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COOPERATION BETWEEN THE UNITED STATES AND KAZAKHSTAN IN THE FIELD OF TECHNOLOGY TRANSFER: CHALLENGES AND PROSPECTS

This article explores the issues of interaction between Kazakhstan and the United States in the field of technology transfer, considering the key challenges and prospects of this interaction. In the context of globalization and the rapid development of technology, effective transfer of knowledge and innovation is becoming an important factor for economic growth and modernization of Kazakhstan.

The article examines the main aspects of the process of "transfer of technology and related rights from one side to another for their implementation and use" in Kazakhstan's diplomacy, as well as the contribution of this process to international initiatives for their implementation and promotion at the global level.

The author examines existing coordination mechanisms as shared scientific research, trade-off programs, investment undertakings and highlight main limitations such as legislative disparities, cultural obstacles and absence of infrastructure. The article also studies many problems regarding effective global cooperation in technology transfer sphere. Then the article raises the issue of effective expanding of cooperation between various organizations and nations to bring high level exchange of knowledge, information, know-how, and innovations.

The article offers recommendations for improving cooperation, emphasizing the need for strategic planning and creating an enabling environment for innovation, which will allow both countries to maximize the benefits of partnership.

Key words: technology transfer, technological development, innovation, intellectual property, sustainable economic growth, diplomacy, international initiatives.

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АҚШ пен Қазақстанның технологияларды беру саласындағы ынтымақтастығы: сынақтар мен перспективалар

Мақалада АҚШ пен Қазақстан арасындағы технологиялар трансфері саласындағы ынтымақтастық талданады, осы өзара әрекеттестіктің негізгі сын-тегеуріндері мен перспективалары қарастырылады. Жаһандану және технологиялардың қарқынды дамуы жағдайында білім мен инновацияларды тиімді түрде беру Қазақстанның экономикалық өсуі мен жаңғыруының маңызды факторына айналуда.

Мақалада Қазақстан дипломатиясындағы «технологиялар мен оларға байланысты құқықтарды бір тараптан екінші тарапқа беру және оларды енгізу мен пайдалану» үдерісінің негізгі аспектілері, сондай-ақ осы үдерістің оларды жаһандық деңгейде енгізу және ілгерілету бойынша халықаралық бастамаларға қосқан үлесі қарастырылады.

Автор бірлескен ғылыми зерттеулер, алмасу бағдарламалары және инвестициялық бастамалар сияқты ынтымақтастықтың қолданыстағы механизмдерін қарастыра отырып, заңнамалық жүйелердегі айырмашылықтар, мәдени кедергілер мен инфрақұрылымның жетіспеушілігі сияқты негізгі тосқауылдарды анықтайды.

Мақалада сондай-ақ технологиялар трансфері саласындағы тиімді халықаралық ынтымақтастыққа кедергі келтіретін әртүрлі мәселелер қарастырылып, талқыланады. Сонымен қатар, елдер мен ұйымдар арасында білімді, инновацияларды және озық әзірлемелерді неғұрлым тиімді алмасуды қамтамасыз ету үшін ынтымақтастықты дамытудың перспективалық бағыттары талданады.

Мақалада ынтымақтастықты жақсарту бойынша ұсыныстар беріліп, стратегиялық жоспарлау мен инновациялар үшін қолайлы орта қалыптастырудың маңыздылығы атап өтіледі. Бұл екі елге де әріптестіктің артықшылықтарын барынша тиімді пайдалануға мүмкіндік береді.

Түйін сөздер: технологияларды беру, технологиялық даму, инновациялар, зияткерлік меншік, тұрақты экономикалық өсу, дипломатия, халықаралық бастамалар.

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Сотрудничество между Соединенными Штатами Америки и Казахстаном в области передачи технологий: вызовы и перспективы

В статье проводится анализ сотрудничества между США и Казахстаном в области трансфера технологий, рассматриваются ключевые вызовы и перспективы этого взаимодействия. В условиях глобализации и стремительного развития технологий эффективная передача знаний и инноваций становится важным фактором экономического роста и модернизации Казахстана.

