

Chinese leadership and innovations: a capacity for technology transfer to Kazakhstan

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Abstract The ongoing progress in the sector of Research & Development (R&D) is vital for the future of civilization. Both wealthy and underdeveloped countries seek sustainable development that requires economic growth. With regard to the above, maximizing benefits from science-based technologies and their management essentially crucial. Science and Technology (S&T) are an impersonal process, which depends on the individual work of scientists and engineers, whose leadership role has a great impact on society. China is increasing its scientific and technical power day by day and occupies a leading position in different global scientific indicators. This paper introduces Chinese leadership philosophies and practices in the R&D sector as well as outlines the capacity for Chinese technology transfer to Kazakhstan. Kazakhstan as a developing country seeking greater industrialization. The results of this paper demonstrate that this industrialisation can be achieved through intensifying S&T cooperation capabilities with China as an emerging R&D superpower and its strategic partner.

1 Introduction

Nowadays, Chinese Research & Development (R&D) sector is growing at enormous pace. Currently, Chinese scientists are very respected worldwide. China is a leader according to a number of scientific articles in 2018 (Tollefson 2018). The official Beijing already positioning itself as an inventor in emerging green technologies as solar power, etc.

However, one can see that the country's progress in innovations has become possible through the efficient implementation of the Reforms and Opening Up policy over the last 40 years. The Chinese government attaches great importance to the Science & Engineering (S&E) development policy. The nation has vast population which gives it an enormous capacity for labour growth and competitiveness in S&E positions (Lawrence 2018). The large-scale reforms accomplished in the People's Republic of China (PRC) last four decades envisage modernizing management systems at all organizational levels, qualitatively updating the national model of managerial culture and actualize the need to form new types of academic leaders capable of exercising effective leadership in the country's new socio-economic and political realities. The main criteria of the new type of managers are based on the synthesis of socio-cultural traditions and modern management principles. Despite the large number of publications on comparative studies of leadership style and leadership in various countries, questions remain about the possibility and conditions for combining national models of Chinese governance with the principles of Western management, about adapting the traditional foundations of management culture to the requirements of a changing external environment (international, political, economic). Especially these problems are relevant for modern China, which plays an active role in global economics, becoming an equal partner of the West, a new superpower or 'responsible and major power'.

R&D is important for Beijing: the recent economic slowdown of China has shown that the current economic model does not adequately respond to global market and competitiveness demands. Encouraging innovation appears to be the only way to re-establish growth and return to the path of sustainable development. Therefore, innovative development as part of a new stage of modernization is one of the challenges faced by the Chinese economy. At the meeting with the country's best scientists and researchers at the National Congress of the China Association for S&T in 2016, Chinese President Xi Jinping said that China should become one of the most innovative countries by 2020 and the leading innovator by 2030. The purpose is to make China a major power in S&T by 2050. The Chinese government gradually launches scientific development programs, such as the National Medium- and Long-Term Plan (2006) and Made in China 2025 (2015). R&D goals and scope are also widely addressed in the 13th Five-Year Plan for 2016-2020 and in the documents of the 2017 Two Sessions (the two meetings of the National People's Congress and the Chinese People's Political Consultative Conference). Moreover, the successful implementation of R&D is critical for the viability of the Great Rejuvenation of the Chinese Nation concept introduced by President Xi in 2013. The state support measures aim to enhance such areas

as green energy, data analytics, the Arctic Science Observatory, national cybersecurity, interplanetary space exploration, genetic research, quantum communications, and artificial intelligence.

2 Leadership with Chinese specifics

Most of the research on leadership is made at the Western agenda and responds to the Western society and its demand. However, most countries at the East have their own definition of leadership and traditions. Socio-cultural factors play an important role in identifying the type of managerial situation by a leader, and therefore they should be considered as one of the significant variables determining the effectiveness of leadership style. The system of values, beliefs, traditions established in a particular national culture influences the decision-making of a leader, predetermining not only the choice of strategy, but also the ways of achieving goals. In China, the model of effective leadership is largely determined by the national-cultural traditions. Leadership as a social phenomenon is largely ensured by the position of the leader in the hierarchical structure of the organization's management. The formation of the modern management system in China and the formation of a socially approved image of the leader was influenced by the national cultural and historical traditions, social and philosophical views of Confucius and his followers. From the point of view of a formed sociocultural ideal, the Chinese leader is a "noble husband", "virtuous" "humane", endowed with a sense of responsibility, who seeks self-improvement for the sake of others, attaches great importance to the hierarchical order, family values, and the maintenance of rituals.

