Summary

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Towards an „Innovation Silk Road“? Science, Technology and Innovation in the Central Asian States

VERANSTALTUNG AUS DER VORTRAGSREIHE "TRANSNATIONAL LECTURE SERIES ON INTERNATIONALIZATION OF SCIENCE, TECHNOLOGY AND INNOVATION

Summary erstellt von: Clemens Binder, Paul Dunshirn

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Towards an ‘Innovation Silk Road’?

Science, Technology and Innovation in the Central Asian States

Vortragender:

George Bonas

Director Centre for Regional and International STI Studies and Support – CeRISS

Dr. George Bonas is a founding member of and Managing Director of CeRISS. He has more than 20 years’ experience in International Cooperation in Science, Technology and Innovation (STI) with emphasis on bilateral and multilateral S&T cooperation between the EU and its neighbouring countries and regions (Eastern Partnership countries, Russia, Central Asian, Western Balkan, South Mediterranean/Arabic countries, Turkey and Iran). In the context of Central Asia, he coordinated the IncoNet EaP and EaP PLUS, of the IncoNet for Central Asian countries. George Bonas has started his career as researcher at the National Hellenic Research Foundation in Athens, served as Scientific Officer at the European Commission (Research and Innovation DG) and at the General Secretariat for Research and Technology (GSRT) in Greece and was also Advisor for STI at the International Center for Black Sea Studies (ICBSS) for more than 9 years.

Moderation:

Clemens Binder, MA

Dr. Christian Haddad

Zusammenfassung

Zentralasien kommt aufgrund seiner geographischen Lage eine wichtige strategische Rolle zu – sowohl für die EU, als auch für Russland und China. Diese entscheidende Rolle manifestiert sich auch im Bereich von Forschung, Technologie und Innovation – beispielsweise wurde einerseits zwischen der EU und den Staaten der Region ein Partnerschaftsabkommen geschlossen, in welchem zentrale Bereiche für Kooperationen (beispielsweise im Energiebereich oder im Wassermanagement) definiert wurden. Andererseits sehen sich die zentralasiatischen Staaten im FTI-Bereich mit vielfältigen Herausforderungen konfrontiert, sowohl in Bezug auf die Struktur als auch auf die Implementierung. Diese Herausforderungen sieht George Bonas gleichzeitig aber als Potenziale für zukünftige Kooperationen, da Expertise im FTI-Bereich dringend benötigt wird. Er erklärt nicht nur die nationalen und regionalen Spezifika der FTI-Systeme sondern bettet diese vor dem geopolitischen Hintergrund ein und bemängelt insbesondere den Rückgang der Kooperation zwischen EU und Zentralasien, trotz des geschlossenen Abkommens.

Abstract

Due to its geographic situation, Central Asia has evolved into a region of strategic interest, for China, Russia and the EU. This interest manifests in the sector of science, technology and innovation and is exemplified in the agreement on cooperation between the EU and Central Asia, which defines central sectors for cooperation, such as energy and water management. However, the states are facing numerous challenges regarding structure and implementation. According to George Bonas, these challenges also bear potentials for future cooperation as Central Asian states have a need for expertise in the STI sector. In this regard, he does not only focus on national and regional specifics of the STI-systems, but embeds them in the geopolitical framework and laments the deterioration of cooperation between the EU and Central Asia, despite the agreement.

Introduction to Central Asia

After gaining independence as a result of the dissolution of the Soviet Union in 1991, the Central Asian states have attempted to move to more market oriented models. This also included the establishment of new structures in the area of Science, Technology and Innovation (STI). However, despite of reforms, Central Asian economies do still heavily rely on the export of natural resources, making economic growth dependent on global economic development and therefore volatile.

This became clearly visible in the course of the global financial crisis in 2008. While most of the states have recovered from the crisis, Kazakhstan for example has had difficulties to recover and suffered in recent years dramatically from the dropping oil prices. For this reason, Kazakhstan is particularly interested to diversify its economy especially trough the means of STI. Evidence for this is the formulation of policies in the field of STI that aim for an increase the Gross Expenditure on R&D (GERD). Other countries in the region have followed Kazakhstan’s example, however they are still facing obstacles, which George Bonas outlined detailed for each country in the region.