В статье рассматриваются основные аспекты процесса «передачи технологий и смежных прав от одной стороны к другой для их внедрения и использования» в казахстанской дипломатии, а также вклад этого процесса в международные инициативы по их внедрению и продвижению на глобальном уровне.

Автор рассматривает существующие механизмы сотрудничества, такие как совместные научные исследования, программы обмена и инвестиционные инициативы, и определяет ключевые препятствия, включая различия в законодательных системах, культурные барьеры и отсутствие инфраструктуры. В статье также рассматриваются и обсуждаются различные проблемы, препятствующие эффективному международному сотрудничеству в области трансфера технологий, а также анализируются перспективные направления развития сотрудничества между странами и организациями для обеспечения более эффективного обмена знаниями, инновациями и передовыми разработками.

В статье предлагаются рекомендации по улучшению сотрудничества, подчеркивается необходимость стратегического планирования и создания благоприятной среды для инноваций, что позволит обеим странам максимально использовать преимущества партнерства.

Ключевые слова: передача технологий, технологическое развитие, инновации, интеллектуальная собственность, устойчивый экономический рост, дипломатия, международные инициативы.

Introduction

The discussion of technology transfer is one of the main factors in the development of both individual countries and the global economy as a whole, and its effective use of the results of scientific and technical research and development in the country, ensuring a mutually beneficial exchange of knowledge and technology between education, government, science, and business has become the main mechanism in the United States.

In order to achieve the positive outcomes related to the scientific and technological rise in Kazakhstan, speaking specifically about the work that focuses on creating new technological products that are related to technology transfer through diversification, it is necessary to focus on expanding new opportunities, as well as focus on creating a sustainable and strong technology transfer system. Thus, in order to implement this process, it is necessary to work out concrete steps for technology transfer from research institutes to the civilian sector of the economy.

The study examines the best foreign practices, especially the successful experience of implementing and using practical methods of technology transfer in the United States, which rely on the potential of national laboratories, government agencies and foreign policy agencies that can provide opportunities for the implementation of these processes in Kazakhstan. Partnership in the sphere of innovation and tech transfer between US and Kazakhstan is starting more appropriate since the global technological boom. Kazakhstan and its vast mineral, oil and gas resources, geography and with all these opportunities country aims to renovate and diversify national economy by utilizing new technology in it. That is why teamwork with the US that is one of the technologically advanced nations in the world opens up new opportunities to both parties.

The purpose of this article is to analyze the key mechanisms of technology transfer in US organizations, as well as to identify the basic principles that can be adapted by Kazakhstani organizations. In addition, the article offers recommendations for improving this process. Despite the fact that "transfer of technology and related rights from one party to another for their implementation and use may seem like a simple process", it often faces difficulties and various obstacles.

The concept of "transfer of technologies" does not have a broad notion that exist not only in Kazakhstan, but also in the global scientific world. Finding optimal ways at the theoretical level for the collaboration of various parties in the field of new technologies brings us to the creation of many models of technological transfer.

The core attributes of the process of dissemination of technologies are advancement of scientific results, licensing, and publications of the innovative results.

And the transfer of technology is a protection of intellectual property, copyrights, patents, trade marks and innovative secrets. The effectiveness of the technology transfer system requires the improvement of human capital and competition, including the formation of an organizational structure.

The State plays an important role in the development of technology transfer. For example, countries such as the USA, Germany, Switzerland, South Korea and Israel occupy fairly high positions in the global innovation ranking.

Materials and methods

This article examines the formation of a system and cooperation between the United States and Kazakhstan in the field of technology transfer: challenges and prospects.

The analysis used various analytical and empirical methods, as well as materials from open sources, including documents from international organizations, official reports and government documents, researches in the field of technology transfer in the United States, as well as researches and publications in scientific journals and specialized forums, statistical data from the National Science Foundation of the United States.

Literature review

Currently, the issue of cooperation between the United States and Kazakhstan in the field of technology transfer, considering the key challenges and prospects of this interaction occupies one of the central places in international diplomacy, both in political and academic literature.

