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Predispositions for creation of biomedical cluster at al-Farabi Kazakh National University

Abstract

Predispositions for creation and development of the biomedical cluster on a transnational basis are based on a clear interaction between states, business-structures, science and education. Success of the cluster is seen to be dependent on the coordination of basic and applied research, creation of a unified scientific research and education infrastructure, mutual recognition in the field of science and education, implementation of joint initiatives in pioneering sectors, including such in medicine. Universities should become active subjects of transnational innovative scientific and educational clusters, since human resources are concentrated there and they are the intellectual centers of innovation. Creation of the biomedical cluster on a transnational basis was shown by the example of al-Farabi Kazakh National University (KazNU, Almaty, Kazakhstan).

Key words: transnational cluster, medical-biological cluster, innovations, innovation politics, university, education, transfer of technologies.

Introduction

In a context of the key documents concerning both science, and education in the Republic of Kazakhstan extremely important is an idea of cross-border and transnational clusters, which facilitates international cooperation not only with foreign universities and research centers, but also with financial and industrial groups. This will lead to development of productive scientific and educational ties through the increase of scientific contacts, exchanges, training, joint implementation of international projects and programs, innovative technologies and creation of competitive scientific and technical products [1].

In the framework of such transnational cluster, members will need to develop the skills of marketing research for the brilliant development and distribution of new products and services in accordance with the international requirements. In general, there are more opportunities (financial, managerial, and others) for building an entire process chain – from joint research and development to commercializa-

tion of products and services, including promotion on the market [2].

From this perspective, creation of transnational clusters is an important task, as the interaction of economic objects in the cluster gives an opportunity to enrich work skills and experiences to withstand competition, to offer new technologies and services for the international markets, as well as to solve the issues of internationalization of education. The success of transnational clusters is known to be dependent on many factors, among which are the following: 1) political factors – building up strong intergovernmental relations and participation in international organizations; 2) institutional factors – the presence of a common legal framework, creating favorable conditions for investment, ensuring equal access to inputs and markets for goods and services, reducing customs barriers and harmonizing technical standards and manufacturing regulations; 3) economic factors – the formation of a stable, positive and dynamic economic development in participating countries; steady GDP growth, high

demand for goods and services, labor force availability, favorable investment climate, preferential taxation for innovation, infrastructure development and improvement, and 4) technological factors – the availability of new technologies, legislation encouraging innovation and technology development, a large potential demand for technology and innovation, experience in cooperation and joint funding of research and development; 5) socio-cultural factors – human resources, formation of a standardized database, and augmentation of information exchange and shared core values. Analysis of the literature data shows us that potential for creation of transnational clusters is available in various sectors of the economy, that is, biomedicine, biotechnology, pharmaceuticals, metallurgy, chemical engineering, mechanical engineering, and information technology [3, 4]. Global experience has shown that the formation of transnational clusters in these areas requires the establishment of a strong interaction between states, businesses, science and education. It was found that success of the cluster depends on the coordination of basic and applied research, creation of a unified research and educational infrastructure in each state, the mutual recognition of documents in the sphere of science and education, and the implementation of joint initiatives in sectors of innovation.

Prerequisites for creation of transnational clusters in Kazakhstan

All of the above-mentioned prerequisites for creation of clusters on a transnational basis currently exist in the Republic of Kazakhstan. Recognition of Kazakhstan at the international level was proved by its chairmanship of the OSCE (in 2010). A stable domestic and foreign political situation in the country creates a favorable investment climate. In recent years, growth of the Kazakhstani economy has been remarkable. The gross domestic product (GDP) has increased 2.2 times higher than the 1990 level of 36.6 % in the past 10 years. In the period from 2007 to 2009, the GDP increased by 32.8 % and in 2012 alone the figure was 30 346 958.2 mln tenge or 203 520.6 mln U.S. dollars (USD) at the official exchange rate. In this period, the gross expenditure on research and development was 68 460.4 mln tenge [5]. However, it should be noted that the innovative development has not occurred at the same pace.

Actually, the share of innovative products in the GDP has declined in this period, from 1.19 to 0.49

%, but the innovative potential generated during that period under certain favorable conditions in the economy created the prerequisites for accelerated innovation. The cost of fixed assets for research and development increased from 18.8 to 22.0 billion tenge. The observed growth in Kazakhstan is mainly provided by the intensive development of non-renewable mineral resources. Unfortunately, over the past 10 years, the basic direction of Kazakhstani industry has continued to be raw materials. However, the experience of developed countries shows that the growth rate of GDP by 75-80 % is achieved at the expense of new knowledge embodied in engineering, technology, and organization of production.