Overview of STI in Central Asia

The evaluation of the Central Asian STI systems proves complicated since the reliability of data is not given, therefore a critical perspective towards typical indicators (such as patent numbers and publications) needs to be applied. More valuable insight could be derived from peer reviews that were implemented under the bi-regional IncoNet projects of the EU Commission. Generally speaking, all Central Asian countries are characterised by a very low GERD (General Expenditure on Research on Development) by GDP (0.1-0.2%). At the same time investments in R&D mainly build in government funds and there is rather little involvement of the private sector and the industy. Bonas emphasised that the formulation of high goals and a lack of follow-up and systematic implementation measures are a characteristic pattern for the countries in the region. Therefore, Bonas raised the need to develop an “evaluation culture” in areas of research, business, and governance, in order to increase.

As natural resources (in particular oil, gas, and uranium) constitute a major part of Kazakhstan’s economy, there is an endeavour for diversification. In 2013, as a result of the fall of oil prices, the country’s GDP dropped by 54%. As a consequence, Kazakhstan’s government has strived to diversify the economy and therefore has adopted ambitious STI strategies. Over the last years, a number of

STI-related laws, programs, and organizational frameworks have been introduced. However, the introduced policies have not been sufficiently implemented due to a lack of strategies and observation mechanisms. In addition, the lack of commitment by the relevant stakeholders proves disadvantageous for successful implementation.

The low level of investment in STI (0.2% in 2015) poses a problem for Kazakhstan's future. While the government has set a 2% target in GERD for 2020, the country lacks of sustainable funding mechanisms and clear budgetary strategies to realize the planned reforms. Bonas proposed that the predominant state-driven top-down approaches to R&D spending need to be complemented with other forms that involve the business community, the scientific community, NGOs, and society much more actively. In this regard, the National Agency of Technology Development (NATD) has played an important role in implementing programs which aim at increasing the activity of private enterprises. In addition, the government introduced a law "On Subsoil and Subsoil Use", which requires subsoil users to invest 1% of their annual income in internal or external R&D. The government aims to reallocate parts of the rents from the extractive sector to the financing of the research-based development of STI related economic sectors. Regarding the STI infrastructure, several Technological Parks and Innovation Clusters have been established in Astana and Almaty. Investments in the STI sector can be seen as a part of the country's ambition to build up a more diversified and knowledge-based economic system and the overall effort to reduce dependence on the export of natural resources.

Bonas also highlighted the need to improve the structure and performance of the STI sector, which still bears traces of its Soviet past. In this regard, he argues that human resources should be a top priority for STI policy. The aim has to be attracting new students and young researchers through quality working environments and competitive salaries to engage more in research activities. These efforts have to include the development of new curricula, to recognize the importance of applied research, and to increase university autonomy. Bonas mentioned in this context Kazakhstan's flagship project, the Nazarbayev University. Huge amounts of money and human resources were used for the establishment of this university. Bonas warned that this however bears the danger of the emergence of a two class-system in higher education, which should be avoided.

Regarding innovation Bonas emphasized that Kazakhstan needs to find a balanced approach that builds on R&D, but also includes non-R&D related innovation models. Terms like social innovation are until this point non-existent in the region. One national priority area will be Green Economy, and in

this context several programs dealing with clean coal, environmentally friendly mining and the processing of raw materials have been introduced.

While in Kazakhstan there is visible development in the STI system, in Kyrgyzstan it has remained more or less unchanged since the country's independence. Bonas thus sees the requirement of an encompassing reform of the entire STI system. A number of laws has been introduced, but hitherto their implementation has been delayed. Bonas argued that, considering the country's low rates in R&D spending, it would be necessary to define priority areas and niches of excellence to concentrate efforts until more financial resources are made available. The establishment of an agency or a fund for research which would entail the opening up of research financing structures, could be helpful in this regard. In the current system, funds are almost exclusively allocated by the Academy of Sciences to pre-selected public institutions. There is however a strong dichotomy between the turn to market economy and the opposition against the extensive privatization of the assets (such as buildings and infrastructure) of STI-relevant institutions.

