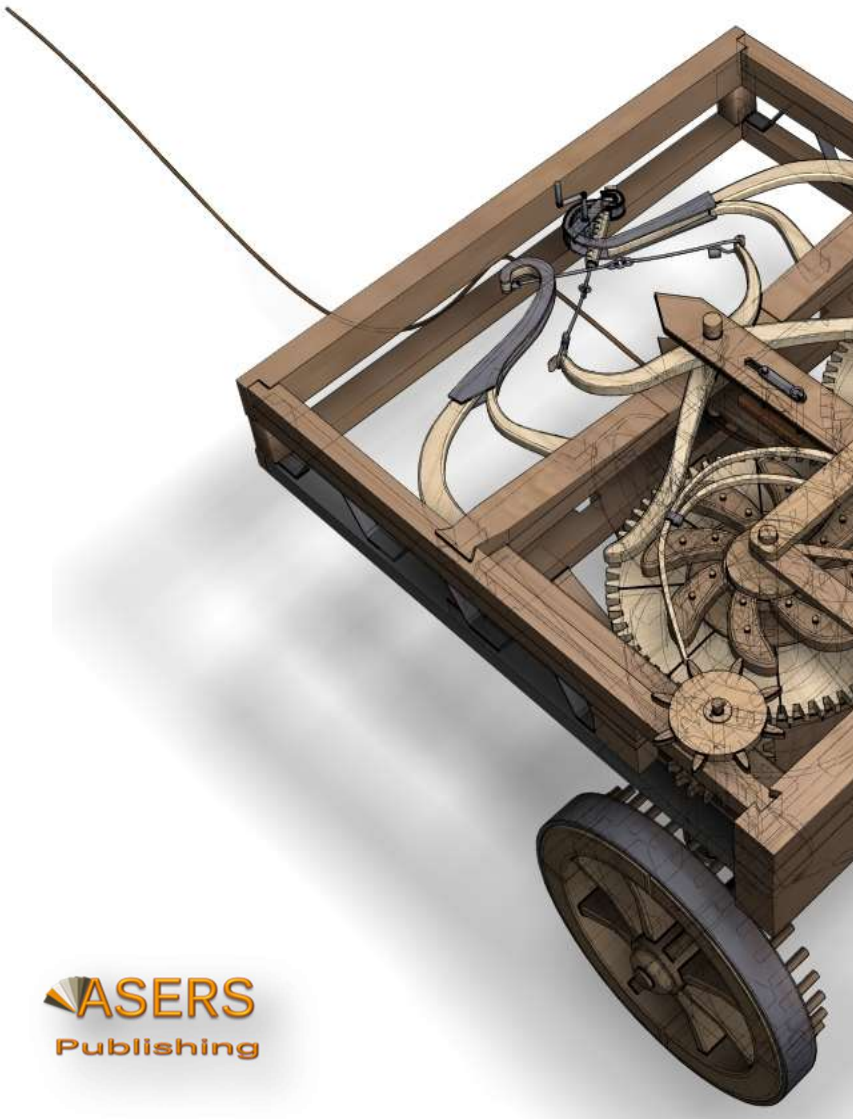
Theoretical and Practical Research in Economic Fields



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UNIVERSITY-BUSINESS COOPERATION AS A KEY FACTOR IN INNOVATIVE ECONOMIC DEVELOPMENT IN KAZAKHSTAN

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Abstract:

The aim of this article is to study the role of university-business cooperation in innovative economic development in Kazakhstan. It was considered some issues related to the creation of research universities, the development of innovative activities and university-business cooperation. The study revealed that the creation of the partnership between universities and technology parks is beneficial from an economic perspective. This interaction provides high-quality training for experts focused on innovation in priority areas of science, engineering, and technology development. Moreover, these integration structures are expected to have a significant impact on the socio-economic development of the region, specialized industries, and the higher education system. It was suggested a set of interacting organizational and economic components aimed at creating incentives and interests for investing in small innovative enterprises at research universities. The principal research method used in this study was a documentary analysis method. The state programmes and regulations of the Republic of Kazakhstan in the field of science, education and innovation were examined. International articles and monographs were reviewed, which were conducted based on the empirical research methods and statistical data. The results of empirical studies conducted by national scholars over the last few years were used as secondary data.

Keywords: university; business; cooperation; innovation; high-tech parks; Kazakhstan.

JEL Classification: I23; I28; K15; L30; L33; R11.

Introduction

In Kazakhstan's strategic and other key documents education is set as a top priority for national development. To date, the key task of education reforms in Kazakhstan is the adaptation of the

education system to the new socio-economic conditions (Smagulov *et al.* 2017). The important step was the adoption of the State Programme for the Development of Education of the Republic of Kazakhstan for 2020-2025, that focused on the development of human capital and the provision of opportunities for higher quality education (State Programme, 2019). In this regard, government aims to create research universities that can provide the national economy with qualified employees and facilitate implementation of innovative ideas in real economic sectors. The experience of world-class universities has clearly shown that modern research universities can establish mutually beneficial cooperation with businesses and industrial companies. Small and large high-tech companies, technology parks and business centres are set up in research universities. Cooperation between universities and businesses promotes innovation and the knowledge society by transferring knowledge and technology (Orazbayeva and Plewa 2020). The purpose of this article is to study the role of university-business cooperation in innovative economic development in Kazakhstan. In particular, some issues related to the creation of research universities, the development of innovative activities and university-business cooperation will be addressed below. This topic has relevance for discussions among researchers, that will be considered in the literature review chapter.

1. Literature Review

Innovation and higher education are now widely recognized as key drivers of economic development and competitiveness for national economies (Lo and Tang 2020; Thomas and Paul 2019). Studies from different parts of the world indicate the growing importance of university-business collaboration. For instance, Wedekind and Mutereko (2016) have examined the longstanding partnership between the pulp and paper industry and the technology university in South Africa and stated that the benefits of this partnership expressed in targeted training of skilled workers and high employment rates for graduates. Hou *et al.* (2021) have analysed the efficiency of university-industry collaboration of 71 Chinese leading universities and found that the efficiency of such collaboration varies depending on university's characteristics, governmental funding of the research and regional economic status. An international review of seven case study countries (Canada, France, Israel, Japan, Singapore, South Korea, and the United Kingdom) by Dollinger et al. (2018) shows the differences between university-industry collaboration in different contexts. The authors have conducted national-level international comparison through three dimensions – environmental, technical, and managerial, and stressed the importance of transparent intellectual property rights and policies and multi-disciplinary programs in advancing university-industry collaboration.