It is becoming increasingly clear that Kazakhstan aims to pass the shortest period of transition from a sector of raw materials to a sector of innovative development in the economy and society. According to official statistics, the share of mineral products in total exports from Kazakhstan equal to 2.0%. World experience shows that such exports will not protect Kazakhstan from future potential global crisis. The way forward to the implementation of the strategy of innovative development is clustering on cross-border and transnational levels.

As noted above, the integration of science, education and industry is the backbone of innovation for the social and economic development of Kazakhstan and its competitiveness at the international level [6-8]. In this connection, KazNU, one of the oldest and largest universities in Kazakhstan, has created all the conditions for such a platform of interaction and innovation. In its 80 years of existence, this university has established strong academic schools, mostly, of course, thanks to the close cooperation between Russian and Kazakhstani scientists who developed and used the latest technology in the laboratories of their research institutes. They also developed conditions for supporting student business incubator in the structure of the industrial park and attracted investment for their implementation. In recent years, expanding international cooperation is noted not only with scientists from the CIS countries, but also with others from abroad. Such cooperation and collaboration is facilitated by the development of friendship and partnership between the two countries at the parliamentary and governmental as well as ministry, agency, and the business community levels. For example, during the years of independence, Kazakhstan has developed mutually favorable international relations with countries

in the Asia-Pacific region and, in particular, with South Korea [9]. Due to the rapid development of trade and economic relations between the two countries, there are now more than 300 joint ventures in Kazakhstan with Korea, financed by Korean capital. The total direct investment by South Korea in Kazakhstan's economy is 3.4 billion USD. During the last visit of the President of Kazakhstan to the Republic of Korea Lee Myung-bak, many agreements on economic, scientific and technical cooperation in the field of oil, gas and petrochemical industry, mechanical engineering, nuclear energy, uranium mining in the space sector, the development of transport and communications, health, and education were signed between the two countries. In particular, the two countries decided to create a transnational biomedical cluster and construct a medical center on the territory of KazNU campus. It is well known that the level of medical services in South Korea is very high and patients from around the world are seeking a highly skilled, but low-cost health care clinics in Korea. A well-acknowledged problem in Kazakhstan is the training of managers in the field of medicine; and, this problem can be possibly resolved by the creation and successful functioning of the biomedical cluster. In addition, in recent years very high quality scientific research and technological development could be seen at the universities in South Korea; this is not only in the field of information technology but also in the field of biomedicine.

International organizations, taking part in the creation of biomedical cluster

Creation of biomedical cluster on the territory of KazNU campus (Fig. 1) will contribute to the following strategic solutions – conclusion of memorandum of cooperation between KazNU and three renowned universities in South Korea, namely Seoul National University, Korean University and Yonsei University.

In the most recent world rankings of universities (QS Rankings), these institutions hold, respectively, 35th, 145th and 191st places.

Each of these universities has medical schools and colleges as well as university clinics and hospitals, equipped with high quality equipment, most of which are produced in Korea. In university laboratories innovative technologies are developed, which are used in practice and, especially in the treatment of patients in hospitals. As a result of multi-stage negotiations, agreements were also signed between KazNU and medical centers of the South Korean universities such as the University of Korea (with its Medical Center – KUMC) and Yonsei University (Gangnam Severance). KUMC, founded at the University of Korea in 1938, is known as a global medical organization, which currently provides services using the most advanced technologies and specializes in medical management. KUMC has research laboratories, three hospitals, a Faculty of Medicine and a Faculty of Health on its campus. Severance Hospitals have 125 years of history, and in 1983, the health system was established in the economic center of Gangnam. The Gangnam Severance Hospital complex has five clinics, two graduate institutions, and three academic institutions (Medical University, Institute of Dentistry, Institute for training nursing staff). The health care system at the University of Yonsei is recognized not only as a leading medical organization in the country, but also as an international medical organization. Thus, Gangnam Severance Hospital, the leader of the Korean Health International, has both the medical accreditation (JCI) and extensive experience in technology transfer and investment. The importance of the consent of the international institutions involved in the biomedical cluster on the territory of KazNU campus, is also in the fact that multi-Gangnam Severance Hospital has a well-developed computer network through which it can provide advice anywhere in the world, specifically in Kazakhstan. In addition, the above-mentioned clinics have extensive experience in designing medical facilities that provide comfortable and convenient services to the public, as well as a pleasant environmental in and around the clinics.