Socio-cultural features of management and leadership in China are based on the system of values, beliefs and traditions formed during the historical and socio-economic development of the country under the influence of religions prevalent in the East, the teachings of prominent philosophers and thinkers, among which Confucius has a special place. His ideas are fundamental ideological origins, which predetermine the formation of such values as virtue, humanity, responsibility, restraint and tolerance towards others in leaders. Confucianism regards the perfection of character as a basis in serving state and people. It also attaches great importance to the hierarchical order in society and affirms the value of humanity and rituals. In Chinese science organizations, due to established traditions of respect for elders and authority, a manager is always perceived by employees as a leader caring for his subordinates. This is an example of traditional leadership, which is based on paternalistic style.

The Confucian ideology inspired the Chinese belief in the superiority of their values and the fact that the Middle Kingdom is the centre of the world, the pinnacle of world civilization. The Chinese foreign and internal policy was derived from the basic concept of Grand Unity and Benevolent Ruling, which was originated from the pre-Qin thought. The Book of Poetry claimed: "all the lands and people belong to the emperor". The world and everywhere "up to the South Sea" are under the rule of the King of Chou, either "legally or territorially" (Berger and Luckman 2017). The Analects also stated: "within the four seas all men are brothers" (Shi 2006). According to the ancient Chinese Record of Rites, the core of traditional Chinese community ideology centred on the value of "we are the world" namely, "all families live within one family, all individuals become one person" and "all citizens in the kingdom as well as the sage in each feudatory nation are your people and courtiers" (De Bary and De Bary 1998). With this concept, the Chinese rulers firmly believed in the necessity of treating all peoples and communities as the family members. For that goal, exercising the power of role model and morality and acculturating people through educating them with rituals would be the most effective means and much more attractive and useful than the military power. However, the seemingly expansionary doctrine of universal imperial authority did not approve the desire for expansion and foreign aggression, excluded the triumphant spread and adoption of these ideas does not imply the power to include external people, and their transformation, was to serve as a long-term policy of ruling. In the minds of educated people Confucian warfare itself was considered unworthy pastime, the war was seen as a sad necessity dictated by concern for the highest purposes of the state (see e.g. Meliksetov 1998; Tihvinskii 1982; Malyavin 2000; Bokshanin 1968; Duman 1977; Gurevich 1979; or Barfield 2009).

At the XVIII Party Congress, former President of the PRC Hu Jintao said that: "*hegemony, power politics and neo-interventionalism have increased. The local upheaval become more frequent*" (Jintao 2012). In 2004, the Academy of Social Sciences of China has published "Analysis of neoliberalism". Scientists determine neoliberalism as a "theoretical expression of the ideology of globalization of international monopoly capital, its main purpose the dismemberment of the nation-state in favour of the expansion of space for monopoly capital". The misunderstandings of neoliberalism can lead to the errors "in theory and in the policy" (Miheeva 2005). The antique Chinese strategies of Sun Tzu and Wu Tzu "The Art of War" call on to win without fighting. For achieving this goal, it is necessary to use an indirect influence, not a dictate, long-term processes and contacts, not an impulsive decision, precisely metered impact on the key points instead of straight onslaught. The Chinese philosophers taught that the ideal of victory – to achieve a favourable balance of forces through diplomacy, espionage, trade, cultural and even interstate royal marriages etc., avoiding battles (Samarcev 2012).

