is the Italian humor magazine. In 1957, he created his famous comic character Abdülcanbaz. His cartoons rely on contradictions, solidarity and misunderstandings in human life. While he criticizes people, he tries to educate them by showing the good and truth. Thought is the main point of his cartoons and humor has the second priority. His illustrations are brief, clear and stunning. In 1992, Turhan Selçuk celebrated his 50th year in the world of art with an exhibition. Between 1993 and 1997, his graphic art exhibition, "İnsan Hakları" (Human Rights) visited major cities of the World, and in 2005, a selection of his original prints were exhibited in various cities in Germany. He died in 2010 in Istanbul/Turkey. He was one of the founders of the Turkish Cartoonists Association and he was also granted numerous awards.