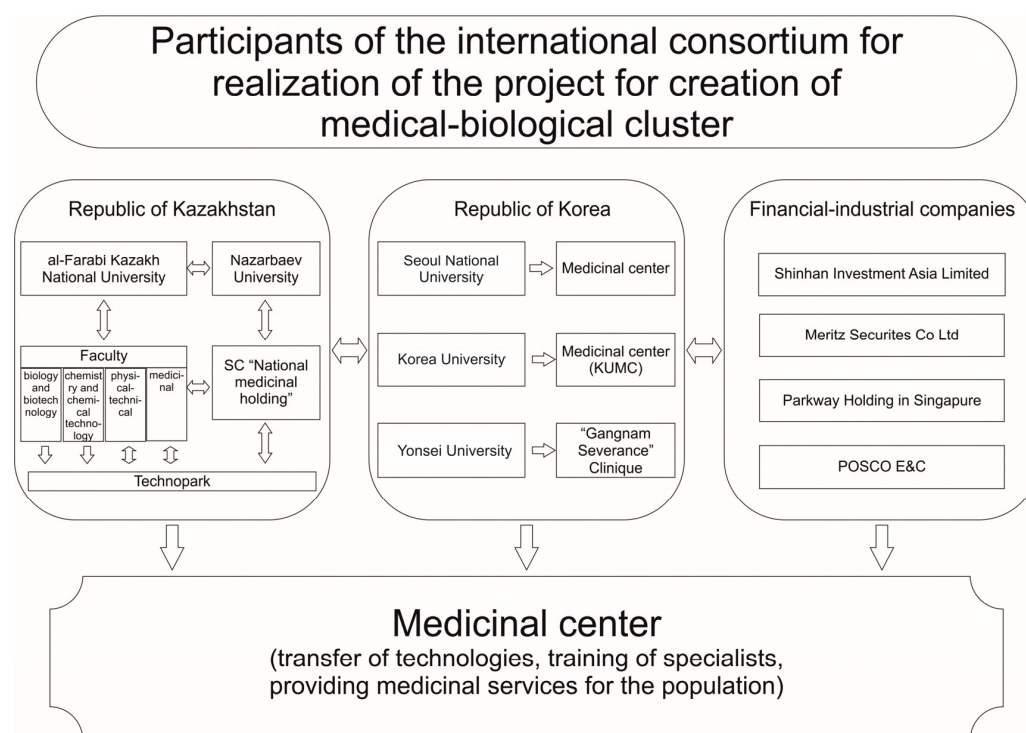


Figure 1 – Organizations participating in the biomedical cluster at al-Farabi KazNU

As noted above, these hospitals are part of the leading universities in Korea, where a high level of scientific and methodological preparation of medical staff and students provides opportunity for transferring their theoretical knowledge into practice in the specialized departments of the hospital. Korean scientists together with their students in well-equipped laboratories are developing cutting-edge technologies of diagnosis and treatment for patients.

Their best practices are widely communicated to the world, as evident from numerous publications in top-rated journals. In addition, the university has students not only from the Asia-Pacific region, but also from other continents of the world. These students, upon graduation and returning home, are applying the knowledge and skills they acquired to improve the state of public health in their own countries. Within the biomedical cluster, there is signed an agreement on training of Kazakh students as well. Moreover, the Korean side will conduct the first phase of development of this cluster training.

Creation of such a cluster is not possible without a favorable economic environment. The most im-

portant result of international agreements between the Government of Kazakhstan and South Korea, and other countries of the Asia-Pacific region is the decision to invest in the development of the biomedical cluster and the construction of a medical center at al-Farabi Kazakh National University. The project is estimated to cost 152 mln USD. Financial institutions in the project are financial companies of Kazakhstan, South Korea, Hong Kong and Singapore. For example, KHIDI (Korea Health Industry Development Institute) in the framework of this project will be implementing some sort of approval for export financing by the Korea Export-Import Bank. The Korean Export-Import Bank will partially fund the project, especially the purchase of medical equipment and construction Medical Complex. The main mechanism for the interaction of the financial companies involved in this project will be a public-private partnership concession. We hope that the law on the introduction of new types of public-private partnerships and expand their areas of application that is adopted in Kazakhstan in 2013 will be a reliable guarantor of the terms of the

agreement between the member organizations of the consortium [10].