Technology transfer (TT) refers to the process of exchanging, disseminating, or applying technological knowledge, innovations, and inventions from one entity to another. In the US context, TT often involves the movement of innovations from academic and research institutions, private companies, or government agencies to commercial applications that benefit society. This literature review examines the evolution, mechanisms, issues, and impact of TT in the US, focusing on the contributions of the academic, government, and private sectors.

Major works by authors such as Mowery, D.C., et al., Adams, J. (2002), Link, A. N., and Scott, J. T. (2005), Audretsch, D. B., and Feldman, M. P. (1996) are devoted to this issue. The concept of technology transfer in the United States has changed significantly over the past century. Initially, research institutions and government agencies conducted scientific research in isolation, and technology transfer was informal. However, the technology transfer landscape in the United States was transformed following the passage of the Bayh-Dole Act of 1980, which allowed universities to patent inventions developed with federal funding. This legislation institutionalized the commercialization of academic research, leading to the establishment of technology transfer offices (TTOs) at universities and other research institutions (Mowery et al., 2001).

But the attention in this article mainly focuses on importance of Sino American relations, or Indo Pacific area. Also, it can be highlighted that Bayh Dole law stimulated the growth of licensing agreements, patents, and the formation of spin-off companies that have become central to U.S. innovation and competitiveness.

Also, the attention of authors studying this problem, such scientists as Siegel et al. (2003) and Thursby & Thursby (2002) emphasized that this law played a key role in bridging the gap between scientific researchinstitutions and the private sector, encouraging collaboration between these organizations.

Explaining that in the United States, technology transfer occurs through several key mechanisms:- «Patents and licensing»: One of the main methods of technology transfer in the United States is patents and licensing agreements. Universities and research institutions often file patents for their inventions and

license them to private companies for commercialization (Adams, 2002). These agreements can take a variety of forms, including exclusive and non-exclusive licenses, and have led to significant economic benefits (Czarnitzki et al., 2014).

«Spin-off companies»: Another important route for technology transfer is the creation of start-up companies. Universities and research institutions have become hubs of entrepreneurial activity, with many establishing incubators and accelerators to support the commercialization of their innovations (Litan et al., 2008). These spin-offs play a key role in translating academic research into marketable products and services.

«Cooperative Research Agreements»: The United States also has a strong tradition of collaborative research between universities, government agencies and the private sector. These partnerships help bridge the gap between basic and applied research, leading to improved technologies that can be commercialized (Mowery et al., 2004). Moreover, successful program is Small business Innovative Program that gives grants to R&D.

However, it is worth noting that technology transfer in the United States is a multifaceted process that has evolved significantly, especially since the Bayh-Dole Act of 1980. Although it has faced challenges related to intellectual property management, cultural differences and resource constraints, it remains a critical mechanism for stimulating innovation, economic growth and global competitiveness. As technological advances continue to shape the future, understanding and improving technology transfer mechanisms will be critical to maintaining the United States' position as a global leader in innovation.

Results

Notable results in the fields of nuclear energy, information and aerospace technologies, communications, and bio-nanotechnology are demonstrated by the United States, which has impressive scientific and innovative potential. The potential development of a production system focused on the consumption of competitive innovative products is, in particular, the scale of the consumer market.

Innovation system and technology transfer in the USA

Each year the U.S. Government gives approximately $165 billion for research and development. Such incentives from the government leads to boost of new inventions and technologies. As we know, the main characteristic of transferring of techs is the process of receiving new technologies by the national industry from countries' research institutes, laboratories, and universities that these techs can be led to the production into the final product or service. As a result, U.S. products have high level of quality and can easily compete in the global market. The transfer of ideas, inventions, and technologies developed with tax money to the private sector, where they can be further developed, scaled, and commercially deployed, leading to job creation and a useful new U.S. product, technology, or service offered in global markets these are the principle of technological transfer from national academia.

The development of innovation is a main task for the US nowadays. Businesses raise its interests to R&D spendings (Figure – 1). And the government works with fundamental and applied research.