Siegel (2010, 57) explores university motivations for participation in a network that includes business organizations and highlighted that "the restructuring of higher education organizations to better address contemporary challenges and opportunities may involve a "radical" reconfiguration in the form of interorganizational relationships that effectively create a new interstitial form". The most effective form of integration of science, education and production in developed countries is science and technology parks (Malairaja and Zawdie 2008; Poonjan and Tanner 2020). On the other hand, universities and industry often face problems and impediments in engaging with each other (Azman *et al.* 2019; Dollinger *et al.* 2018). The findings of the study by Azman *et al.* (2019) have revealed that in Malaysia university-industry collaboration experiences six primary barriers, including organisational cultural differences, differing priorities and perspectives, lack of clearly defined organisational policies and strategies, lack of reputation and expertise, lack of trust and issues of intellectual property rights. Nevertheless, Muscio and Vallanti (2014, 426) analyzed obstacles in university-industry collaboration in Italy and pointed out that "the effect of perceived obstacles on the intensity of collaboration is less clear-cut. This apparently surprising result can be interpreted as evidence that even if academic researchers recognize that there are barriers to collaborating with firms, these obstacles do not matter once the department has accumulated collaboration experience with industry".

To sum up, the literature reviewed provides evidence that partnerships between universities and industrial enterprises have overall positive impact on all players (Thune 2011; Wedekind and Mutereko

2016). Studies have indicated that companies with university links tend to perform better than comparable companies without such links while universities that established partnerships with industry have better scientific performance (Garcia *et al.* 2020; Malairaja and Zawdie 2008).

2. Methodology

The principal research method used in this study was a documentary analysis method. The state programmes and regulations of the Republic of Kazakhstan in the field of science, education and innovation were examined. Furthermore, international articles and monographs were reviewed, which were conducted based on the empirical research methods and statistical data. The results of empirical studies conducted by national scholars over the last few years were used as secondary data. The materials gathered were analysed using the content analysis method. Content analysis results have been reflected in charts to improve visibility. International experience in the development of research universities has been studied using a comparative historical research method.

3. Findings and Discussion

Research universities

It is worth noting that in Kazakhstan's universities, research has never been their competitive advantage. Since the existence of the USSR, universities have primarily been a place of study, but not for conducting scientific research (Sarinzhipov 2013). The latter function has been assigned to the state academies system. A characteristic feature of university research was its indirect connection with the educational process. In the 1990s, the number of universities increased, but the number of staff engaged in research and development, especially in the scientific departments of universities, was declining. During the first years of the independence of Kazakhstan in 1990s, science remained poorly integrated into the new economy and its tasks did not always coincide with the needs of the development of society (Amandykova *et al.* 2016). Moreover, science was artificially distanced from the higher education system, which fundamentally contradicted the modern experience of developed countries. Therefore, it was necessary to improve the research potential of universities and to strengthen collaboration with external stakeholders, that is, to establish national research universities.

Research universities have characteristics that are easily formalized by a number of parameters and that other universities may focus on. In addition, they are characterized by informal features (prestige, the presence of leaders, a management system that stimulates constant development) (Mammadov and Aypay 2020). In this regard, the formation of a research university is a lengthy process that results from the interplay of several factors. It should also be borne in mind that most foreign research universities have land and real estate at their disposal, so they are largely financially independent (Piqué *et al.* 2020). Other authors suggest that in order to create modern research universities, they need a large piece of land that they own and that facilitates the cooperation with high-tech companies (Altynbassov *et al.* 2021). For example, the Stanford University campus was built on a city site of 8,180 acres (33.1 square kilometres or 3,310 acres) on a farm in Palo Alto. For comparison: the largest campus of the University of Kazgugrad in Kazakhstan is located on 90 hectares, which is 36 times smaller than the area of Stanford University. Stanford University is located in the U.S., approximately 60 km southeast of San Francisco. Although more than one hundred and thirty years have passed since the opening of Stanford University, the area of land owned by the university has not decreased by more than one meter and remained the same - 8 180 acres. It is known that Silicon Valley was established on the ground at Stanford University, where Stanford Industrial Park is located with world-class offices. Eastman Kodak, General Electric, Hewlett-Packard and other large companies are located on campus, among others. The property is owned by the Stanford University campus and is leased by local shopping malls, high schools, and other organizations. That is, the entire proceeds of the land lease will go to the endowment fund of the university. Today, Stanford University has endowment fund with $28.9 billion, with $6.6 billion in annual expenditures (Stanford University Endowment fund, 2021). The total number of students at the

university is 18 thousand, with a teaching staff of about 2.3 thousand. This figure means that the university has a very high financial capacity.

The policy of assigning universities the category of "national research university" implemented in Russia is based on the concept of strengthening existing universities through temporary additional budget injections, rather than the permanent cultivation of research universities (Arutyunov 2018). Of course, such an approach has the right to exist. However, in order to achieve the parameters specific to the world's research universities, in addition to funding, it would be necessary to create conditions which regulate the work of universities. This includes opportunities for attracting foreign teachers and students, campus construction, etc. On the other hand, we think there is another approach that might be more effective. With this approach, the state provides favorable conditions for the work of any universities, including for the development of research while universities on a competitive basis will apply for budget funding for research projects. In other words, universities will receive extra funding, according to their potential. As a result, an "elite" group will gradually form from the general mass of universities, which will be a natural result of development in conditions of competition and equal opportunities.

In the context of Kazakhstan, research universities will develop according to special target programs approved by the government and will also support high-level research activities and use its results in practice. A university of such model - Nazarbayev University - becomes not only a university with training at the level of world standards, but also an international research center (Tengelbay *et al.* 2021). Such a university is focused on the synthesis of three important components: education, science, and innovation. In this regard, the government is carrying out a large-scale reform of public universities, changing their organizational and legal status. According to the State Programme on Education for 2016-2019 was launched which argues for the creation of non-profit joint-stock companies with 100% state participation based on state and national universities (State Programme 2016). Therefore, relevant amendments were introduced to the Civil Code and Law on Non-profit organizations to state that "joint-stock companies may be established in the form of non-profit organizations". Currently, the 25 public universities have been converted into joint stock companies with a corporate governance system that allows them to operate as businesses and attract external funding (Altynbassov *et al.* 2020). There is an expectation that public universities will be more flexible in implementing and commercializing their innovative ideas.

