Presentation date: June, 2022, **Date of acceptance**: August, 2022 , **Publication date**: November, 2022

46

THE MODEL OF INTERACTION BETWEEN RESEARCH UNIVERSITIES, BUSINESS AND GOVERNMENT IN THE USA AND POSSIBILITIES OF ITS APPLICATION IN KAZAKHSTAN

EL MODELO DE INTERACCIÓN ENTRE LAS UNIVERSIDADES DE INVESTIGACIÓN, LAS EMPRESAS Y EL GOBIERNO EN LOS ESTADOS UNIDOS Y LAS POSIBILIDADES DE SU APLICACIÓN EN KAZAJISTÁN

Gulnaz Kuramayeva[1]
E-mail: gkuramaeva@mail.ru
ORCID: https://orcid.org/0000-0002-3802-1646
[1] University of Southern California. USA

Suggested citation (APA, seventh edition)

Kuramayeva, G. (2022). The model of interaction between research universities, business and government in the USA and possibilities of its application in Kazakhstan. ***Revista Conrado, 18(89)***, 434-448.

ABSTRACT

Research universities have a significant impact on the economic development of the state, the processes of implementation and development of entrepreneurial infrastructure, the development of small businesses through the creation of technology parks and business incubators. Therefore, the creation of research universities in Kazakhstan contributes to the liberation of the country from export dependence on raw materials and ensuring high growth dynamics in processing, intellectually oriented and knowledge-intensive industries. This paper analyzes the problems of interaction of research universities, business and government in the current economic environment of Kazakhstan. Based on the study of US experience of integration of leading universities in the innovative development of the regions discussed ways and means to solve the problem.

Keywords:

Kazakhstan, the USA, research universities, business, government, education, science.

RESUMEN

Las universidades de investigación tienen un impacto significativo en el desarrollo económico del estado, los procesos de implementación y desarrollo de la infraestructura empresarial, el desarrollo de las pequeñas empresas a través de la creación de parques tecnológicos e incubadoras de empresas. Por lo tanto, la creación de universidades de investigación en Kazajstán contribuye a la liberación del país de la dependencia de las exportaciones de materias primas y asegura una dinámica de alto crecimiento en las industrias de procesamiento, intelectualmente orientadas e intensivas en conocimiento. Este artículo analiza los problemas de interacción de las universidades de investigación, las empresas y el gobierno en el entorno económico actual de Kazajstán. Con base en el estudio de la experiencia estadounidense de integración de universidades líderes en el desarrollo innovador de las regiones, se discutieron formas y medios para resolver el problema.

Palabras clave:

Kazajstán, Estados Unidos, universidades de investigación, empresa, gobierno, educación, ciencia.

INTRODUCTION

Science and innovation continue to be one of the key global priorities for improving competitiveness and economic growth. In addition, advanced science is also a contribution to improving the quality of people's lives (education, healthcare, ecology, and much more).

Countries that have the ability to create new scientific achievements and technologies receive a special profit – a significant intellectual rent from their use. This gives a highly competitive advantage. Those states that are not capable of this are forced to pay intellectual rent to more developed world centers.

Education and science are the main factors of the economy. The World Declaration on Higher Education for the 21st century emphasizes that without adequate higher education and modern research institutions, with qualified and educated people, no country is able to achieve real sustainable economic development.

There are three mutually reinforcing factors behind the outstanding results of research universities or world-class universities. These are a high concentration of talent, an abundance of resources to create a favorable learning environment and conduct advanced research, and a university governance structure that promotes strategic vision, innovation and flexibility, allowing the university to make decisions and manage resources without bureaucratic barriers. An analysis of foreign experience shows that it is research universities that become the key source of ideas for the implementation of globally competitive innovations by the world's leading companies. Over the past two centuries, world-class research universities have emerged in Europe, the United States and a number of other countries, specializing in the production of new knowledge and the training of unique specialists in the context of breakthrough scientific and technological development. These universities make a significant contribution to the dissemination of knowledge through scientific research, teaching according to the latest curricula and pedagogical methods in an environment conducive to these processes. At the same time, scientific research becomes an integral component of the educational process, and graduates achieve success both during their studies and after graduation.

In the context of global competition, the importance of research universities has increased, in order to develop country's scientific and innovative system. Currently, Kazakhstan faces the challenge of reforming universities so that university education meets the challenges of growing globalization. In the light of the strategically important task set by the First President to build an effective scientific and innovative system, Kazakhstan has been in the process of forming and developing a network of research universities.

Problem statement

The nature of innovation is complex and depends on a number of factors. Institutional infrastructure, economic system, legal framework, knowledge base and public policy are some of the factors that influence innovation development. International connections, global access to science and knowledge production stimulate innovation. Historically, the general strategy for innovation development has been to increase R&D spending (Nurtayeva & Nurmukhanova, 2020).

Today, the university is a natural incubator, a mechanism for the commercialization of research and a source of new knowledge and technologies. By introducing entrepreneurship education, the university has the potential to strengthen partnerships with participants in synergistic cooperation. Thus, the university is the driving force behind the "triple helix" system and the agent of innovation, industrialization and sustainable development, but at the same time it is necessary to think through the relationship with the state.

This research is aimed at studying the links that exist between the state, business and the academic environment in Kazakhstan in the field of innovation development, as well as finding political and managerial solutions to strengthen this interaction. The subject of the study is the links between universities and enterprises in Kazakhstan: academic cooperation, cooperation in the field of commercialization of innovations, non-academic cooperation, including consulting services of universities provided to enterprises, as well as joint organization of events. As an academic environment, the study considers only universities, and not scientific organizations in general. This approach was due to two main reasons: firstly, the ongoing education reform in the country – including the creation of techno parks and commercialization offices at universities – gives more importance to innovation within the university and, secondly, the study of the diverse links between all scientific organizations Kazakhstan and enterprises and the prospects for the development of such ties would be quite an extensive task for this study.

Research Questions

On the basis of this study goals and review of the literature the author developed three research questions. Our research questions fellow and asked:

Research question 1: is to analyze the state of the higher education sector, summarize and study the world

experience of the process of transition of universities to a new type - an entrepreneurial university.