Nowadays, Chinese ideologists using indicated technology, since China has powerful mechanisms as modern efforts to re-establish neoclassical Chinese culture as a base of China's leadership. The Chinese Communist Party (CCP) ideologues have learned Liang Qichao's representation, who said that the Chinese people as a "loose sand", it should be cemented, i.e. joined together and civilized, then the world will not find a more competitive force (Moskalev

2003). Moreover, the promotion of international competitiveness of China and the consolidation of Chinese business in the economy of different countries is not only the state capital but also the possibility of the Chinese diaspora - Huaqiao, and traditional clan ties that help implement and adapt to their circumstances. The CCP started introducing the national spirit into society first of all to save China, then the CCP has adopted this idea to build a new state in 1950th, and later during the reforms and opening up policy after 1978 the “all the Chinese people – one family” slogan has provided a new course of the CCP by support of the overseas Chinese (‘huaqiao’) who pulled billions of dollars in investment and communication in the global markets, contributing to the successful recovery of the motherland (Abdirov 2013). Since the beginning of the 21st century, China started promoting its transnational corporations to the global market, investing into the economies of various countries, and conducting the foreign economic reinforcing position within the countries, becoming an integral part of their economic activity.

The Chinese are social; especially they value the moral support of their family. In addition, it is Huaqiao contribute to the successful implementation of China’s scientific and technological innovation. With more financial opportunities and connections with certain circles, they naturally build and continue the business where localized, and whom they will attract to work, if not their countrymen through traditional clan ties (Koptseva 2012). In the country of residence of the Chinese diaspora characterized by law-abiding and collective lifestyle, they help to attract investments from China, helping them to grow stronger in other areas of the economy. Thus, gradually the Chinese business starts to become an influential force of the country, which increases the capacity of China and its state-owned enterprises. This long-term paradigm will give China an opportunity to smoothly solve the problem of lack of resources and increasing population pressure, as well as many others, by increasing its economic presence in other countries and full integration into the global community. National policy have a great ideological influence on the Chinese people, instilling the spirit of unity and solidarity, as well as the foreign policy of peace and development, which makes it clear to entire world that China will not pose a threat as a major, responsible state, carrying a mutual benefit to all with whom they cooperate and the so-called “win-win” partnership. This well thought-out and rational policy ensures loyalty and normal relationship within representatives of Chinese business and diaspora.

Confucianism still stands as a main force of the fastening unity and uplifting spirit of the Chinese management. The revival of traditional Chinese culture in the past two decades, in particular Confucianism is the result of this cultural change. After decades of criticism, Confucianism is once again being reinstated as a cultural icon to represent China’s leadership; its revival has important implications for domestic governance in mainland China. The Chinese leadership, embarked on the path of building “socialism with Chinese characteristics”, looking for ways to organic convergence of socialism with the peculiarities of national thinking, promoting Confucian renaissance. It is noteworthy that, Deng Xiaoping in the formation of the planned reforms in China refers to the Confucian concept of “small welfare” (Xiaokang), which is a necessary step to achieve the reforms enshrined in all of the XII Congress of the CPC to the last time XVIII. As used in party rhetoric phrase “Xiaokang shuyin” appears as a stage “average prosperity”, which is to come, the Chinese population (Smirnov 2011: 22). However, at level of the ordinary, deeply rooted in the minds of the Chinese Confucian perception of the concept of “Xiaokang” is filled with much more significant content related to the concept of Confucius perfectly ordered society “Great Unity”, and it does not matter whether it was of great antiquity, or this dream of the future world order of society, as presented Kang Youwei, most importantly, that these are two categories of Confucian integral to each other, that is, if talking about one, it begs another. It is in the interpretation of Kan borrowed these Confucian category Sun Yat-sen, giving a clear signal to the nation-building was originally a small level of economic and cultural well-being of people (Xiaokang) and then its slow progress to society “Datong”. Mao Zedong also openly designated to modernize China – build a society “Great Unity”, in his speech on the people's democracy, delivered on July 1st, 1949, on the occasion of the 28th anniversary of the CPC. Thus, the concept of “Xiaokang” taken by Deng Xiaoping as a symbol of building socialism with Chinese characteristics, anyway, in the minds of the Chinese people is associated with the fact that the ultimate goal of socialist modernization, designated as an achievement by the end of the century social prosperity at the highest international level, an ideal society “Datong” (Berger 2009). This was discussed at the conference on the 2550 the anniversary of Confucius held in Beijing in 1999 (Delusin 2011).