Transnational component of the project also confirmed the participation of world famous South Korean company POSCO and its subsidiaries, which is ranked fourth in the world in steel production. Since 2006, this fund has been implementing a program that grants scholarships to the best students in Asian countries. KazNU is one of the first signatories to this Memorandum of Cooperation Fund and currently, more than 50 KazNU students are holders of scholarships from POSCO TJ Park Foundation. It has also expressed interest in the implementation of an important project – constructing and equipping a Medical Center as part of biomedical cluster. The Medical Center will be constructed over an area of 56 thousand square meters, and the structure will be a modern hospital with diagnostic and research laboratories. The necessary infrastructure for the center is planned on the territory of KazNU campus.

Basic traits of the biomedical cluster

Because the medical center will be located on KazNU campus, functioning of this complex will be linked with its educational activities.

KazNU is the flagship of higher education in the country, and it ranked first in the category of “multi-disciplinary universities” according to an independent evaluation of the Kazakhstan Agency for Quality Assurance in Education (IQAA) (published in the national newspaper “Kazakhstanskaya Pravda” (No. 220 – 221, 15.07.2011). Similarly, al-Farabi Kazakh National University is ranked 299th by the international agency QS World University Rankings in 2013.

Currently, the higher education institutions in Kazakhstan have about 620.442 students enrolled, of whom about 20 % are at medical institutions.

It is planned that the students of medical schools of Almaty will have opportunity to receive practical training, internship and residency at the Medical Center of biomedical cluster.

Thus, this project will contribute to the development of highly qualified specialists in the field of health care in the country.

Construction of the Medical Center will have an impact on the scope and quality of medical services to be provided in the city of Almaty and region.

According to the calculations, when the medical center attains its maximum capacity, it will provide treatment to about 23.699 patients in the inpatient

unit and 354,816 ambulatory patients of the clinical department; the number of beds in the city will be increased by 504, or about 5%.

Overall, during its maximum occupancy, the Medical Center will provide services to about 370 thousand people, representing about 7.5% of the total number of patients treated in Almaty. Clearly, the project will have a tremendous positive impact on the quality of health services provided in the city.

The successful implementation of the project will also employ more than 500 medical professionals. The project is planned to attract professionals of the highest quality to provide quality health services and acquire best medical equipment.

In addition, the planned annual attendance of the employees working at the complex in specialized courses to improve their skills, conduct research conferences, and do internships in foreign medical institutions will augment their level of expertise in their respective fields. They are all required to be able to perform complex surgical operations and diagnosis of rare diseases.

The improved quality of services will be possible not only by attracting highly qualified professionals, but also by introducing new methods of treatment and acquisition of modern medical equipment. In addition, the planned annual attendance of the employees working at the the complex in specialized courses to improve their skills, conduct research conferences, and do internships in foreign medical institutions will augment their level of expertise in their respective fields. Implementation of these projects will contribute to a decree issued by the President of the State Program “Salamatty Kazakhstan”, to which the funds will be allocated from the Republican budget [11].

Teachers and students of the universities located in Almaty will receive medical treatment at a facility that is equipped with cutting-edge medical knowledge and the best equipment that is available to medical science.

Those who are diagnosed at the center, if necessary, will be able to get treatment in South Korea in the clinic “Gangnam Severance” on favorable terms. Yonsei University will also participate in the program designed to train KazNU biomedical cluster personnel.

And, as the last, but not the least, patients will not need to travel long distances from their home to get quality health care because medical specialists of the complex will provide high-quality service

centers staffed and equipped with the latest telecommunication equipment.

Conclusion

Thus, KazNU has all the conditions and prerequisites for developing a biomedical cluster on a transnational basis, namely: memoranda and agreements on cooperation with international organizations and investors (universities, hospitals, research centers, funding agencies, etc.); effect laws that meet international requirements in the field of technology development and innovation, favorable investment climate and a favorable business environment; well-developed infrastructure (academic buildings, laboratories, technology parks, business incubators, start-up company) for education, research and innovation; highly qualified human resources; University scientists conducting world-class research, including in the field of biomedicine; conditions for development and transfer of innovative technologies; academic exchange programs for students and teachers between universities of cluster members; joint events, international conferences, and round tables; technical and economic documentation for the construction of the Medical Center; diagnostic center for students; highly qualified professionals in the labor market.

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