University-business cooperation

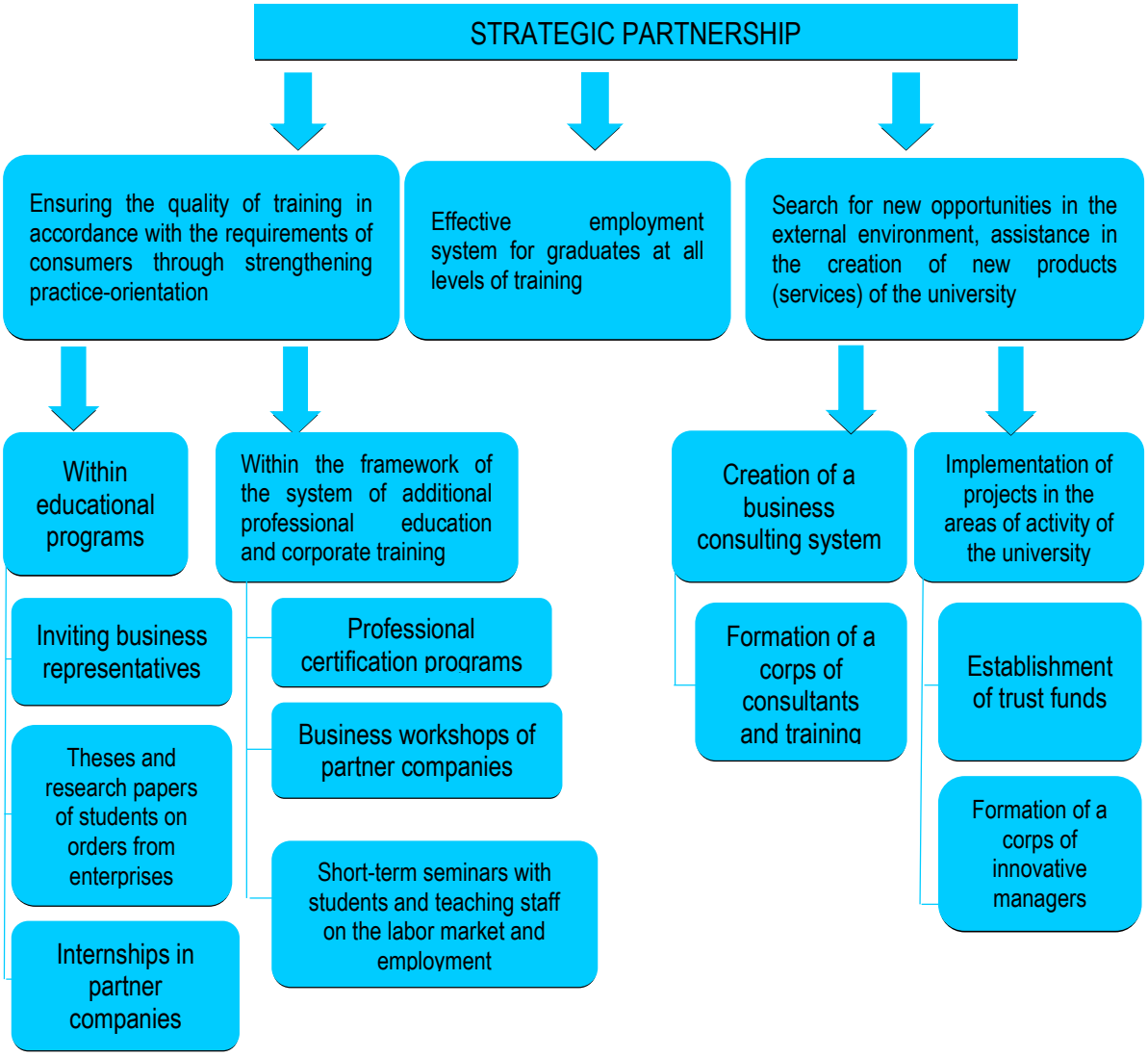
The efficiency of the national innovation system, which ensures a greater competitiveness of the economy, is directly related to the creation of favorable conditions for the development of high-tech small and medium-sized enterprises, increasing the scientific and engineering potential of the country. At the same time, within the context of globalization of the world economy, Kazakhstan faces a number of challenges, one of which is the lack of an efficient link between science and production and the lack of funding for research. It is obvious that the path towards innovation and technological modernization of the Kazakhstan's economy requires both the training of staff with new skills and the formation of a powerful source of innovative ideas and technologies in the higher education system. This means that to strengthen the competitiveness of the economy, it is necessary to accelerate the processes of integration of science, education, and production, to involve the results of intellectual activity into economic turnover.

According to the Law "On Science" (2011), in the future, science, innovation and educational activities will become the main activities of universities. To date, the scientific community has come to understand the need to combine the efforts of higher education, science, and entrepreneurship. The state considers higher education as the most important tool for the implementation of regional economic strategies and a supplier of new ideas and knowledge for the development of the economy (Iskakova *et al.* 2021). Without a strategic partnership with the business environment, these objectives are not achievable. According to Orazbayeva and Plewa (2020, 1), university-business cooperation

"encompasses a wide range of collaborative activities related to research and teaching, valorisation and governance, while the term 'business' solely used for simplicity, with the sense that it can embrace a variety of organisations and institutions that might benefit from engaging with universities and that are not themselves research organisations, including for-profit and non-profit firms, governments, and associations, to name a few". When developing relationships with business environment, the university should take the position of an equal and strong partner with significant resources. It seems that the partnership should be considered much broader than the relationship in the "client-supplier" system, in which the university is a supplier, and the company is a consumer of qualified personnel (van der Walt *et al.* 2011). The most reasonable interaction scenario should be based on the formula "university plus enterprise equals new enterprise". For the university, this approach offers the opportunity to develop new popular products and services. If we compare the general tone of the positions of the business community and the university, we can observe a relatively high degree of business passivity. The position of modern enterprises is more consumer-oriented, expecting certain advantages of the university and being reluctant to invest their efforts in the overall result.

Perhaps it is because of the lack of interest on the part of companies in establishing partnerships with the university in general. After all, the managers of national companies do not see the specific direct and "fast" benefits of this partnership, which they will be able to receive in the foreseeable future. Managers and business owners, recognizing the need to focus their interests on quick benefits, account for this lack of predictability in the economy.