To demonstrate the extent to which in the perception of Chinese traditional images rooted there is an example from the book of the daughter of Deng Xiaoping, Mao (1995) which she wrote about her father (entitled “My father Deng Xiaoping”) where she writes: *‘Chinese people have already had suffered more than enough to allow others to manage again his fate. The biggest blunder of the United States government was his choice regime hated the Chinese people, the choice of the “Son of Heaven”, which could prop up his “choice of self-defeating perspective’* (Mao 1995). Apart from the fact that the Americans made a mistake by putting on Chiang Kai-shek, Mao demonstrates the presentation of modern Chinese elite, if specifically, its associative perception of China as the head of the Son of Heaven, and thus their state, as the centre of the world. By the way, we note that the term “Celestial”, which is embodied in the world of China, the Chinese themselves understood as “the whole world”, the centre of which is Zhongguo. As a proof, a quote by famous Sun Yat-sen can be attached: *“if the world’s largest country will create the most powerful government, is this state does not surpass all other nations? Such a*

government will have no equal in China" (Bergère and Lloyd 1998). There is also a meditation can bring an interesting fact that on one side of the gold yuan issued since 1982 and is legal tender, the plotting of the Temple of Heaven, where for centuries the Chinese rulers – the sons of Heaven do the ritual sacrifice to Heaven, symbolizing the legitimacy of their rule in China. Is not it amazing that out of many well-known to all mankind attractions of China as a way of future major currencies of the world, namely a place, many experts are predicting gold yuan in the future instead of the US dollar, selected the Temple of Heaven, given the profound symbolism of Chinese thought, and On the other hand, placed panda bear, associated with the image of a large, strong, kind, fair peacemaker?

With each turn of the country development the PRC leadership continues to introduce into the consciousness of the Chinese, that they are a great nation, which should be revived and be responsible mission in the world to establish justice, which requires a tightly knit complete modernization. At last the XVIII Congress this idea promoted under the banner of "patriotic united front", its honours was already an appeal not just to strengthen the unity of all peoples of the country and the cohesion of the Chinese nation in China and abroad, but also to encourage the unity of the Chinese people and the peoples of all countries in the world. A new leader of China, Xi Jinping has issued the idea of "rejuvenation of the Chinese nation" as a "Chinese Dream", the achievement of which will not only benefit the Chinese people, but also "people of all nations", because "the growth and development of China are providing plenty of opportunities".

All in all, it is obvious that the Chinese leadership has to solve two major tasks simultaneously, the first - is to focus on the common cause of socialist modernization his people, and the second - the international community to focus on co-development, because China has become too great and cannot develop within their boundaries, before upgrading the state there is a problem of resources and the need to expand the international space, so that the merger with the global economy it is vital. In this connection, it is important to China in every possible way to improve its international position and prevent the occurrence of adverse events in the world and curb its economic development, with an interconnected global integration, since an increase in its power and influence growth, of course, lead to a greater role in the regulation of global processes.

If the solution of the first task of the CCP resorted to bet on traditional thinking, going back to the Confucian value system with priority concepts of social stability and the search for consensus in contradictions, as a prerequisite for further self-preservation and the elevation of the Chinese nation. Then to solve the second problem highlights the relevance of the cosmopolitan ethical and political ideas of Confucius. Promoted popularization in the world of the best traditions of Chinese culture and socio-political thought. However, it is not enough to make the world without resistance took Beijing as the main organizer of the new world order. Modern international community too imbued with the Western world.