Research question 2: the author present the main problems and trends in the development of higher education in the context of the formation of a new type of development of universities - entrepreneurial universities, synergetic cooperation between the players of the «triple helix»: state, education and business.

Research question 3: How strong are the ties between business and science in Kazakhstan and do they contribute to the development of the country's innovative potential?

MATERIALS AND METHODS

The study was conducted using methods such as abstract – logical and comparative analysis, method of description and generalization. The sources of the study were theoretical and analytical articles, works of Kazakhstani and foreign authors, which deal with issues of higher education and the concept of "Triple helix".

The concept of a triple partnership between universities, academia, business, and government, known as the "triple helix" model, emerged in the mid-1990s as a synthesis of the institutional views of sociologists and the biological analogy. In the work of H. Etzkowitz (Stanford University) and L. Leydesdorff (University of Amsterdam), this partnership was presented as a hybrid social construction with the advantages of the DNA molecule (cohesion of helical structures) and increased ability to adapt to changes in the external environment (Etzkowitz & Leydesdorff, 1995; Etzkowitz & Zhou, 2017). In the 2000s, this structure was introduced into the economic practice of developed countries (from Scandinavia to Japan) as a basis for the formation of regional clusters and generation of innovations, as a model for organizing national innovation systems. It also began to appear in the decisions of the Baltic Development Forum and EU strategic documents as a new approach to integration processes and the creation of a common knowledge market. The growing popularity of the "triple helix" model in various countries of the world, including in the context of the global crisis, is due, in our opinion, to the fact thatit proposes a new consensus-building mechanism that can enable self-development complex network systems. Adapted to a dynamic innovation environment, this model harmonizes it at all levels of economic interaction (Smorodinskaya, 2011).

The main element of novelty of the innovation model of the "triple helix" is the strengthening of the role university. Traditional innovation models and public systems are focused on the role and initiative of the state, as well as concepts such as open innovation, as well as the role of private business, innovative enterprises. The authors believe that both the state and business can play "first violin". And from here, we have basically three different versions of this model, depending on who is in the lead. However, we have an optimal model of interaction only when all three participants in the "spiral" make an approximately equal contribution to its development. Of course, this often requires a major rethinking of the role of universities, their mission and core social functions. But the transition from the university as a teaching and research institution to an entrepreneurial university as an innovative institution – such a university is also engaged in education and science, but in a different way, with different goals and at a slightly different level.

Government support is critical to the emergence of entrepreneurial universities. For example, the US government actively promoted entrepreneurship education and encouraged the emergence of entrepreneurial universities. Stanford and MIT are examples of success. MIT tracks alumni entrepreneurship. In particular, 650 companies, including Gartner, Genentech, HubSpot, InVivo Therapeutics, Teradyne, and Zipcar, were founded by graduates of one of the MIT divisions, the Alfred Sloan School of Management (A. Sloan School of Management at the Massachusetts Institute of Technology, 2022). In a specially prepared report, the authors estimated the impact of MIT as follows: in 2006, there were 25,800 college-educated companies employing 3.3 million people and generating about $2 trillion in annual revenue. US dollars (Roberts & Eesley, 2011). These companies were high-tech enterprises operating primarily in information technology, biotechnology, electronics, engineering, and consulting. It is noted that almost each of them had a significant impact on the economy of the region (Artemova, 2017).

This study also uses information and data from open sources, official statistics, as well as the results of interviews conducted with representatives of a number of scientists. The material obtained was used to evaluate academic and non-academic cooperation between the studied universities and enterprises, as well as to identify the reasons that hinder the achievement of a higher level of communication between universities and enterprises in Kazakhstan.

RESULTS AND DISCUSSION

The author interviewed researchers and experts regarding the issue under consideration. Talking with Professor Bob (Professor of the University of Southern California, Los Angeles, CA, USA) about the elements of the model of the interaction, the model has to take into account the needs of the business. The most important for business is profit and speed. Business cannot wait for a long time, because

time is money. However, on the other hand, governments have objectives beyond profit, the government is more considered about helping people, or specific area, sphere etc. There is a need for balance in the interaction between research universities and business structures. The ways for mutually beneficial interaction are: fair agreements and trust.

Professor Bob gives several examples of successful interaction of government and business structures. City of Longbeach and Nashville, which are popular with their music events and shows are the good examples of successful interaction. Both government and business benefit from attracting people to their cities, by producing different festivals and shows. Florida is another example. The government of Florida gave an opportunity for Disneyworld to be a city itself and govern itself. This is a good example of mutually beneficial partnership, where both parties have profit.

Talking about university ranking system, Professor Bob is suspicious about ranking system and thinks it can be problematic. In his opinion, the ranking should take into account:

1. competence of university
2. make sure if university meets generally recognized standards
3. interaction between university staff and students is vital

However, in the US, success of university is judged by the success of their graduates. For example, the prominent graduates of Harvard Law School are usually those who run the country.

Moreover, according to Professor Bob one of elements of successful interaction model of business and government of the US is that the court system is independent in the US. Professor provides examples of money stealing by people in power in countries like Nigeria, Russia etc.

According to Professor, talking about interaction between research university and business structure business provides funding and invests and also take new ideas for product, while university is developing these new ideas and products. New ideas become new businesses, products, services, factories etc.

As for the challenge for the interaction, Prof. Bob points out trust. Universities need to provide reliable and fair information for business structures and for the university it is important to be sure not to be cheated.

Talking about the role of the government, Mr Bob highlights two points:

1. Governments should make sure opportunities are fairly distributed for universities and businesses
2. Governments should be encouraging incubators and small businesses.

According to the point of view of Abil Yerlan (Rector of the Academy of Public Administration under the President of Kazkahstan) “about 20 years ago, regional universities gave impetus to the development of the region”. But according to Abil Yerlan, universities faced problems such as weak government support and low funding. In addition, state investments were not justified, since there was no demand for grants and no one controlled the execution of the grant. These problems still persist, but nevertheless, a mechanism has been developed. Universities are partially transferred to joint-stock companies (JSC). And according to Abil Yerlan, the Ministry of Education and Science of the Republic of Kazakhstan should be given the opportunity to place shares of universities. Since flexibility and profit are very important for business. And until the business scheme enters the university, science will not develop.