Similar to other countries in Central Asia, a key challenge for Kyrgyzstan is increasing the attractiveness of careers in research. The country has suffered from heavy brain drain, and existing staff is ageing rapidly. In this context, there have been several attempts to re-organize the science system, including the launch of the Council of Sciences, which involves scientists, national and international agencies, and businesses. Furthermore, the National Science Foundation was launched in 2016. These developments seem to point to an overall departure from the old Soviet science system. In this context, there is an on-going process of dismantling the old National Academy of Sciences. Some of some its institutes were merged and the link between research and the universities has been encouraged.

In terms of innovation, George Bonas saw the need to revise existing laws and to introduce a national innovation policy for Kyrgyzstan. Similar to research policy, innovation would benefit from the establishment of collaborative grants for the cooperation between business and academia and the removal of barriers for innovative businesses. Bonas suggested to not only focus on innovation in the IT sector and to include other areas of national priority such as renewable energy or energy efficiency.

In difference to Kazakhstan and Kyrgyzstan, Uzbekistan, the region's most populous state, has established a self-sufficient economy which has helped the country surviving the dropping oil prices without economic recession. In addition, Uzbekistan has established, albeit strongly state-driven, STI mechanisms. STI activities are centralized in the Committee for Coordination of Science and Technology, Research and Development is organized through the Academy of Sciences, comprising 28 institutes and approximately 4800 staff members. Only a few projects have been initiated, for instance the Technical Institute (Physics Sun Institute) and the International Solar Energy Institute (which was funded by the Asian Development Bank). While Uzbekistan's research output is relatively high in terms of quantity (second highest in the region after Kazakhstan), George Bonas pointed out that there are very few links between society and research and businesses and research. In this regard, the state has introduced some support mechanisms for innovative projects. There are some positive signs for the internationalization of the education system. Uzbekistan has tried to adapt higher education structures (BA, MA, PhD) to the Bologna Process and has also announced to promote English language education in schools, as well as in other societal areas such as telecommunication.

In the remaining states in the region, Tajikistan and Turkmenistan, STI capacity building has hitherto not taken place in a comprehensive fashion. Tajikistan's total GERD has increased by 156% (2007 – 2013), but due to high overall growth rates the GERD/GDP only rose from 0.07% to 0.12%. According to Bonas, the government seems to give STI development little importance. Similar to the situation in Uzbekistan, the research structure has not changed much for decades, and thus remains disconnected from market needs. Gender balance has traditionally been a non-issue for Central Asian states, but Tajikistan's current development seems particularly worrisome. Also, in Turkmenistan there are efforts to strengthen STI structures, which are however hindered by the strong totalitarian and closed political system that poses an obstacle for the involvement of private and foreign actors. The National Academy of Sciences was reorganized in 2009 and currently there is a techno park under construction. The National Space Agency was launched in 2011, and an international university (The International Oil and Gas University) was opened in 2013. While George Bonas mentioned that the UNESCO is rather optimistic about these developments, he questioned the impact of these measures and highlighted the lack of reliable data on STI indicators due to the totalitarian nature of the political system.

Areas of high activity in STI

Referring to a study by the Centre for Social Innovation (ZSI), Bonas emphasized that Kazakhstan has increased its publication rates and overtook Uzbekistan as the leading country in scientific output in 2011. While Kazakhstan has grown the fastest in publication quantity, Uzbekistan held the highest impact per publication. A high number of publications are co-publications with other countries were especially the EU is an important partner, providing between 25% and 50% of total co-publications. Central Asian researchers have often co-published with researchers from Germany and the UK, but also Turkish partners are important for Turkmenistan and Kyrgyzstan. Across the region, research activity is the highest in Physics & Astronomy and in Mathematics & Statistics. This is a legacy of the Soviet Union's STI policies. In addition to that Chemistry and Clinical Medicine have been prioritized. However, Information and Communication Technologies that have high salience in public discourses, suffer from a lack of research. Major international donors in project funding are the United Nations Development Program (UNDP) and the International Science and Technology Centre (ISTC). Even though there are many publications in Environmental Sciences and in areas such as Agriculture, there is very little research under the term "climate change". The topics of energy sustainability and efficiency are underrepresented as well.