Today, Kazakhstan's Science Foundation JSC is successfully implementing the "triple helix" model of the U.S. Innovation System. And the system's main trait is based on rapid collaboration between state, science and business. It is true that innovation process consists of academia, labs, thenoparks, R&D institutes and clusters. Academia gives fundamental research, national laboratories and research institutes provide applied research and finally science and innovation parks and private sector produces the final products.

The core pillar of the US innovation system is the protection of intellectual property rights IPR. The strong laws play essential role in protection of intellectual property and gives organizations feelings of protection of inventions that are created and supported by federal fundings.

For instance, strong laws as Bayh Dole, Stevenson Weidler laws, Trade mark act Federal Technology transfer act all of them came into force in 1980s. US law says that the technology transfer process is a core aspect in economic achievements of the nation.

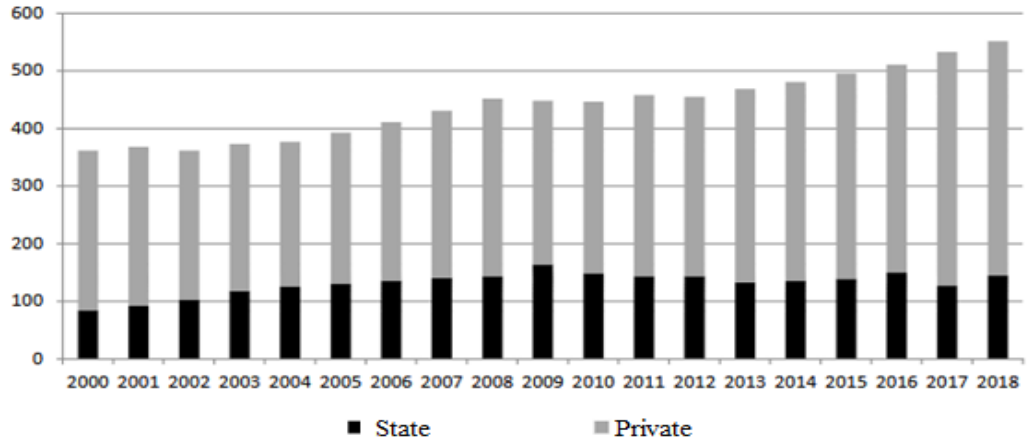

Figure 1 – Spendings on R&D in the US in 2000-2018 in billions of US $
Source: Organization of TT in national labs of the US: Experience for Russians, 2020.

Table 1 – Federal legislation on technology transfer

Stevenson Weidler Technology Innovation Act (1980)	First US technology transfer law. Under this law labs have to be active in funding and participation in tech research.
Bayh Dole act (1980)	Adopted to support and accelerate the commercial use of research results sponsored by federal budget. The act made it possible to increase the number of patents and licensing activities, startups and create new innovation results.
Federal Technology Transfer Act (FTTA) (1986)	The act grants access to technology from federal labs and leads to creation of Laboratory Consortium for TT (more than 300 federal labs).
The law on Transfer and Development on National Technologies (1995)	The law gave adequate intellectual property rights to justify instant boost of inventions.

Source: US Environmental Protection Agency (2024)

The Bayh Dole act enabled universities to become copyright holders for inventions that were funded from the federal budget. The act made a huge influence to the US economy and boosted of creations of many successful startups.

At the same time Stevenson Wydler act came into force that gave opportunities to federal labs cooperated with industries and then the Small Business Innovation Research program was established.

If the federal agencies' budget was over 100 million dollars these agencies have to distribute at least 1.25% of this capital to small firms.

After that the General Law on Trade and Competitiveness of 1988 was adopted that proclaimed creation of industrial technology transfer centers where public sector would cooperate with private sector of the federal economy. The rules under the law granted national laboratories rights to attract third parties to the process. All in US confirmed that technological exchange was effective to the national economy.