Figure 1. Activities of the university to develop partnership with enterprises



Unfortunately, we have to state the fact that today in the triad "university-science-business" potential partners do not have a conscious common goal that would be attractive to each of the parties. It is logical to assume that this situation is due to the current situation in the economy, as well as the peculiarities of the regional business environment, among which the following seem significant:

1) poorly expressed innovative nature of the national economy, insufficiently developed production sector;

2) the absence, in most cases, of long-term business strategies, especially with regard to business development in the region;

3) a small proportion of large companies that may act as serious business clients for the university and have the prospect of establishing long-term stable relationships;

4) the absence in some regions of the largest "city-forming" enterprises and industries, the dynamics of development and the nature of production would allow them to act as major customers of targeted training and research;

5) the presence of certain nuances of the consumer position on the part of universities, which prefer to regard the business environment not as partners, but as sponsors.

The proposed structure of the university's activities to develop partnership with the business environment is presented in Figure 1. When selecting the forms of cooperation of a particular university, the primary focus must be on sectoral and regional needs. The problem of the orientation of educational programs to the formation of applied skills can be solved primarily through the mechanism of participation of enterprise specialists in the educational process, the organization of internships for students in partner companies, as well as the implementation of project and research work by students on the orders of enterprises.

The purpose of inviting representatives of the business (practitioners, entrepreneurs) is their participation in the educational process and correction of classes from a purely theoretical direction to a theoretical and applied approach. On the one hand, it widens the university's links in the external environment, and on the other hand, it raises the prestige of the educational institution, has a positive effect on the employment of its graduates and on attracting students. At the same time, such an approach promotes the cooperation of the teaching staff with practitioners. At the same time, participants in the innovation system can include: higher educational institution; specialized public authorities; innovative companies - partners; elements of supporting innovation infrastructure (business incubators, technology parks, etc.); financial structures, including business angels, seed, venture funds.

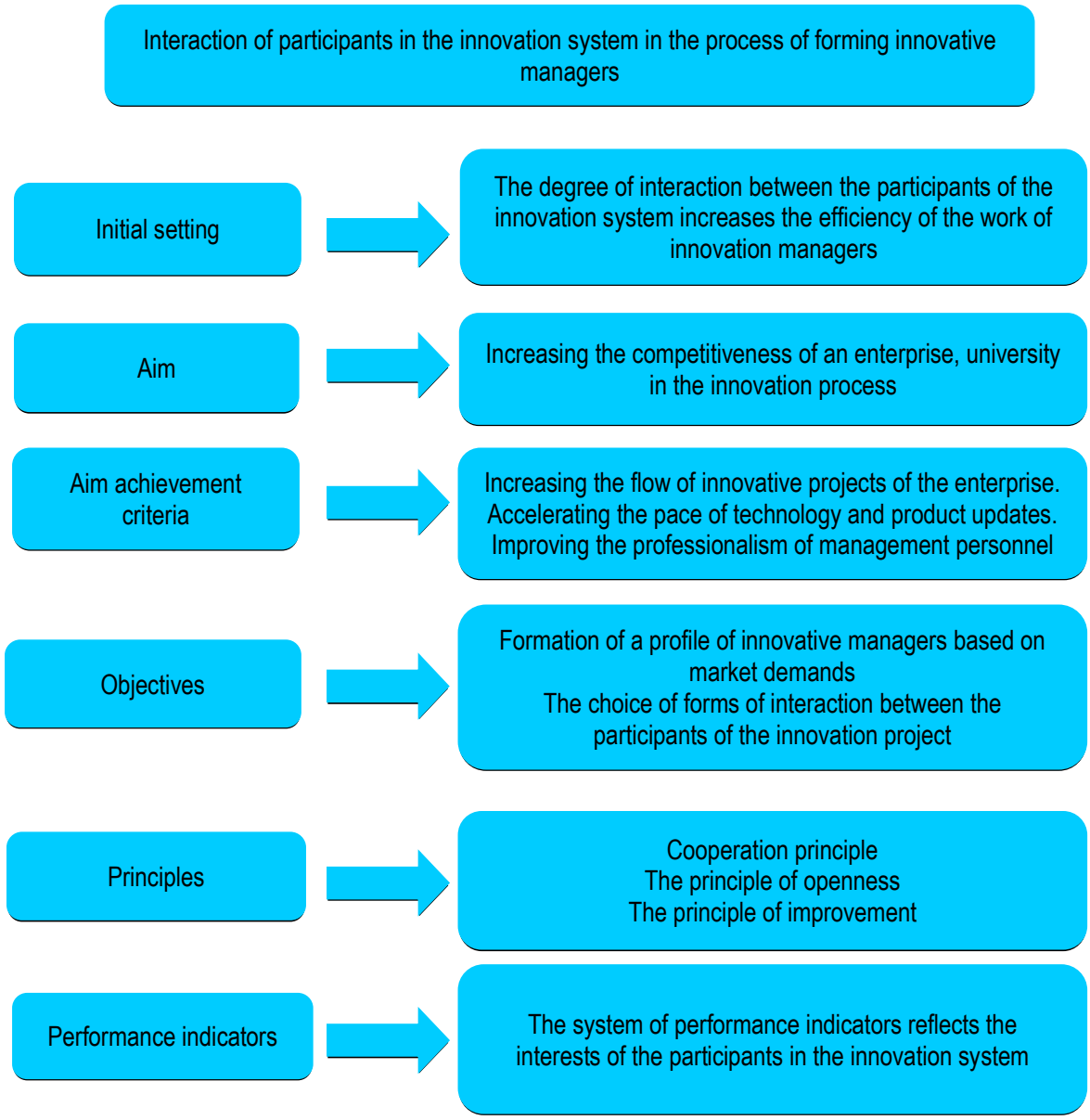
As the experience of developed countries shows, in the conditions of modern dynamic competition, only professionally trained managers can ensure the successful transformation of scientific and technical developments into an innovative product (Xiao *et al.* 2020). It should be noted that Kazakhstani universities work according to the industrial model of education, which assumes that professional subject teachers work with students and during their studies they study a certain number of academic disciplines. During such training, students' knowledge is repeatedly transformed, distorted and outdated, which makes their application in real life problematic.

In addition, the current education system has some issues: the non-conformity of most programs with the principles of an effective educational model; lack or restricted application of the competency-based approach; lack of innovative infrastructure of the educational process (business parks of projects, business incubators, technology parks); lack of programs with the possibility of a budgetary basis of training. Hence, it becomes obvious the need to bridge the gap between the theoretical knowledge of students and their skills in the organization, the need to implement collective and individual empirical research projects in the field of innovation management and venture business. All this is evidence of the need to modify the forms, teaching methods and management of education systems.