One example of interaction is the Temirtau Metallurgical Plant and Karaganda Polytechnic University, where the university has departments where employees of the plant teach, and university students are given the opportunity to practice at the plant.

According to Abil Yerlan, the American model of interaction between business and university does not work in Kazakhstan, because our business and universities are not mature enough. Abil Yerlan explains the complexity of interaction on the example of the Kazakh state apparatus, the Presidential Administration and the Academy of State Administration.

According to Abil Yerlan, the state should help the interaction between business and university, but the ultimate beneficiary is business. Higher education should be elite, the Ministry of Education and Science of the Republic of Kazakhstan should review the education system.

For example, Professor Vicram (Professor of Adjunct Instructor Sol Price Office of Faculty Affairs of the University of Southern California, Chief Digital Officer LACERS, Los Angeles, USA) starts his interview with the example of Los Angeles business incubator. Due to Professor, there are three elements in the interaction: government initiative, private sector initiative and research university initiative. Professor gives an example of L.A. government supporting small businesses. Los Angeles government makes opportunities for small businesses to locate in L.A. For example, L.A. government makes loyal tax initiatives or tax exemption. So, the main idea is to make comfortable conditions for businesses. Another example: L.A.

airspace businesses moving to Arizona, because Arizona is offering free land and no taxes for years. So, according to Professor Vicram, government's conditions and support are vital.

Another model of interaction, business tend to cluster around each other. Businesses finding each other and working together. Government supports with the promotion (press, highlights etc).

The last model of interaction is where government, business and research universities come together. Large research institutions have business programs, science labs. Moreover, research institutions spin out with a new technology or research. So, research institutions provide talents, ad moreover, provide ecosystems. Businesses in US locate near research institutions and tend to offer funding for students, and students compete for these funding.

Professor gives another example of business interaction model how Los Angeles used rebranding, large campaigns for attraction, loyal tax initiatives to make its area attractive. So basically, according to Professor, universities are involved in supplying talents.

Another researcher Chet Newland (Retired Professor of the University of Southern California Price School, Member of the National Academy of Public Administration, Los Angeles, USA) express his point of view concerning this question. He said that each American state has its distinct government-run Higher Education System, usually with only a few highly regarded research universities. In California, the University of California San Francisco, which is a Medical and Health Sciences institution, usually ranks topmost in expenditures. UCLA usually ranks 2nd, and it also excels in Health Sciences Research. Other campuses perform major research in various specialized areas.

In the 1860s the United States Government provided funding for each state to create a research and teaching college/university in Agricultural and Technology specialties, and those state systems, like the University of California Aggie campus at Davis (near Sacramento) have been topmost in pure and applied science research. Each of these State institutions usually operates research and advisory offices in every county, supporting related businesses, professional groups, 4 H clubs for children and youths, etc. In addition to state and federal government institutions, some states have outstanding Private Universities, such as Stanford, USC, and Cal Tech in California—or Princeton, Harvard, Yale, MIT, & Duke in the East.

Also Prof. Newland noted that businesses commonly provide endowment funds; contracts for faculty and students; internships and jobs for students and graduates; and shared leadership in specialized disciplines and fields. For example, USC's Schools of Cinema, Theater, Music, and Dance are closely associated with Hollywood and other Entertainment Industry operations. The Viterbi Engineering School has been responsible for decades of advances regionally, nationally, and internationally.

In this case governments and businesses commonly provide such location/relocation incentives to organizations and institutions as Land Sites and Tax Free Years of Operations, but these methods mostly apply to non-research operations – except when they are linked to existing operations. This is common practice among universities, performing arts organizations, and businesses in general.

The most serious challenges concern the different purposes of these entities. Ideally, governments are chiefly responsible for seeking Justice in Governance among people and organizations while facilitating freedom for their prosperity or other enjoyments; businesses seek to profitably development, produce and distribute desirably useful goods and services; and universities are devoted to advancement and sharing of knowledge, chiefly practicing openness and transparency. Ideally, all of these are responsible for advancing enlightened civilization via respect for ***Truth, Beauty, and Good***, but that is where challenges lie. Many people, organizations, and nations are destructively self-serving or worse.

The research roles of American governments are extensive, as noted above. Among important examples, during the 1940s (World War Two), when it became known that Nazi Germany was researching development of Nuclear Weapons, the USA decided that it also had to do such research. However, it was thought that government should not do the work directly. Instead, responsibilities were divided mostly among five university and private industry giants (Young, 2022). Later, when the National Aeronautics and Space Administration was created in the 1960s, a similar model of reliance on dispersed performance among universities and commercial enterprises was followed. The governmental components of NASA were only 5 to 10% of its overhead operations. In short, in many respects, the role of the Federal Government and roles of state and local governments are to ***facilitate getting needed research and development done*** outside of government.

Based on the results of the analysis of interviews with experts, the author came to the conclusion that a number of consistent government initiatives and fundamental institutional changes may be required to implement working mechanisms for the commercialization of knowledge and

technology transfer, to encourage the creation of innovation infrastructure, business universities and regional innovation clusters. Achieving sustainable change remains a fundamental challenge. Studies of entrepreneurial universities have led to the identification of their common features:

1. leadership and management (aggravation of the importance of the managerial level);
2. organizational capacity, people and incentives (attracting and retaining talent);
3. development of entrepreneurship in teaching and learning (extraction of additional income from the educational process);
4. connections with business structures for knowledge sharing (collaboration with business for research and improve their efficiency);
5. international relations (internationalization of science and education);
6. influence on the external environment (participation in the social and cultural life of the territories).

Due to the high level of scientific and innovative potential inherent in an entrepreneurial university and, at the same time, conservatism and inertia, aspects related specifically to management methods and leadership. At the same time update dissues of designing control systems, which is the object of study of socio cybernetics, which explores mostly invisible control systems that control the functioning society (The Kazakhstan Association of Entrepreneurial Education has been created, March 14, 2017).

In the last decade, dynamic transformations have been carried out in Kazakhstan, innovation potential has been increasing, and conditions have been created for the development of entrepreneurial education and regional innovation clusters.

Without the interaction of business, government and universities, a sustainable innovative economy impossible.