George Bonas pointed out that there are problematic aspects in using indicators for STI activity since common assessment tools tend to focus first and foremost on international and English-speaking journals. While these bibliographic studies can give insight into the overall trends in the region, the Bonas said that there certainly exists relevant and high-quality research in not listed national or Russian journals. This exemplifies the various flaws in reliability of the available data on Central Asian STI.

Central Asia as a region of strategic interest for the EU

Central Asia is situated between China, Russia, the Middle East, Turkey, and the EU. STI systems are thus embedded in multiple regional frameworks, for example in the context of the Eurasian Union or the so-called One Belt, One Road Initiative with China.

The EU has also maintained strategic partnerships with the region, recently, both partners adopted a new cooperative strategy (EU and Central Asia: Strategy for a New Partnership – 2017). Bonas elaborated on the central features of this partnership, which ranges from areas such as quality of

democracy and education to economic modernization and diversification. It highlights the importance of research and collaboration in regard to radicalisation. In education, the strategy aims to support institutions by assisting the development of modern and inclusive curricula. Environmental governance and aims to promote investment and exchange in innovative technologies, notably in the field of renewable energies, energy efficiency, water management, agriculture and rural development (for instance in the improvement of crops and efficiency in the cotton industry) are additionally mentioned. Furthermore, the strategy includes plans to promote multilateral and regional frameworks for dialogue concerning the sharing and management of resources, most importantly of water. How to mitigate and adapt to climate change is a key issue for the region, and the environmental disaster of the disappearance of the Aral See only reinforces this point.

Despite this joint strategy, Bonas lamented that cooperation between the EU and Central Asia in the field of STI has regressed lately. He argued that the application procedures under the Horizon 2020 framework have not encouraged much participation by Central Asian stakeholders. He proposed the re-establishment of broader and more sustainable forms of interregional cooperation if the EU seeks to maintain its relevant position in the region. Other global powers, such as Russia and China, have interest in increasing their influence in Central Asia. Particularly China has emerged as a big regional player and has heavily invested in infrastructure (e.g. in highways and power lines). While it is in Central Asia’s best interest to maintain a state of equilibrium in terms of cooperation intensity with mentioned global players, Bonas urged the EU to actively engage with cooperation in order to stem against the current decline in its regional networks.

Potential for EU-Central Asia cooperation

George Bonas regarded science diplomacy as an important instrument for deepening potential cooperation with Central Asia. As formulated in the EU-Central Asia partnership of 2017, research areas such as violence, terrorism, migration, gender equality issues, climate change, and water are of particular interest for both sides. The development of climate change mitigation and adaptation measures is a key concern for Central Asia. Resulting from the high number communities across the region, which have relatively weak connections to the power grids, research on energy efficiency and renewable energy is of primary importance. These fields represent areas that bode well for applying a strategy that includes science diplomacy, especially in terms of linking research cooperation with political cooperation.

Furthermore, science diplomacy could play a key role when it comes to introducing stable trans-boundary management systems for resources, most importantly of water. Most of the region's water supply stems from the mountains in Tajikistan and Kyrgyzstan. There are major political tensions with Uzbekistan. Due to the melting glaciers, estimations indicate a huge short-term increase in water supply, before a subsequent long-term drop will occur. George Bonas argued that European science diplomacy could play a key role in resolving these issues before water scarcity becomes an even bigger issue in the future.

In higher education, Kazakhstan in particular has shown interest in collaborating closer with the EU and becoming less dependent on Russia. This is reflected in its entry to the Bologna Process and the Enhanced Partnership and Cooperation Agreement with the EU (2015). Bonas saw a lot of potential for the EU to meet these interests and collaborate with Kazakhstan in the area of higher education. As mentioned above, the development of new curricula is a key issue for Kazakhstan, as well as for the rest of Central Asia.

There is a lot of potential in assisting Central Asian countries to reform their STI systems. This includes the introduction of peer reviews, roadmaps, and foresights, the establishment of competitive funding mechanisms, and the institutionalization of STI evaluation and data collection observatories.

Additional Sources

UNESCO (2015) Central Asia. In: UNESCO Science Report: Towards 2030.