Such success created a National Technology Transfer Network in 1990. The network includes National TT Center – NTTC, six regional centers, from each state. All programs under the network were supported by ministries and departments, like National Science foundation, National Space Research Agency, Ministry of Defense, Ministry of Energy, Ministry of Agriculture and etc. All parties have main goal to develop cooperation between government, science community and private sector to lead to the economic raise.

But there is very complicated decision making process and businesses have no info about any developments of national labs. The other problem was a decline of public fundings of R&D. And result of this issue was a debates on the state level about rebuilding transfer of technology system.

The main pillar of the US innovation system is the national laboratories. More than 700 labs devoted their attention to the security and defense issues. The most innovative and advanced laboratories related to the Ministry of Energy. The notion of a "national laboratory" is not a legal concept but it is a subject that has a set of advanced research capabilities.

The laboratories financed for their activities from the federal budget. Up to 70% of all fundings related to the Ministry of Energy. The main priority of the national labs is set to the technological transfer and commercialization of technologies. The structure of the activity in the Ministry of Energy consisting of several offices (tech transfer, individual program and technology transfer offices in state laboratories.

National laboratories use a wide range mechanisms that can be divided into the following groups: financial, cooperative, informational, organizational, and educational. All mechanisms work together.

The implementation of technology transfer includes several stages:

- Defining and of capabilities of a new product in various fields.
- Market research where products will be used and produced
- Financial results of the products
- Risks of the product when it will be used
- Creating legal framework to the product
- Monitoring of the use of the product

Recently, it has been noticed that both in Kazakhstan and in the global community there is a trend that takes technology transfer to a new level of active development of innovative technology transfer centers. TT is always developing through business incubators and various innovation centers, academia with the participation of private sector of economy.

The specific functions performed by the existing technology transfer centers are shown in Table – 2.

Table 2 – Functions of technology transfer centers

Registration and protection of any invention and technologies	– detection, recording or registry of intellectual property objects – consideration of patentability and deterring of the results of innovation – preparing documents for registry – monitoring of patent applications, receiving all certificates of IP objects
Producing of products and its capitalization	– advertisement of new products and advancement products in industrial companies – building of strong strategies in order to promote products in the market
Tactics and monitoring (audit)	- tactical consultancy in the sphere of management of IP and commercialization of technologies – monitoring of remuneration checks for rightsholders of the technologies

Source: Kostin, K., 2022.

An analysis of US science and technology indicators by state (Table – 3) shows: the national indicator for R&D performed by enterprises in the United States includes undistributed R&D performed by enterprises, and states for which data is hidden shows the results of the implementation of legal support.

Table 3 – Percentage of research and development (R&D) performed by businesses, by private sector, by state: 2017-2022

State	2017	2018	2019	2020	2021	2022
United States	2,33	2,44	2,61	2,89	2,90	2,67
Alabama	1,05	1,18	1,23	1,50	1,34	0,95
Alaska	2,14	0,06	0,11	0,12	0,44	0,35
Arizona	2,18	2,00	1,94	2,10	2,45	1,95
Arkansas	0,43	0,42	0,40	0,35	0,37	0,37
California	5,48	5,64	6,33	7,12	6,94	6,75
Colorado	1,53	1,53	1,73	2,05	2,05	1,86