According to 2017 data, 8 universities of Kazakhstan declared themselves entrepreneurial, among them AlmaU, Narxoz, Karaganda Economic University of Kazpotrebsoyuz, Turan University, UIB. On the basis of the National Chamber of Entrepreneurs of the Republic of Kazakhstan "Atameken" the Kazakhstan Association of Entrepreneurial Education was established. More than 20 universities from almost all countries have become members of the Association regions of Kazakhstan. The organization operates with the support of the Ministry of Education and Science of the Republic of Kazakhstan. The objectives of the Association are the development and support of entrepreneurial universities, the creation of a platform for the exchange of knowledge, experience and the implementation of joint projects, the development of entrepreneurial thinking among teaching staff, students and university staff, the formation of a regional policy for the development of entrepreneurial education, the development of the methodology and ideology of entrepreneurial education (The Kazakhstan Association of Entrepreneurial Education has been created, March 14, 2017).

Entrepreneurial universities consider it important to change the mission of their development. Along with education and research, the mission of the university is also active involvement in the socio-economic development of the region (the key process is the commercialization of new knowledge through technology transfer and the creation of start-ups).

According to open data posted on the websites of universities, analysts of the club of young entrepreneurs have compiled a rating of universities in Kazakhstan in the context of training students in entrepreneurship. The evaluation was carried out on the basis of the following criteria (Lukicheva, 2013):

- the presence of a clause on entrepreneurship, business in the mission of the university;

- teaching subjects about entrepreneurship;

- experience of teachers in business;

- availability of student business organizations, business clubs;

- conferences, meetings with entrepreneurs; availability of laboratories, technology parks, incubators,

- commercialization offices (Table 1).

Table 1. Rating of some universities of the Republic of Kazakhstan for business education.

Place	University	Subject	Laboratories, technology parks, business incubators	Conferences, public lectures, meetings with entrepreneurs	Student organizations	Teacherswith businessexperience	Mission	Result
1	AlmaU	1	1	1	1	1	1	6
1	UIB	1	1	1	1	1	1	6
1	Narxozuniversity	1	1	1	1	1	1	6
1	«Turan» university	1	1	1	1	1	1	6
1	InnovativeEurasian University	1	1	1	1	1	1	6
2	Karaganda Economic University Kazpotrebsoyuz	1	1	1	0	1	1	5
2	KIMEP University	1	1	1	1	1	0	5
3	Suleiman Dimerel University	1	1	1	1	0	0	4
4	Karaganda University "Bolashak"	1	0	1	0	1	0	3

*compiled by the author based on the official websites of these universities

If we talk about business universities, AlmaU's distinctive advantage is that they are accredited by AMBA (Association of MBA's, UK, London), which puts them on a par with the 200 best business schools in the world. Narxoz University has an accredited international educational program ACCA –Narxoz for training and taking exams in all fundamental disciplines of ACCA. At Turan University, along with business education, school business programs Kinder, Junior, Teen MBA are implemented. The UIB University of International Business offers an Executive MBA program in cooperation with the Higher School of Corporate Management (HKSHU) of the RANEPA (Moscow). At the Karaganda Economic University of Kazpotrebsoyuz, for the implementation of practice-oriented training, instilling entrepreneurial skills, educational-scientific-industrial complexes (ESPC) have been formed. UNPK is created as one of the organizational forms of integration of education, science and production, interaction of the university with government agencies, industrial enterprises, service enterprises, business communities, in order to improve the quality of training of specialists and their competitiveness in the labor market. The university provides training in new areas that form entrepreneurial competencies: "IT-entrepreneurship", "Project and innovation management", "International business".

As Aryn Orsariyev, Executive Secretary of the Ministry of Education and Science, notes in his speech at the forum "Entrepreneurial Education in Rapidly Developing Societies": "... the education market of Kazakhstan is already entrepreneurial, legislation and infrastructure allow the development of university entrepreneurship. The law on the commercialization of scientific and scientific and technical activities provides mechanisms and opportunities for universities to support entrepreneurship, including student entrepreneurship. Therefore, the exchange of experience on the development of entrepreneurial education, which is taking place today at the forum, is so important, plus recommendations and practices for improving legislation in this area" (Shulembayeva, 2017).

The main goal of universities is to teach students how to use their knowledge and ideas in real business and industry. In order for theoretical training to be put into practice, it is necessary, firstly, to identify problems that hinder the development of existing industries, and secondly, to start looking for new promising areas in a particular area (Suleymenova, 2014).

In November 2017, on the basis of Turan University, the Kazakhstan Representative Office of the International Triple Helix Association (KP MATS) was established, a non-governmental non-profit organization of professionals from various fields, such as business, government agencies, higher education institutions, research centers that work together on a number of tasks to promote the concept of the Triple Helix in Kazakhstan, helping to strengthen the interaction between universities, government and business.

The Kazakhstan office of the International Triple Helix Association ensures the introduction of mechanisms that are aimed at developing entrepreneurial activity among young people who increase the share of small and medium businesses and are engaged in innovative activities.

Priorities and prospects for the development of Kazakhstani research universities

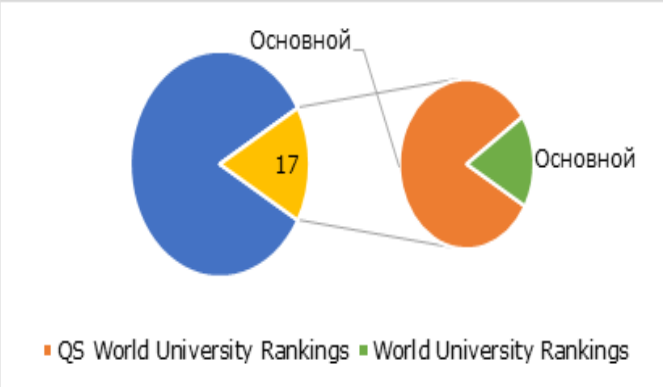
It should be noted that the problems of the real state of Kazakh science, its results and their demand for the real sector of the economy are increasingly discussed in the press, initiate scientific discussions, generate publications and give rise to heated debates in various social groups and collectives. This is another look, an attempt to assess what is and understand what needs to be improved in this area.