Obviously, the interaction of participants in the innovation system is mutually beneficial: the university receives platforms where students develop professional skills and leave the higher

education institution more prepared; the partner enterprise, attracting young managers to its innovative projects at the stage of their training, receives young, qualified personnel; business incubator – new ideas, projects, as well as potential employees for resident companies (OECD, 2019). The effective functioning of the proposed model, the project-based teaching method based on the principle of "doing - knowing" and allowing to minimize the gap between the theoretical and practical knowledge of students is appropriate, which makes it possible to bring training closer to the needs of employers. The effectiveness of an innovative company's operation is largely dependent on the number of innovative projects successfully implemented. Experts believe that the training system for innovation management specialists does not meet the needs of the market. In this regard, it appears necessary to examine in detail the issues of improving the training of management staff for the implementation of innovative activities. Leadership is also considered as a key element in the successful functioning and transformation of higher education institutions and enterprises as well as effective leadership can bring change to an organisation through improvement and innovation (Bayanbayeva & Altynbassov 2020).

Figure 2. Model of interaction of participants in the innovation system



Innovation environment within the local context

A review of the economic literature shows that in the definition of the concept of the "innovative environment of the enterprise" there is no clearly formed opinion. Some authors define the innovative environment as a set of innovative enterprises, innovative infrastructure objects, institutions and mechanisms that offer favourable conditions for the implementation of innovations. Others believe that the innovative environment consists of the innovation potential of the company and the innovation climate of the external environment, which interact closely and complement one another (Illiashenko *et al.* 2018). The innovative environment of the organization (enterprise) is considered as a set of elements of the internal and external environment, the interaction of which forms the process of the emergence of innovations. This allows to evaluate the quality of interaction according to the criteria for the effectiveness of creating, implementing, and promoting new products, and organizational, process or marketing changes carried out by the organization. In this regard, the innovative environment of the enterprise should be understood as a system of internal, regional, sectoral, and national institutions involved in the innovative process.

At the same time, the following tools should be used in the training of innovative managers:

1. A combination of practical work and theoretical knowledge. Training should be based on the correlation between educational and practical elements, which can be obtained through business cooperation with educational institutions. The practical component is integrated into the educational process to ensure that work on an innovative project continues throughout the training period. This allows students to acquire practical skills, and the partner company to form a low-budget innovation team.

2. Teamwork. In theoretical classes and during the implementation of projects, it is necessary to apply team forms of work. In theoretical classes, this happens mainly in the format of business games and trainings. Working on the project, students either become team members or are project managers and themselves form a project team. In addition, the university becomes a platform for conducting field schools, seminars with the participation of employees of the enterprise.

3. Work with mentors. The mentors are employees of the partner enterprise, representatives of interested innovative structures (venture funds, business incubators) (Cencič 2020).

When analyzing the factors of the external innovative environment, the issue of the aggregation of influencing factors is important. Aggregated and measurable factors should be understood as: provision of innovative activity with specialized equipment, materials, tools and raw materials; availability of external sources of financing and the magnitude of innovative financial risks; the level of development of the elements of the supporting infrastructure: business incubators, technology parks, business associations, technology transfer agencies; readiness of potential consumers to purchase innovative products of the enterprise; the presence of competitors in the relevant market segment for the dedicated innovative product; the degree of training and qualification of scientific, technical and managerial personnel.

In the real sector of the economy of Kazakhstan, despite the huge resource potential of raw materials industries, the possibilities of increasing production due to extensive factors have been largely exhausted. As part of the entry into a new technological order for Kazakhstan, an outstanding opportunity for accelerated development, as well as modernization of industries such as the electronic, nuclear, electrical industry, opens up. To this end, the country has a number of relevant so-called auxiliary elements in the form of human resources, as well as a significant scientific and technical base.

It should be noted that abroad small innovative enterprises at universities have been successfully operating since the middle of the last century. This process is most successful, for example, at universities in Germany, Sweden and the United States. For instance, German universities establish their own centres to support small business. Four major German research organizations – the Max Planck Society, the Fraunhofer Society, the Leibniz Society and the Helmholtz Society – have respective units that support scientists in the implementation of scientific results at

universities and research institutes (Isabekov and Mukhambetova 2017). The services provided by universities include advising and helping to set up an innovative company and preparing a business plan. Currently, approximately 300 technology innovation centers provide support to start-up entrepreneurs focused on creating technological innovation firms research and educational institutions (Isabekov and Mukhambetova 2017). Preference is given to works in the field of information and communication, optical and laser technologies, materials science, biotechnology, and medical technology, as well as energy-saving technologies and environmental protection.

Small innovative enterprises at universities can apply for support to the HTGF (High-Tech Grunderfonds), which was created for the founders of enterprises working in the field of high technologies. The fund, created by the Federal Ministry of Economics and Technology of Germany, invests venture capital in young enterprises.

Sweden implements a model that combines the freedom of universities in the commercialization of the results of intellectual activity created by them with tools aimed at obtaining the state's return on the created developments. Forms of cooperation between universities and business can be different: the creation of special units in universities engaged in the commercialization of research results; establishment of special consulting organizations and forums for cooperation with external market participants; creation of specialized units advising on economic and legal issues; establishment of holding companies whose main tasks include the ownership, disposal and management of shares in companies whose purpose is to facilitate the commercial dissemination of research results at the relevant university. To date, the Government of Sweden has established 14 companies at universities (Isabekov and Mukhambetova 2017).

Another form of cooperation between business, government and universities is centers of expertise, which act as a link in the framework of cooperation between several research groups from the university and several partners from the industry. The main task of the Center of Expertise is to contribute to the conduct of problem-oriented interdisciplinary research, as well as the transformation of new knowledge and competencies into new products, processes and services. In addition, in Sweden, transfer technology centers are being created at universities, the main task of which is to assist in drawing up a business plan, expertise innovative projects, and provide consultants for the entire period of formation of a small innovative enterprise.

In the United States, the principle of functioning of small innovative enterprises at universities is a triad: from fundamental university knowledge through national laboratories to the commercialization of technologies. At leading universities, large national laboratories are founded, around which the so-called belt of small and medium-sized enterprises operates. Universities supply innovative projects to private laboratories and industrial enterprises. It should be noted that a large number of scientific discoveries and inventions are made in small innovative enterprises at universities. At the same time, the authors of scientific discoveries and inventions were often the founders of small innovative enterprises and acted as entrepreneurs.