Continuation of the table

State	2017	2018	2019	2020	2021	2022
Connecticut	3,53	2,96	2,87	3,18	3,15	3,11
Delaware	3,28	3,61	3,03	3,58	4,81	3,52
Districtof Columbia	0,45	0,42	0,42	0,67	0,71	0,79
Florida	0,72	0,68	0,72	0,77	0,83	0,67
Georgia	1,25	0,93	0,84	0,95	1,03	1,12
Hawaii	0,24	0,20	0,21	0,42	0,56	0,55
Idaho	2,77	3,71	3,65	2,87	2,59	2,92
Illinois	1,92	1,67	1,74	1,82	1,93	1,80
Indiana	1,94	2,04	2,28	2,44	2,47	2,31
Iowa	1,77	1,94	1,78	1,96	1,54	1,52
Kansas	1,53	1,71	1,78	1,79	1,64	1,20
Kentucky	0,56	0,79	0,77	0,67	0,71	0,41
Louisiana	0,14	0,18	0,31	0,26	0,23	0,20
Maine	0,53	0,49	0,69	0,69	0,72	0,79
Maryland	1,75	1,84	1,75	1,83	1,82	1,53
Massachusetts	4,96	5,42	5,81	6,16	6,78	6,87
Michigan	4,65	4,76	4,42	4,56	4,33	4,17
Minnesota	2,23	2,20	2,32	2,30	2,21	2,00
Mississippi	0,29	0,30	0,34	0,29	0,32	0,38
Missouri	1,93	2,54	2,15	2,20	2,18	1,38
Montana	0,32	0,41	0,45	0,54	0,51	0,64
Nebraska	0,55	0,51	0,68	0,71	0,81	0,95
Nevada	0,43	0,62	0,63	0,60	0,57	0,73
New Hampshire	1,88	3,42	3,24	3,48	3,56	1,52
New Jersey	3,11	3,65	3,54	3,91	4,01	2,95
New Mexico	1,14	0,93	0,80	1,52	1,98	1,55
New York	1,07	1,14	1,25	1,48	1,53	1,62
North Carolina	2,16	2,38	2,57	2,56	2,68	1,83
North Dakota	0,60	0,58	0,65	0,70	0,61	0,69
Ohio	1,68	1,61	1,69	1,79	1,70	1,41
Oklahoma	0,51	0,50	0,62	0,64	0,58	0,89
Oregon	3,92	4,21	3,65	4,79	4,70	4,78
Pennsylvania	1,61	1,72	2,10	2,21	2,29	2,07
Rhode Island	1,44	1,36	1,32	1,31	1,44	0,94
South Carolina	0,72	0,83	0,84	0,74	0,80	0,91
South Dakota	0,43	0,42	0,40	0,43	0,39	0,32
Tennessee	0,44	0,44	0,48	0,52	0,70	0,49
Texas	1,41	1,29	1,43	1,64	1,51	1,20
Utah	1,89	1,83	1,60	1,81	1,91	1,63
Vermont	0,90	1,04	0,82	1,25	1,41	1,74

Continuation of the table

State	2017	2018	2019	2020	2021	2022
Virginia	1,03	1,30	1,31	1,56	1,61	1,17
Washington	4,68	6,08	6,99	7,65	8,07	8,53
West Virginia	0,33	0,35	0,37	0,36	0,72	0,54
Wisconsin	1,89	1,99	2,10	2,10	2,06	1,82
Wyoming	0,28	0,12	2,04	3,48	0,26	0,19

Source: National Center for Science and Technology Statistics. (2024).

World scientific leaders-countries are constantly updating their scientific and technological policies. In order to become an active participant in global scientific policy, Kazakhstan needs innovations, and some of them are reflected in such Memo of Understanding and Cooperation between the United States and Kazakhstan in the field of technology transfer as:

- Memorandum of Understanding and Cooperation between Qaztech Ventures JSC and 500 Startups, September 2019, New York;
- Agreement of Intent on Cooperation between Darmen Holding and Plug and Play, September 2019, New York;
- Protocol on strategic cooperation in the sphere of Internet between Astana International Financial Center and the Center for fourth industrial revolution (2019), United States
- Memorandum of Understanding between the National Museum of the Republic of Kazakhstan and the Museum of Asian CultureSan Francisco, December 2019, San Francisco;
- Memo on further implementation of covering all the territory of Kazakhstan and far away areas with rapid intenet connection through satellites (2019), San Francisco;
- Partnership Agreement between the Plug & Play Accelerator and Capital Holding, December 2019, San Francisco;
- Protocol of the entrance QazTechVentures to 5th International Global fund 500 startups (2019), US.
- Memo of partnership and creating in 2020 fund for investment in industrial and infrastructure projects between Bright Sphere Investment Group and KIDF (2019), United States.

In conclusion, based on the analysis of most of the Memoranda it is worth noting that the existence of a common goal, during which the parties plan to develop cooperation in the field of innovative economics, intellectual property, technology transfer, production of high-tech products, and human capital development and knowledge in Kazakhstan.