A fact that is difficult to dispute: over the years of independence, Kazakhstan's scientific and innovative system has been formed, which includes a system of higher education and specialized research institutions subordinate to the Ministry of Education and Science of the Republic of Kazakhstan and other ministries, scientific and production associations, technology parks, consulting, engineering firms and other legal entities carrying out scientific and technical activities.

Currently, there are 120 universities in the republic, of which 44 are state, 15 are non-civil, and 61 are private. 14 universities are included in the authoritative international QS World University Rankings, and three universities are in the world university rankings. Compared to 2018, the number of students studying on grants has almost doubled (from 32 to 56 thousand).All data is clearly shown in Figures 1-3.

*compiled by the author based on source (Krokhmal, 2016).

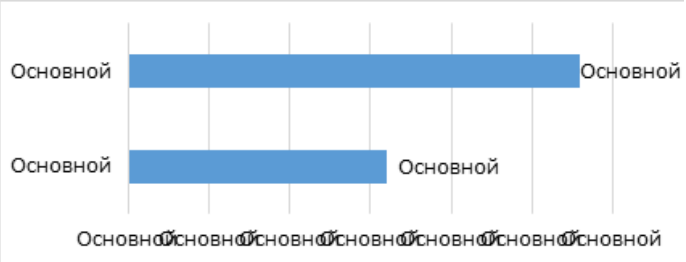
Figure 1. Distribution of universities.



*compiled by the author based on source (Krokhmal, 2016).

Figure 2. Universities in world rankings.

As part of a large-scale process of transformation of the management of universities, 28 state higher educational institutions have passed into the status of a non-profit joint-stock company. Corporate governance has been introduced: a Board of Directors has been created in each university. The rector's staff has been updated by more than 50%. Universities are given financial independence. The salaries of the teaching staff have been increased; the teaching load has been halved.



*compiled by the author based on source (Krokhmal, 2016).

Figure 3. Students Studying on Grants.

In recent years, serious work has been done aimed at improving the quality of higher education. In particular, an open register of educational programs was created, which included 9371 EPs, including 284 innovative ones. Educational programs have been updated to reflect professional standards and the Atlas of New Jobs.

In 2021, funding for science has doubled. Scientists are provided with new opportunities for the implementation of scientific ideas. The material and technical renovation of research institutes continues. The national project "Technological breakthrough through digitalization, science and innovation" was developed and approved, as well as the Concept for the development of science for 2022-2026 (Mukasheva, 2021).

A number of innovations are planned in the higher education system: the creation of the first online universities, the opening of branches of leading foreign universities, an increase in the number of grants by 5,000, and a reorientation of the Bolashak program.

On behalf of the President of the Republic of Kazakhstan, emphasis will be placed on training personnel in technical areas. Grants for technical and IT areas will be increased from 40% to 60%. The issue of allocating grants for graduates of schools in the western regions is being worked out: Mangistau, Atyrau regions. In addition, the issue of providing educational grants to the children of military personnel, employees of law enforcement and special government agencies who died while performing tasks to protect public order will be worked out.

A review of the discourse of Kazakh scientists on the implementation of the credit system of education shows the ambiguity of its assessment. The positive side of the credit system is that it increased the amount of independent work of students, developing their thinking during the study, taking notes, abstracting multiple texts; increased the work of both teachers and students on the specification and operationalization of concepts during testing; increased transparency and objectivity of knowledge assessment, which, accordingly, reduced the possibility of corruption in the educational process. At the same time during the credit system implementation, there were some problems.

The credit system with its learning process leveled the former student group, which contributed to the upbringing of collectivism, and communicativeness. Further, students, making their schedule of study, can choose easy courses that are not relevant to their profession, or choose subjects based on the subjective preferences of teachers.

Solving these problems, in our opinion, requires a comprehensive approach: increasing the responsibility of the academic tutor of students – adviser; strengthening the educational work of the curators of student groups; working with teachers themselves to improve their knowledge and pedagogical ethics in their relations with students.

Many new training courses will need to be more practice-oriented. Internships in firms and stays abroad should provide students with the opportunity to learn new forms of work organization and the necessary abilities.

Finally, every Kazakhstani university should be linked to Western programs that encourage student mobility, as well as researcher mobility.

Internationalization of education and research is a necessary direction of development, which gives impetus to the substantive modernization of universities. The importance of international and global relations in the curricula of higher educational institutions is increasing in perspective. Internet, telecommunication, satellite television, and the development of electronic trade promote the creation of the international education market. This modification manifests itself primarily in the field of university education. The "virtual campus" is the actual phenomenon in western universities. In Kazakhstan, it is also important to create a «virtual campus» in universities and the government should provide credits in this direction. It will promote the aspiration of high schools to be competitive at a world level. Teaching in universities involved in the program should be brought into line and didactic software should be produced. In the future, there may be a kind of "market" for universities and teachers. In universities, teachers actively present themselves in the market, intensively communicate, and attract more students, including foreign students. That is, one aspect of the internationalization of the education market is cooperation with foreign universities.

The latest trend in developed countries is the increasing role of universities in the generation of scientific and technical knowledge. There is a big difference between traditional research laboratories near universities and university laboratories. The basis of the model of the university laboratory is a mechanism guaranteeing the crossing of ideas coming from universities and industrial researchers, easy training of staff, and transfer of experience between universities and in-house research projects. This model increases access to university research.

A classic example of the university laboratory model is Stanford University. It is the core of the largest territorial scientific and industrial complex "Silicon Valley". The leaders of the world's hi-tech business tend to get access to the fundamental research of the university, which is held in a free mode by students and professors. Exactly

big universities, as a rule, the centers of technopolises, are transforming today in areas of the basis of the manufacturers connected with the newest technologies in the advanced branches of NTP. For example, about 1200 enterprises are concentrated around Stanford, 1300 firms are concentrated around Boston University (Technopolis "Road 128"), and 500 firms are concentrated around Cambridge (Zaytsev & Kraft, 2012).