Taking just a quarter of the path of socialism with Chinese characteristics, China on personal practical experience develops a new approach to the dialectics of social development and social processes. The CCP pushed the antagonism of classes and systems and looking for rationality in action law of the unity and struggle of opposites through the Confucian concept of "harmony" (He). China is trying to harmonize the social and economic contradictions that have arisen in a mixed economy, speaking with Confucian slogan "unity and harmony of different" ("he er bu tong"), means the possibility of harmonious coexistence and even merging of opposites. Through the prism of such an approach should be considered a vision for the future of China on global governance, i.e. the stimulation of an international environment in which states with different social systems are suitable and acceptable to all peaceful coexistence and harmonious cooperation. The same is formulated in times of President Hu Jintao, the concept of building a "harmonious world", namely "to live peacefully while maintaining differences" (Jintao 2012). China emphasizes that harmonious world - a multi-polar world, featuring cultural diversity, which is based on recognition of the various co-existing states and their mutual respect for the independence of each. China shows how you can build a relationship with fundamentally different positions partners and competitors, and with neighbouring countries that share the disputed territories, and with friends and neighbours, and many other different countries in their development, without requiring them to change its internal structure and their beliefs, and building a partnership based on constructive dialogue, strategic partnerships, collaboration, and mutual neighbourhood.

Thus, studies have confirmed that the socio-ethical orientation of Chinese leadership and management is a strong competitive advantage of Chinese enterprises. In Chinese management culture, the amount of leadership is balanced by the amount of responsibility; the unshakable authority of the leader is reinforced by his unselfish service to the people, etc. The strengthened socio-ethical determinant of leadership behaviour is supported and supported by party and state leadership, existing national traditions and rituals. At the same time, the success of Chinese companies of the traditional type is primarily due to the presence of a completely defined social environment and an extensive network of trust relationships that exist only in Chinese society and are supported by national cultural traditions and rituals, so not all the benefits of the Chinese management system can be used another sociocultural environment. There is reason to assume that the improvement and development of the Chinese management system will occur in the direction of the assimilation of modern foreign management concepts and technologies while preserving the established national traditions and norms of communication.

3 Leadership in science and innovations: a case of China

Currently, China occupies a prestigious 2nd place in the world in terms of indicators such as investment in R&D, the issuance of scientific publications, the expansion of high-tech production, etc., as well as 1st place in the global wind energy industry. In 2016, R&D expenditures in the PRC grew by 9.4% and amounted to about \$ 221 billion (Pirozhenko 2017). Year 2019 marks the 70th anniversary of the PRC, and this date is a significant occasion to showcase Chinese achievements in innovations. For instance, China achieved much progress in the development of digital economy. According to McKinsey, China is a leading nation in e-commerce and digital payments (more than 70% coverage of the population), and home to one-third of the world's most effective start-ups valued at over \$1 billion. Baidu, Alibaba, and Tencent, or BAT as they are informally known, are giant global-access Internet companies generating a multifaceted, multi-industry digital environment that penetrates every aspect of lives of Chinese consumers. China's innovations are not limited to e-commerce and public services, as the most internationally competitive and recognized elements of Chinese innovations are supercomputers and the country's space program.

China ranks second globally behind the United States in terms of R&D expenditures. According to the Chinese government report published in January 2018, China's total R&D spending increased by 12.3% in 2017 to a record \$254 billion (Normille 2018). China has the largest number of engineers in the world. Thus, according to the U.S. National Science Board, from 2000 to 2014, the number of S&E bachelor's degrees awarded in China rose by more than 350%. In addition, China is taking a set of measures to prevent brain drain abroad, as well as to return them to their homeland. In order to serve highly qualified foreign and Chinese (persons who have received education abroad) specialists, as well as to return to China to engage in scientific activities and open companies, on June 29, 2010, the "Thousand people plan" official site started operating.

In particular, on February 27th, 2017, a prominent scientists Yang Zhenning (a physicist) and Yao Qizhi (a specialist in computer technology) refused foreign citizenship and serving as an academicians of the Chinese Academy of Sciences. This is the first case in history of the transition of foreign academicians to China, for which the PRC government specifically developed Temporary measures for the adoption of academicians of the Chinese Academy of Sciences with foreign citizenship to Chinese academicians. It should also be noted that 10 years ago the proportion of Chinese graduates of foreign universities who returned to their homeland after studying abroad was one third, but now about 80% of graduates of foreign universities return to China for work. In 2016, for the first time in history, China bypassed the United States by the annual number of scientific and engineering publications – more than 426,000 compared to about 409,000 (Condliffe 2018). Thus, the development of R&D is a key strategic direction of China's policy aiming at sustainable economic development and a moderately prosperous society in all respects. Russian expert Sitnikov writes that the core of those who returned, created the so-called "Los-Alamos Club". Members of this club have created or led hundreds of leading Chinese research centres at the leading universities, including Tsinghua University, the University of Science and Technology of China, the Harbin Institute of Technology and Fudan University (Skakovsky 2017).