In our opinion, the use of the experience of foreign countries in local context is possible with a certain adaptation of the models of functioning of small innovative enterprises at local universities:

1. Creation of centers of expertise of innovative projects on the basis of universities to identify the relevance of the idea at the earliest stage, which will significantly reduce the share of inefficient and unpayable projects.

2. Establishment of transfer technology centers at universities of Kazakhstan with a wider range of opportunities: assistance in establishing contact with partner enterprises, assistance in finding personnel, formation, and maintenance of a client base at the earliest stage of development of a small innovative enterprise.

3. Organization of holding companies at universities. The establishment of this structure at universities will help to streamline and coordinate the activities of smaller units at universities that support small innovative enterprises (Son *et al*. 2022).

4. Application of the US experience in creating large university research laboratories, through which communication is carried out in the chain "University - small innovative enterprise" (Zakirova 2020).

However, when creating small innovative enterprises at universities, a number of problems may arise, the solutions to which should be foreseen in advance. In particular, renting of premises and scientific equipment may become a problematic issue. It seems that the creators of a small innovative enterprise should be exempt from paying rent for the premises used during the first two years of their activity. Payment of rent in subsequent years can be carried out according to the following scheme: the 3rd year - 10% of the commercial value, the 4th year - 20%, the 5th year - 30% (Isabekov and Mukhambetova 2017).

At the same time, questions could arise when budget organizations issue patents for inventions and other results of intellectual activity. It is advisable to take into account the experience of developing the commercialization of technologies abroad, where the assignment of intellectual property rights to developer organizations is essential in the development of a mechanism for introducing into economic circulation the results of scientific and technical activities and intellectual property objects created at the expense of public funds is.

In innovative small businesses, a staff problem can become relevant. The emergence of the problem is predetermined by such factors as: lack of personnel, low professional quality of the young intelligentsia, lack of opportunities for young people to realize creative abilities in conditions of financial deficit, unwillingness of the younger generation to connect their lives with science. There is therefore another problem - the interest of students in research at the initial stages of education. It is necessary, in our opinion, to invest in updating the renewal of research and library collections, Internet equipment for workshops, educational, experimental, and scientific work, as well as to maintain cooperative ties with scientific institutions on the basis of which training can be conducted.

Perhaps a major problem is the lack of financial support and the lack of real financial and lending mechanisms to provide such support. Small innovative enterprises in universities with high intellectual potential may not have an expensive material and technical base for prototyping. In this case, it is necessary to intensively attract sources of external financing of small innovative enterprises to universities, by developing modifications, venture financing schemes for innovative projects, a business angel network, encouraging the participation of innovative enterprises at universities in international projects.

Innovative model of universities

Current state policy in higher education of Kazakhstan puts forward one of the predominant forms of arrangement of higher educational institutions the so-called innovative model of universities. Universities should become educational organizations of the entrepreneurial type, whose main objective is to increase their competitiveness in relevant segments of the national economy. In turn, the development of entrepreneurial universities has also significant technological, managerial, and organisational implications for the economy (Forliano *et al.* 2021). The activities of universities should be restructured in the direction of their commercialization and the creation on their basis of innovative competitive business structures that interact with employer enterprises and strategic partners of universities in educational, research, development, and production activities.

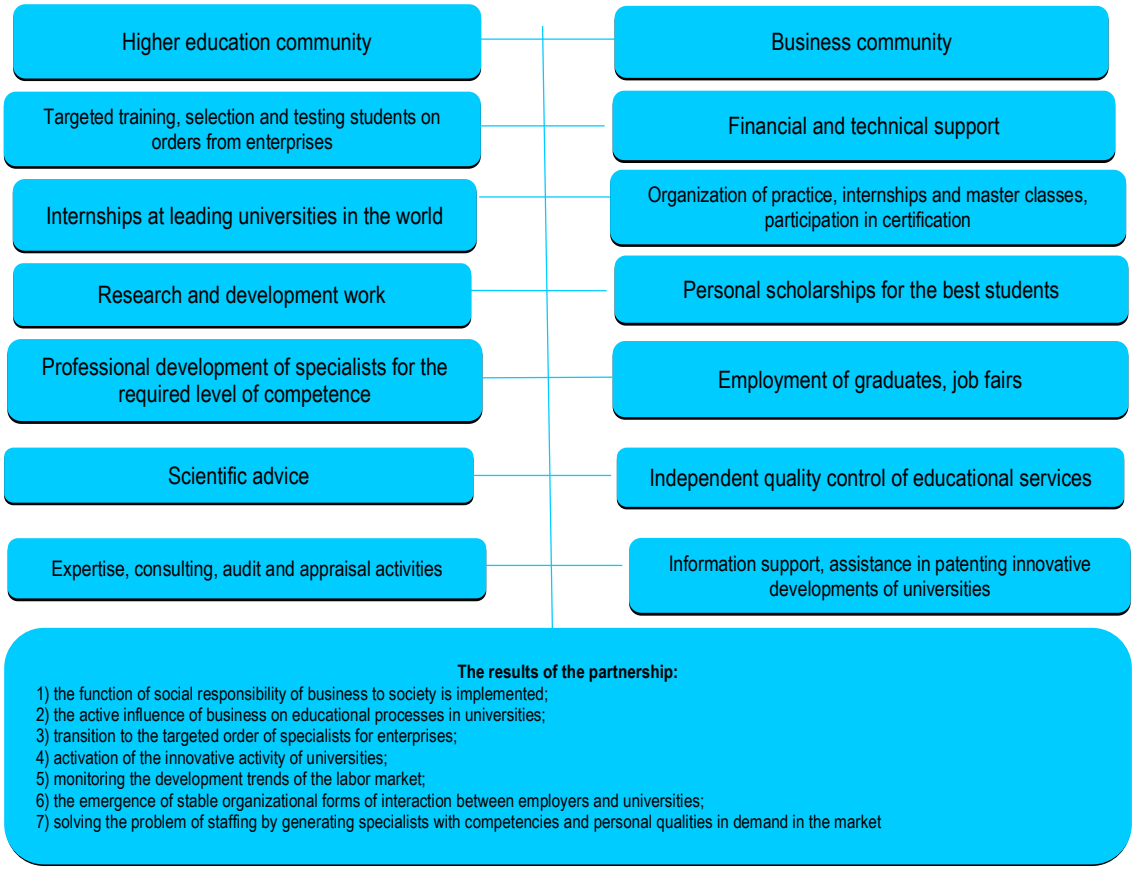
The creation of higher educational institutions of an innovative model is possible when combining their activities in the scientific and technical sphere with a technopark (Baldyniuk *et al.* 2021). The technopark will create an environment in which the main links of the innovation cycle of creating innovations can be implemented in practice. In other words, the technopark serves as a structure that combines scientific research, innovation, and the market of innovations in the scientific and technical sphere. The partnership of universities with technology parks is beneficial from an economic perspective and achieves a dual goal. On the one hand, such interaction provides high-quality training of innovation-oriented specialists in priority areas of development of science,