At the modern stage of the formation of research Universities, simultaneous processes of differentiation of the Kazakhstan higher educational institutions proceed. 9 national universities have been allocated; in 2010, 10 innovation-oriented universities were identified through a competition, based on which their transformation into world-class research universities is planned; Nazarbayev University has been created and the first graduates of specialists have graduated; KazNITU named after K.I. Satpayev has been formed. Nazarbayev University is an institution of higher education at the international level, created on the initiative of the First President of Kazakhstan to integrate education, science, and production, create an effective academic environment and conditions for the entry of domestic scientific structures into the world scientific space. In 2015, Nazarbayev University was given the status of a research university and its development program for 2016-2020 was approved. The integrated scientific system of Nazarbayev University includes the National Laboratory Astana and Nazarbayev University Research and Innovation System (NURIS), which generally provide the link between the academic process, research activities, and the development of proposals and recommendations for the implementation of research developments in production. One of the priority tasks of NURIS is to create an intellectual and innovative cluster of Nazarbayev University as part of the development of a belt of knowledge-intensive and high-tech companies. The key elements of the cluster are schools and research centers, commercialization office, business incubator, techno park, and science park Astana Business Campus. In addition to research and educational activities, engineering, pilot, and investment activities will be carried out in the science park. In the field of scientific activity, the development of Nazarbayev University is carried out in two main directions. Firstly, it is the development of science in the traditional sense, when scientific activity is formed mainly by the teaching staff and researchers. Participation of undergraduate, graduate, and doctoral students in research projects is a prerequisite. Secondly, scientific activity covers not only the interests of research staff and faculty but also takes into account the national scientific priorities of the republic. Following the personnel policy, Nazarbayev University purposefully supports employees aiming to continue their studies in Master's and Ph.D. programs as well as a postdoctoral research and scientific internships. Based on Nazarbayev University schools by international standards, more than 60 modern laboratories have been established. The strategic development of Nazarbayev University is based on international cooperation and partnership with the world-class educational institutions of the United States and the United Kingdom (Cambridge University, Duke University, University College London, University of Pennsylvania, and others). The University uses the experience of its partners in developing undergraduate, graduate, and doctoral programs, managing scientific and educational processes and developing scientific research. Today Nazarbayev University is a national brand of education, the first higher education institution in Kazakhstan that works according to international academic standards and is guided by the principles of academic freedom and autonomy. Its experience is gradually transferred to all universities in the country.

The following characteristics of the formation of the Kazakhstani model of research university can be highlighted based on (Krokhmal, 2016):

- the high potential of faculty and teaching staff;
- unique cluster structure that allows combining
- education with research;
- a significant degree of integration with industry and academic research;
- institutions;
- well-developed master and doctoral programs;
- developed scientific and educational infrastructure;
- the significant volume of budgetary and contractual financing of scientific and applied research;
- mutually beneficial ties and productive contacts with business in training specialists, conducting and implementing R&D;
- extensive scientific and educational international relations.

Analysis of the problems of the formation of world-class research universities in our country shows the need for new relations between science and education, on the one hand, and the state, university, and business, on the other hand. Independent Kazakhstan has to form new mechanisms of a partnership between the state, society, education, industry, and business, to create world-class research universities and to preserve the research university as the main source of new knowledge. In the future, the strategic goal of research universities should be to create

and strengthen mutually beneficial relationships between business and the university, with a focus on the development of technology transfer, additional education, and provision of in-demand graduates. Research universities should take responsibility for the preservation and development of the human resource potential of Kazakhstani science, high technology, and vocational education. They must acquire uniqueness and regional identity, becoming effective centers of science, education, and culture.

The model of interaction between research universities in Kazakhstan, business and government: US experience

In the context of global competition, the importance of world-class research universities for the development of the country's scientific and innovation system, relying on the knowledge-based economy, is increasing.

Analysis of foreign experience shows that research universities are becoming a key source of ideas for the implementation of globally competitive innovations by the world's leading companies. Over the past two centuries, world-class research universities specializing in the production of new knowledge and training of unique specialists in the context of breakthrough scientific and technological development have formed in Europe, the United States, and several other countries. Stanford University (USA) is one of the most prestigious institutions of higher education in the world.

Stanford conducts large-scale research covering almost all fields of science. The peculiarity of world-class research universities is the mutually beneficial and fruitful ties with the industry. In particular, the relatively small but internationally recognized Massachusetts Institute of Technology interacts effectively with 700 leading U.S. industrial corporations. This is important not only for the development of university science and higher education. The level of integration of education, science and production, and knowledge-intensive technologies have become decisive factors in the development and growth of competitiveness of the national economy. In the light of the set strategically important task of construction of an effective scientific-innovative system in Kazakhstan, the process of formation and development of a network of research universities is going on. The legislative basis for their creation has been elaborated. Article 10 of the Law of the Republic of Kazakhstan "On science" is devoted to the concept of a "research university" (Olenev, 2013). A high potential for human resources is being formed in the country within the framework of the implementation of the Bolashak program and activities of the Nazarbayev Intellectual Schools.

Currently, Kazakhstan is facing the task of reforming its universities so that university education can meet the challenges of increasing globalization. Is there a unified idea in the reforms of Kazakhstani universities?

In a university education teachers and students work together as equals in the task of education and their free self-determination. A university is a place of scientific reflection. In this sense teaching and research are closely linked. Whereas teaching would only repeat knowledge already acquired in the traditional way and would conflict with practice, research combined with learning guarantees teachers and students a relationship to practice.

U.S. universities are categorized and do not have the same standard of services. They are characterized by five different categories of universities. The two highest categories are research universities, whose primary purpose is research. The next two categories of universities have a relative balance between research and teaching. And in the fifth classification of U.S. universities, which are obliged to teach, it is not possible to award academic degrees. There are also specialized universities, the only task of which is teaching.

The university system in Kazakhstan is being reformed in the direction of the classification of universities into different categories and the differentiation of services on the American model. In this case in prospect, we would also differentiate deductions to universities and awarding of academic degrees by universities. These are some of the requirements for universities, which are set to adapt the Kazakh university to the challenges of globalization and allow you to classify some universities as the elite. For universities, having research and training as the main task, it will be possible to implement the idea of Humboldt University to varying degrees.