Thus, one of the main reasons of dynamic development of Chinese R&D is strong government's commitment. Academic and educational leadership in China aims developing academic leaders on university governance and academic leadership; enhance capacities of academic leaders of HEIs on university governance and leadership (such as policy making, strategic planning and change management) (LEAD 2015). Chinese management also maintaining internationalization of HEIs to strengthen cooperation with leading universities all over the world. Academic leadership approaches in China closely connected with governments directions and CCP plans, this feature differs China from the western understanding of university governance & academic leadership. However, with a boosting process of globalization and integration into the international financial system, Chinese management evaluated through adaptation of the Western management principles and style. In China, all management sectors, including, educational leadership, are political. Executives in education must understand and accept political trends and follow the government's strategy. This approach is appropriate for Kazakhstan, which political system is also implemented in close direction in all social spheres. Both China and Kazakhstan seeking modernization 4.0 and trying to achieve these goals through development S&E.

China is among the five largest investors operating in Kazakhstan, accounting for 4.7% of the total investments in Kazakhstan. Over last years, China's total investment exceeded \$ 42.8 billion, and lending exceeded \$ 50 billion. In addition, in 2016, China's cumulative investment in Kazakhstan amounted to \$ 960.9 million, which is twice as much as in 2015 (Ministry of National Economy of Kazakhstan 2018). At the same time, the outflow of direct investment in China was \$ 57.2 million (this is 13% of the gross outflow of direct investments of Kazakhstan investors abroad). Within the program of industrial-investment cooperation, they plan to build 51 modern enterprises for \$ 26 billion. It is expected that most of these objects will be completed in 2019-2022.

Thus, Kazakhstan was one of the first in the CIS to introduce e-government services using a digital signature in 2008, while by 2020 it is planned to provide up to 80% of public services online. "Industrialization" and "Third

Modernization”, as well as the “Digital Kazakhstan” program, adopted in December 2017, are integrated state programs, mechanisms for ensuring digital transformation and accelerating technological modernization of the economy of Kazakhstan. Today, as China has become one of Kazakhstan’s major economic, trade and investment partners, Kazakhstan considers China as a main source of technology transfer to the country. This topic is repeatedly raised during bilateral negotiations, with Nur-Sultan pushing Beijing to invest in the non-commodity sectors of the Kazakh economy. Chinese technologies are now widely used in the country’s telecommunications, security systems (for example, surveillance cameras), the agricultural and food processing industries, etc.

The first projects already gave the result. These are polypropylene production plants in Pavlodar region and assembly of Chinese electric cars in Kostanay and Semey. \$ 28 million was invested in the further development of production, of which the Chinese investor China National Machinery IMP& EXP CORP invested \$ 18 million. In 2017, 6 projects were implemented: the construction of a transport system in Astana, the construction of a plant for the production of large-diameter pipes, the organization of the production of vegetable oil and the organization of small-scale assembly of cars, etc. The volume of oil production by China National Petroleum Corporation (CNPC) in Kazakhstan amounted to 52 thousand tons, in the last 20 years about 290 million tons of crude oil was produced. Kazakhstan supplied 100 million tons of oil and 183 billion cubic meters of gas to China. June 8 this year NC KazMunayGaz JSC and CNPC have agreed on the supply of Kazakh gas to the PRC in the amount of up to 5 billion cubic meters. Recall also that in May of this year. the construction project was completed and the third line of the Kazakhstan-China Gas Pipeline Corridor (CIM), the high-tech gas compressor stations Bozoi, Karaozek and the booster compressor station Akyrtoke were commissioned.