Moreover, within the framework of the signed Memoranda, a number of training seminars were held for Kazakhstani companies, employees of government agencies and organizations, as well as students of universities in Kazakhstan on the protection of intellectual property rights, on national and international registration of intellectual property objects, disposal of the exclusive right to a registered object under a contract, and the basics of copyright in both countries., and also highlighted the latest changes in the legislation of the Republic of Kazakhstan and the United States in the field of technology transfer.

One of the productive projects that was created with support of some American universities is Nazarbaev university. This university is becoming a place where students and scholars join together and contribute to the development of technology in Kazakhstan.

Moreover, mutual projects in the sphere of agronomics and agribusiness such as implementation modern solutions of watering and managing use of water significantly raise effectiveness of production and stability in global warming.

Year after year collaboration between the US and Kazakhstan in the field of TT is having more multidimensional character. It is expected that next step in partnership between parties will be signing new agreements related to AI, biotech and cyber security. All these aspects leads to building of strong and firm position in the world.

The memoranda of understanding between the United States and Kazakhstan in the field of technology transfer are tools that help build relationships between cultures, science and business. They open the doors to new ideas and innovations, contributing to the development of both Kazakhstan and the entire region. There is hope in this collaboration for a bright future where technology serves the benefit of humanity.

Discussion

Cooperation between the United States and Kazakhstan in the field of technology transfer has major challenges for Kazakhstan:

- Differences in legislation. Law systems and legislations of both parties are different. For instance, in the US there is a well-established protection methods of IP rights, but in Kazakhstan this sphere is new and at the beginning of its development. And these issues can raise some concerns from international firms including American companies about protection their innovations and patents.

- Cultural diversity. Differences in cultural aspects can lead to disagreements in managing businesses, projects and communication. That is why it is essential to consider cultural characteristics in creating joint projects.

- Infrastructure limitations. In spite of recent developments in Kazakhstan, there are still many problems related to infrastructure. Absence of innovations in the current infrastructural projects make it difficult to impose new solutions and innovations that lead to decline of interests from US companies in partnership.

Solutions for Kazakhstan:

- Financing of know-how sphere. Beneficial partnership between the US and Kazakhstan can lead to investment flow into the projects in Kazakhstan. American enterprises can bring their technologies and expert knowledge in order to develop new industries such as IT, biotech and renewable energy field.

- Education and retraining of employee. One of the core perspectives is the exchanging of knowledge in education and professional trainings. Kazakhstan can use various American educational programs and initiatives that are aimed to gaining new expertise in tech and innovation. This can accumulate the number of highly qualified personnel.

- Sustainability. Partnership in TT can lead to success in development of economy of Kazakhstan and utilizing innovations into the fields such as energy sector, agribusiness and the other sectors of industry will raise effectiveness and lower negative influence to the ecology.

Conclusion

Cooperation between the United States and Kazakhstan in the field of technology transfer has both challenges and significant prospects. After studying all opportunities in the US in the sphere of technology transfer, it can be noted as following:

- budgeting of R&D is a main goal of the federal government of the US

- determining of key elements of each laboratory and at the end having the growth of private financing

- all mechanisms in tech transfer have to be binding with strong legislation

- building strong links between science and industrial enterprises

- using all the opportunities of joint work of centers, techparks, academia that can help to create net with scientists

- managing budgets related to R&D in order to expand employees and research abilities.

Overcoming legislative and cultural barriers, as well as infrastructure development, can contribute to a successful partnership. In turn, this cooperation can lead to significant economic and social transformations in Kazakhstan, which will make it more competitive in the international arena.

One of the key prospects is the opportunity to share experiences in the field of education and training. Kazakhstan can benefit from American educational programs and initiatives aimed at developing skills in technology and innovation. This will help create a skilled workforce capable of working effectively with new technologies, and can also contribute to the sustainable development of Kazakhstan. The introduction of modern technologies in agriculture, energy and other industries will help to increase efficiency and reduce the negative impact on the environment.

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