According to the Bologna Charter for Universities, the university is an institution that critically understands and disseminates culture through research and teaching. Universities should have independence from authorities in their research and teaching activities to meet the challenges of our time. Under market economy conditions, where competitiveness, mobility, and quick decision-making are the key factors of education development, the system of centralized administration becomes a brake on the development of higher educational institutions. That is why it is supposed to give autonomy to higher educational institutions in the project of a long-term program of education development till 2017 (Mutanov, 2015). Scientists of Al-Farabi Kazakh National University have proposed at this stage, as an experiment, to grant autonomy to the leading national universities.

Kazakhstani universities are undergoing reforms both in terms of the content and structure of education. The

university education system in Kazakhstan follows the American educational system. The republic has implemented the first three requirements of the Bologna Process. Commonly understood, comparable qualifications in the field of higher education were introduced; the transition to the three-stage system of higher education (bachelor - master - doctorate), which focuses on the continuity of all levels of education and, therefore, improves the quality of education, was completed; the credit system of education was introduced, which is a unified system of credits for the comparison of programs and the implementation of student mobility. At the level of postgraduate education, a master's degree was introduced, and a doctoral Ph.D. The preparation of candidates and Doctor of Sciences by the former system ended in late 2010.

A new understanding of the role of universities by Kazakh politicians and their desire to motivate all actors of the innovation process to increase innovation activity is an important and timely decision for Kazakhstan, whose economy is characterized by a high presence of the raw material sector. None the less the creation of an innovation system and the adoption of new functions by universities is significantly different in Kazakhstan from Western countries.

Thus, in Western countries, and in particular in the United States, ties between universities and enterprises are historically quite strongly developed: universities, business and the state often conduct joint research, business structures are involved in the creation and modification of educational programs and professional development of students by providing internships. Similarly, Western economies are characterized by a sufficiently high demand for innovation, which forces businesses to turn to universities in search of innovations that would give them a competitive advantage. In Kazakhstan, ties between universities, business structures and the state are characterized as weak. In other words, Kazakhstan started to create an innovation system that involves the exchange of innovations between universities and business structures, before developing cooperation between universities and business in a more traditional sense: joint research, consultations between universities, business and the state. Such links between universities and business have not fully developed, despite the implementation of reforms and the creation of an innovation system that motivates all participants to cooperate and innovate.

Recommendations

There are several relevant for Kazakhstan directions of concentration of efforts of universities, state and business:

The first direction is the introduction of practice-oriented learning in the system of higher education. In this regard, an important step for the universities of Kazakhstan is the transformation from traditional universities to research ones and their transformation into real subjects of the knowledge-based economy. Domestic universities will have to implement new mechanisms for the intensive implementation of the results of scientific activity.

They should become centers for conducting advanced research commissioned by the state and enterprises, centers for the real integration of science and education within the walls of universities through the active involvement of teachers and students in research. In this direction, it is important to develop the integration of universities and business in the field of creation and implementation in the educational the process of joint educational programs for targeted training of specialists, the participation of employers in the educational process, the final certification of specialists, as well as in the field of integration, the creation of bases of practices and in-depth professional training of specialists with the passage of industrial practices on the basis of enterprises starting from the 1st year. There is a need for support and funding from the state, jointly with foreign partner universities, for dual, inclusive education and double degree programs. At the initiative of Kazakhstani universities, Councils of Employers are already being created, Concepts of continuous practical training are being introduced. annual forums of employers and job fairs are held, cooperation with the National Chamber of Entrepreneurs of the Republic of Kazakhstan and municipal Employment Centers is carried out. Such initiatives should be supported by the state, in their implementation integration of efforts and active participation is also needed city and regional enterprises.

As world experience shows, all the most successful developed countries are building high-tech industries on the basis of and with the active participation of leading universities. It is large high-tech areas with a core in the form of a research university that become points of growth for the innovation system. Business incubators, science and technology parks, research and development centers created at universities become a source of economic activity and international exchange. Of great importance is the real work of universities with world high-tech companies to create joint laboratories and centers. Leading Kazakh universities began to purposefully work in accordance with such world experience.

In addition, for the effective implementation of this direction, Kazakhstani universities need to:

- increase the involvement of employers in the process of personnel training: a target order for personnel training together with the industry;
- creation of a free and permanent database of practices for trained specialists at enterprises, starting from the 1st course;
- creation of educational programs focused on targeted training of personnel together with large enterprises;
- introduction of mechanisms for certification and attestation of personnel, a system of training and retraining of personnel using modern teaching technologies and leading foreign partner universities.

The second direction is the formation of mechanisms for joint targeted training of specialists for the needs of industrial and innovative development and regions. Currently, within the framework of industrial and innovative development in Kazakhstan, 10 basic universities have been identified to train professional personnel for key sectors of the economy. As part of the implementation of the state program of industrial and innovative development, measures are being taken to increase the volume of the state educational order for the training of personnel in the magistracy and PhD studies, as well as the number of educational programs together with leading foreign partner universities and research centers. This undoubtedly improves the quality of training and the degree of Kazakhstan's involvement in the global educational space.

The third direction is the creation of Startup and Spin off companies together with leading universities. Now Kazakhstani universities have a unique intellectual potential, a powerful scientific, laboratory and experimental base. Universities need to improve the efficiency of engineering laboratories and create high-tech areas of small innovative enterprises.

For effective integration of universities and business, creation of Startup and Spinoff companies, universities need to:

- Expand the autonomy status of national universities, transform into research universities;
- Introducing amendments to the legislation and granting universities with a special status the right to independently create and act as founders (participants) of other legal entities;
- In accordance with world practice, it is necessary to develop and adopt legislation on endowment funds and to exempt from tax all sponsorship amounts earmarked for science and education;
- Creation of a legislative framework for the commercialization of scientific products, development of services and commercialization of the results of scientific products. As world practice shows, recognized foreign universities are the driving force behind the successful development of their states and regions and become points of growth for the innovation system.

Remembering the country, we can accurately name its leading universities: for example: Oxford and Cambridge in the UK, Princeton and Stanford in the USA, Seoul University in Korea, Peking University in China and others (Lundvall, 2016). However, a comparison of such universities with the universities of Kazakhstan shows the lag and weak competitiveness of the latter. It is necessary to emphasize that Kazakhstani universities should have the same opportunities as foreign universities to enter the top rankings. It is known that in order to increase the competitiveness of education and enter the top 100 world universities in various countries, state strategies are being implemented to support universities, aimed at allocating significant financial resources: for example, in England, Korea, the USA, Japan and other countries (Gill et al., 2017).