engineering, and technology on the basis of a single process of obtaining, disseminating and applying new knowledge. On the other hand, such integration structures should have a significant impact on the socio-economic development of the region, specialized industries, and the system of higher professional education. Based on the experience of technoparks at universities in the United States and Great Britain, researchers have concluded that the creation of technoparks at universities in Kazakhstan can really strengthen the university's partnership with industry and business (Altynbassov *et al.* 2021). In addition, there is a real possibility of setting up university campuses in the southern regions of Kazakhstan. The geographic and climatic situation of the region and the proximity of countries with high population density have a positive impact on the development of this project. In addition, the growth of population and economic in certain parts of the country can positively affect the development of the tourism industry in this region (Altaibayeva *et al.* 2020).

To develop effective solutions for managing the activities of integration structures, it is necessary to develop methods for optimizing the interaction of the technopark and the university. At the same time, the degree of effectiveness of their activities should be determined based on a system of indicators. Rating criteria can act as a system of indicators. Rating criteria for assessing the activities of technology parks and universities will contribute to the fact that technoparks together with universities will achieve maximum performance in the rating. The technopark structure in this case acts as a link between higher professional education and industry. From an economic perspective, the integration of science, business and higher education is an accumulation of resources for the development of the knowledge economy. Structurally, tripartite integration is the formation of educational, scientific and production complexes as centers of innovation.

According to Figure 3, the interaction between higher education and the business community is a kind of innovative, but at the same time mutually beneficial process for the Kazakhstan's economy.

Figure 3. Effectiveness of social partnership of higher education and entrepreneurship



The figure shows the contribution of higher education and entrepreneurship to bridging the gap between scientific, educational and production complexes in order to increase the economic efficiency of production.

At the same time, higher educational institutions of Kazakhstan can use various integration options:

1) creation of the "University - Enterprise" system for the training of specialists in accordance with the needs of the regional labor market;

2) the university complex, which implements the model of continuing education. At the same time, two development options are possible: the first is the inclusion in the university complex of not only postgraduate, but also pre-university training, the second is the inclusion in the university complex of only postgraduate vocational training and retraining;

3) creation of innovative educational, scientific and production complexes capable of actively influencing the economic policy of the region;

4) formation of an innovative scientific and educational complex, organically embedded in the international scientific and educational space;

5) creation of a multidisciplinary network research university complex for the development of new scientific areas and training of unique specialists.

Figure 4. The mechanism of interaction of higher education institutions with partners in the framework of the integration of science, education, and production

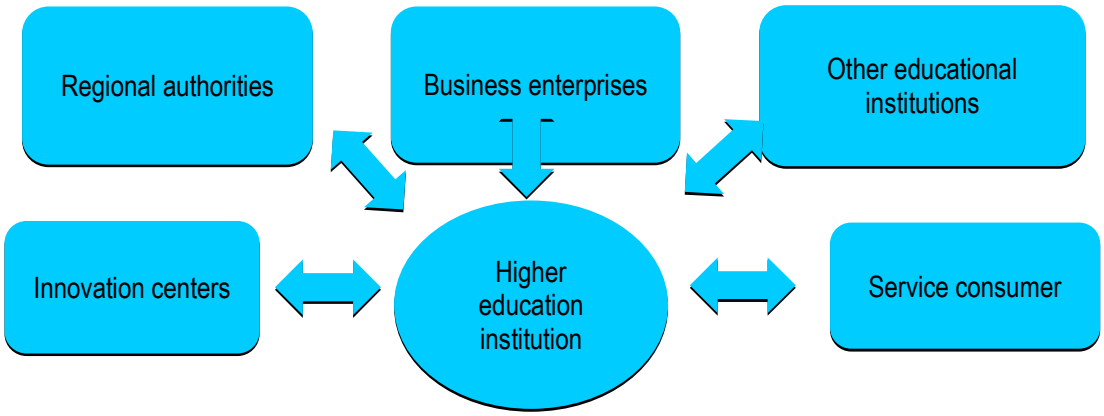


Figure 4 indicates that equal partners for the university are vocational education institutions of various levels, state authorities, sectoral unions of entrepreneurs and employers. The criteria for integrative interaction are: maximum employment of graduates of a particular vocational education institution; the number of long-term cooperation agreements; the availability of additional sources of financing; coordination of the activities of business structures, research projects and educational programs; creation of effective economic structures of small science-intensive; creation of educational-scientific-production centers of support; personalized programs and technologies for training young professionals; development of innovative technologies in education, science, and business.

Partnership cooperation is becoming an organizational form of interaction between regional educational and production systems on the terms of joint use of the resource potentials of partners. The mechanism that unites the efforts of representatives of business, science, and the state in organizing joint activities for research and development, as well as for their implementation, is the creation of technological platforms. The technology platform is a communication tool aimed at intensifying efforts to create promising commercial technologies, new products (services), to attract additional resources for research and development based on the participation of all stakeholders (business, science, state). The implementation of these tasks is entrusted to innovation centers. Innovation centers in the region are designed to create conditions for the development of scientific, technical and innovation policies and to increase the efficiency of interaction between scientific, technical, educational, and industrial complexes.

The activities of innovation centers will contribute to increasing innovative activity in the region, the growth and development of firms, and the establishment of cooperation between researchers and industry. In addition, innovation centers will provide high-quality training of innovative managers, contribute to the acceleration of real economic development through the creation of regional and international networks for the exchange of information and cooperation between enterprises. Innovation centers will enable enterprises in the production sector to reduce the cost of finding innovations, reduce the time for their implementation and thereby improve product quality and competitiveness.

The main areas of cooperation between universities and enterprises of the business community can be the transition of innovative enterprises along the chain from research institutes and universities to innovation centers, then to a business incubator, then to a technopark. Legal support for investment and innovation activities is provided by state structures and departments. Innovations created in various institutes and laboratories from different sectors of the economy should be financed by state grant programs for research and development. They should be located on the territories of research institutes, universities, innovation and technological centers, various laboratories, where there are all conditions for conducting the necessary research. Financing can be attracted by participating in various competitions of innovative projects. If the necessary financing is obtained, a small enterprise can be placed in a business incubator.