According to the results of the Belt and Road Forum in Beijing (May 14-15, 2018) two agreements were signed on the construction of mining and metallurgical complex based on a titanium magnetite (iron with vanadium content) Masalskoye deposit in Akmola region. In addition, JSC NC “Kazakhstan Temir Zholy” concluded in Beijing a purchase and sale agreement for a 49% stake in KTZE - Khorgos Gateway LLP. Attracting anchor strategic investors will ensure the growth of transit cargo volumes through the Dry Port of the Khorgos-Eastern Gate FEZ. Participation of Chinese investors in the implementation of Kazakhtelecom’s projects on the construction of fibre-optic communication lines in rural areas is also planned, and Kazpost together with Alibaba holding subsidiaries are working to increase the transit of goods from Chinese online stores through Kazakhstan.

As formulated by former Vice Minister of Education and Science of Kazakhstan Aslanbek Amrin, Kazakhstan can use its lag in technology as an advantage: the country lacks time to invest in technologies that are already becoming obsolete, so it is easier for Kazakhstan to skip some stages and focus on newly emerging innovations. In his opinion, to foster technological development, the country needs to identify promising niches, in which standards are absent or just being formed. For example, Kazakhstan has good prospects in the extraction of thorium and such rare earth element as neodymium, and this may become a mutually beneficial area of cooperation with China that would allow the transfer of the most advanced processing technologies, along with the production of higher value-added products. To achieve this, it is necessary to set up technology transfer institutes.

Recently, cooperation between the Kazakh National Agency for Technological Development (NATD) and the Chinese National Eastern Technology Transfer Centre (NETTC) has been established. In May 2018, the NATD and the NETTC signed a memorandum of understanding in Shanghai, laying the groundwork for collaboration in the field of innovations. The NETTC has 11 branches and five foreign representative offices – in the United States, Great Britain, the Netherlands, Canada and Singapore. To date, over 5,000 enterprises have passed through the centre’s business incubators. Under the memorandum with the NETTC, the NATD becomes a bridge linking Kazakh incubators with the Chinese ones. Cooperation with the NETTC is relevant for Kazakhstan in connection with the country’s ongoing Business Road Map 2020 program aimed primarily at developing and supporting small and medium entrepreneurship.

Chinese universities are the main implementation mechanisms of the county’s innovative development. Kazakhstan’s universities also aim to reach the University 4.0 model that meets the demands of the Fourth Industrial Revolution. Therefore, the successful experience of the PRC higher education institutions will be useful for them. In 2015, at a meeting with President of China Xi Jinping, then President of Kazakhstan Nursultan Nazarbayev proposed to create an IT park based on the Silicon Valley model at the Al-Farabi Kazakh National University (KazNU). Following this proposal, KazNU, in conjunction with the University Alliance of the Silk Road, established an international IT park. The core of this park will be a supercomputer obtained under a grant from the Chinese government. It is planned that the park will serve as a single data processing center for universities of Kazakhstan and members of the Alliance, as well as provide digital services and carry out high-performance calculations for research projects. It should be noted that KazNU’s supercomputer worth \$10 million should become a powerful computing resource included in the world’s top-500. KazNU also established cooperation with the Aerospace Information Research Centre of China by signing a memorandum of cooperation in 2018. Both parties intend to train specialists and conduct joint research projects in the field of space engineering and technology. The mission of the projects is to create a scientific school on small spacecraft.

4 Conclusions

In a conclusion, it seems rational to admit that China can and should be Kazakhstan's important partner in S&T. Obviously, coherent cooperation between technology transfer providers and recipients at different levels is still at an early stage.

Moreover, the issue of creating systemic mechanisms of scientific collaboration between Kazakhstan and Chinese universities, such as research centres, labs, and professional development opportunities, should be considered at the highest level. China systematically, purposefully and consistently implements state policy in the field of science and technology, skilfully combining market mechanisms and the remaining elements of a planned economy, as well as using tax incentives to encourage the innovation policy of domestic corporations.

It becomes obvious that as China's economy and technology leadership will expand, the need for technological partnership will also grow. Our results show that the two countries in question, China and Kazakhstan, should find some common grounds for R&D cooperation which will be beneficial for both sides. Nevertheless, we would like to stress that at the same time this cooperation should not compromise national security interests of Kazakhstan.

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