In Kazakhstan, it is also necessary to develop a system of state support: Program to improve the competitiveness of universities of the Republic of Kazakhstan, which will allow the allocation of funds to solve the following tasks:

- creation and development of world-class universities in Kazakhstan, becoming one of the 100 leading universities in the world;
- increasing the competitiveness and attractiveness of Kazakhstani education;
- development of research centers on the basis of universities to accelerate the synchronization of science with the innovative development of the economy.

The implementation of all the above measures will allow universities to carry out effective educational and research activities, respond flexibly to the demand of the economy and be a real subject of economic relations, the driving force behind the development of regions.

CONCLUSIONS

Having considered the experience of foreign entrepreneurial universities, the author came to the following conclusions:

Stanford and MIT moved from research, fundamental to entrepreneurial universities, thanks to active state support;

In Kazakhstan, a number of steps have been taken over the past decade to stimulate innovation, create an

innovation infrastructure, encourage triangular cooperation and development entrepreneurial culture. Universities initiated the transition to a new type – entrepreneurial. Government initiatives have spurred the development of an innovation infrastructure, provided the legal basis for establishing bilateral cooperation between triple helix players, and facilitated the transition to entrepreneurial universities. The development of regional innovative clusters of economic growth and the promotion of triangular interaction between universities, industry and the state are the main components of the future strategic development of Kazakhstan.

There is everything necessary for the successful implementation of the "triple helix" concept: natural resources, the possibility of developing new industries, the availability of a good educational base, and a stable political environment.

In the context of the development of the "triple helix" association in Kazakhstan, interest in entrepreneurial universities is growing and is aimed at strengthening their innovative and entrepreneurial potential.

Engagement with the state should provide incentives for a dynamic transition to entrepreneurial universities and link research and innovation activities between the university and the business environment.

An important condition for the implementation of the "triple helix" for all entrepreneurial universities is the creation of a discussion platform for representatives of all participants in the model - universities, government and business, in order to develop a unified strategy for development and implementation. It is important to align the transition with Kazakhstan's long-term economic growth strategy in order to build the endogenous innovation capacity needed for the transition to a knowledge-based society. And, finally, to implement the concept into reality, given specifics of the chosen strategy.

REFERENCES

A. Sloan School of Management at the Massachusetts Institute of Technology. (2022). Web site. http://mitsloan.mit.edu/

Artemova, D.I. (2017). Issledovaniye predprinimatel'skoy aktivnosti v vuze kak faktora formirovaniya predprinimatel'skikh universitetov v Rossii. ***Kreativnaya ekonomika, 11***(5), 565-582.

Etzkowitz, H., & Leydesdorff, L. (1995). The Triple Helix of University Industry-Government Relations: A Laboratory for Knowledge Based Economic Development. ***EASST Review, 14***(1), 13.

Etzkowitz, H., & Zhou, C. (2017). Regional Innovation Initiator: The Entrepreneurial University in Various Triple Helix Models. Triple Helix VI Conference. Singapore. http://www.triplehelixconference.org/th/6/SingaporeConferenceThemePaper050107.pd f

Gill, D., Minshall, T., Pickering, C., & Rigby, B. (2017). ***Funding technology: lessons from America***. The University of Cambridge.

Krokhmal, L.A. (2016). Otsenka predprinimatel'skogo potentsiala universitetov. ***Dal'nevostochnyy agrarny yvestnik, 2***(38), 103-113.

Lukicheva, I. (2013). Reyting vuzov RK po biznes-obucheniyu. https://kapital.kz/economic/18160/rejting-vuzov-rk-po-biznes-obucheniyu.html

Lundvall, B.A. (2016). ***The Learning Economy and the Economics of Hope***. Anthem Press.

Mukasheva, Zh. (2021). Usileniye sotrudnichestva mezhdu universitetami iindustriei v Kazakhstane dlya razvitiya innovatciy: rol gosudarstva. https://www.soros.kz/wp-content/uploads/2021/03

Mutanov, G. (2015). ***Opyt i perspectivy integratciy obrazovaniya, naukiibiznesa v KazNU im.al-Farabi***. Transcript of the plenary session of the International Scientific and Practical Conference «Integration of Education, Science and Business as the Basis for the Innovative Development of the Country». Almaty.

Nurtayeva, D.K., & Nurmukhanova, G.J. (2020). Enterprise Universities and Innovations. ***National Economy Competetivness***, 172-181.

Roberts, E. B., & Eesley, C. E. (2011). Entrepreneurial Impact: The Role of MIT – An Updated Report. ***Foundations and Trends® in Entrepreneurship, 7***(1–2), 1–149.

Shulembayeva, R. (2017). Kazhdyy vuz mozhet stat' predprinimatel'skim. https://www.kazpravda.kz/fresh/view/kazhdii-vuz-mozhet-stat-predprinimatelskim

Smorodinskaya, N. (2011). Troynaya spiral' kak novaya matritsa ekonomicheskikh system. ***Innovatsii, 4***(150).

Suleymenova, F. (2014). Kak s pomoshch'yu universitetov aktivizirovat' sozdaniye novykh industry I razvitiye biznesov. Forbes, Po "troynoy spirali", 40. https://forbes.kz/process/education/po_troynoy_spirali/

The Kazakhstan Association of Entrepreneurial Education has been created. (2017). https://www.almau.edu.kz/news/sozdana_kazakhstanskaia_assotciatciia_predprinimatelskogo_obrazo-11789

Young, M.K. (2022). Industry, Academia, and Government Collaboration: A Game Changerfor U.S. Economic Future. https://www.uschamberfoundation.org/bhq/industry-academia-and-government-collaboration-game-changer-us-economic-future

Zaytsev, A.V., & Kraft, Y. (2012). Vliyanie globalizatsii I rol universitetov v formirovanii intellektualno-kreativnyh resursov obschestva. ***Russian Journal of Entrepreneurship, 2***, 139-146.

Olenev, A.A. (2013). Vliyanie regionalnogo vuza na sotcialno-ekonomichiskoe razvitie territoriy. ***Kreativnayaekonomika, 4***(76), 48-53.