In addition to financing, some developing enterprises have a need for production facilities. At this stage, the project is moving into an industry technopark, created on the principle of public-private partnership. Moreover, specialized technology parks should be created in the region that have the necessary infrastructure for a particular industry. The company, being in the technopark, can receive investments for expansion from venture funds. On the basis of the product created in the technopark, mass production is created, financed by direct investment funds or corporate investors. In modern conditions, the competitiveness of both regions and individual industrial facilities is often determined by mastered and implemented technological innovations. In this regard, it is important not only to anticipate what the interaction of suppliers and consumers of production and technological innovations will be, but also to ensure the sustainability of the interaction of science, higher education and business. The mechanism of interaction between scientific teams and business entities allows its participants to receive high economic incomes based on unequal access to intellectual resources in the form of advanced scientific achievements.

Conclusion

The literature review showed that the most important factor determining the possibilities of innovative development of any economic system is the cooperation between the research-oriented higher education system and business. The universities play an active role in the process of innovative development of economic entities, in terms of providing them with various kinds of innovations, including innovation-oriented specialists and products of intellectual activity. Meanwhile, the transition to an innovative education model, will increase the competitiveness of the university and prepare qualified innovative specialists who meet market requirements and are able to develop an innovative economy. In cooperation with the business environment, the university should take the position of an equal and strong partner with substantial resources based on the principle of "university plus enterprise equals new enterprise". However, in the context of Kazakhstan, the parties to the University-Science-Enterprise Partnership are not interested in shared goals that could appeal to each party.

The creation of entrepreneurial universities has become increasingly relevant for improving their competitiveness in the real sectors of the national economy. It has been argued that the partnership between universities and technology parks is beneficial from an economic standpoint. This interaction provides high-quality training for experts focused on innovation in priority areas of science, engineering, and technology development. Moreover, these integration structures are expected to

have a significant impact on the socio-economic development of the region, specialized industries, and the higher education system.

The experience of Germany, Sweden and the United States illustrated that small innovative enterprises at universities have been successfully operating since the middle of the last century. To increase the investment attractiveness of small enterprises that would be engaged in the development and implementation of various kinds of innovations, this article proposes an organizational and economic mechanism, understood as a set of interacting formalized organizational and economic components aimed at creating incentives and interests for investing in small innovative enterprises. However, it is argued that the context of Kazakhstan, small innovative companies usually suffer from a qualified personal problem and a lack of financial assistance that could have a negative impact on their operations.

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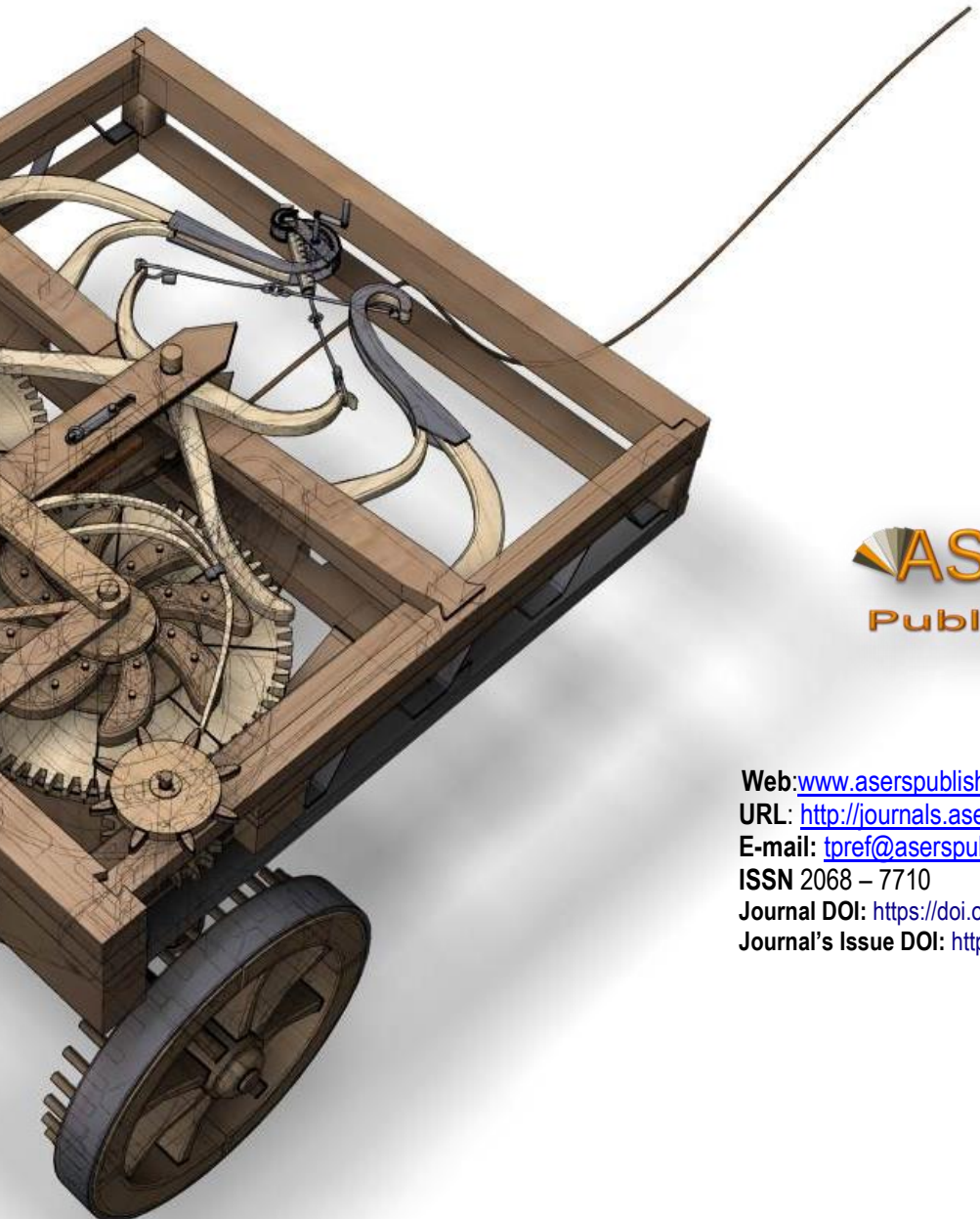

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