Проблемы экономики, организации и управления в России и мире

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СБОРНИК ВКЛЮЧЕН В РОССИЙСКИЙ ИНДЕКС НАУЧНОГО ЦИТИРОВАНИЯ (РИНЦ) И РАЗМЕЩАЕТСЯ В НАУЧНОЙ ЭЛЕКТРОННОЙ БИБЛИОТЕКЕ (WWW.ELIBRARY.RU)
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Уважаемые коллеги!

Благодарим всех участников за активный вклад в дело развития научных исследований.
Как и всегда мы будем оперативно информировать наших постоянных и потенциальных участников и их коллег о планируемых мероприятиях.
Мы предлагаем нашим новым и постоянным авторам продолжить сотрудничество в области опубликования индивидуальных и коллективных монографий в Чешской Республике и всегда готовы к обсуждению новых идей и перспектив.
Оргкомитет выражает благодарность всем коллегам, приславшим свои отзывы о нашей работе.
Желаем всем новых научных свершений и дальнейших творческих успехов!

Оргкомитет конференции
ческого решения проблем. Деятельность каждого инженера-менеджера может оказать существенное влияние на социальное пространство человеческого бытия. Сегодня инженер-менеджер должен обладать производственно-экономическими знаниями, квалифицированными знаниями новых управленческих технологий, административных процессов и организационных структур. Но помимо этого нужно обладать человеческими качествами, так как на инженера возлагается не только ответственность как на профессионала, знающего свое дело, но и социально-гражданская ответственность.

Литература


NATIONAL INNOVATION SYSTEMS AND GOVERNMENTAL FINANCIAL INSTRUMENTS FOR SUPPORTING INNOVATIONS – APPROACHES OF CENTRAL ASIAN COUNTRIES

Abstract

This paper analyses the existing knowledge base on innovation financing, the role of government funding for supporting innovation, the development of sustainable financing systems for innovative processes, and interaction between public finance and sustainable innovation in a society. The paper presents a comprehensive research of the relationship between government regulation tools and innovation processes; thus highlighting several lessons for policy makers. The study proposes a unique scheme of innovation financing, which could be used for building an effective financial mechanism for supporting sustainable innovation process. Finally, the paper aims to determine the roles, principles and boundaries of state involvement in the innovation field, especially focusing on the use of public funds.

1. Introduction

The issues of innovation and innovation-oriented policy have been widely discussed in the last decade. Countries with developed economies are oriented towards innovation and green technologies, investment in environmentally friendly projects, and supporting innovation both through the state and private investors. In offering support for sustainable technology innovation, governments play an essential role in ensuring high economic growth rates. This article presents an analytical analysis of a theoretical national innovation system (NIS), an institutional framework of innovation policy and various mechanisms and instruments of state support for innovation that can help to fund measures aimed at improving innovation and developing the innovative potential of all concerned parties.

Funding is a vitally important component of the innovation process, especially at the initial stages, and access to external financing is likewise of fundamental importance for innovation. Lack of financial support, however, is a powerful constraint on innovation. The availability of equity and equity financing (stock markets, private investors, venture capital) will largely deter-
mine the dynamics of economic development. An effective banking sector and finance infrastructure, as well as the creation of favorable starting conditions for the growth of firms, are important elements of any development strategy. For example, Kazakhstan’s existing NIS and its established structure of innovation management are oriented mainly to meet the needs of sectors and industries. This «vertical approach» was quite promising at the beginning of the country’s innovation process, but today the system has become overloaded with institutions and programs that lack focus and do not ensure the achievement of tangible results in terms of scientific and economic deliverables. In addition, this approach ignores the effective horizontal interrelations (cross-sectoral, inter-departmental) that play important roles in the working operations of a modern NIS.

State financial tools to stimulate innovative activity should be considered as a system of interrelated and interdependent financial instruments that the state uses to motivate innovative and unconventional approaches that can lead to the formation, maintenance and development of innovation infrastructure. Within the field of economic literature, Aghion and Howitt [1] describe different models of interaction between government and innovation. A two-sector model with «clean» and «dirty» inputs and with two key externalities is presented in another study [2]. In the former, the authors propose a simple two-sector model of directed technical change to study the response of different types of technologies to environmental policies. The study focuses mainly on types of policies that can prevent disasters, structures for optimal environmental regulation and long-term growth implications, and the costs of delaying implementation of environmental regulation. In models described by Acemoglu et al, a frictionless financial market channels resources from savings to the research and development (R&D) process, thus revealing the true value of each innovation.

Giordani [3] describes the process of innovation as a routinized and essentially predictable process, using the Bergemann and Hege [4] model to analyze the optimal financing of venture projects by understanding the interaction of moral hazards. The Ewens, Nanda and Rhodes-Kropf model of venture capital investment highlights how falling costs of starting new businesses can alter the composition of investments and the portfolio management strategy of venture capital investors [5].

The scientific literature has focused on several key themes. First, there is clear evidence that financing constraints can influence both the rate and trajectory of innovation of firms engaged in R&D and innovation. Second, capital structure plays a central role in the outcome of innovations. Bank finance is an important source of finance, particularly for larger firms with tangible and intangible assets to be pledged as collateral [6].

What are the main difficulties in financing innovation? Innovation produces an intangible asset, and returns on innovation investment are highly uncertain [7]; there are problems related to moral hazard and adverse selection [8]; and taxes and the availability of funds are other considerations [9].

In matters of innovation financing, the state needs to take into consideration the special role of the conversion mechanism from scientific ideas to application development (e.g. from prototype to mass production), which is defined as the process of innovation. Therefore, the need to assess the effectiveness of public financial instruments to stimulate innovation activity of economic entities is one of the main conditions for increasing its effectiveness. Government policy makers must make informed decisions in directions that will help strengthen the competitiveness of the national economy in conditions of growing globalization and international competition. The economic literature, however, has neglected to completely address financial as-
pects of the problem: in general, there is a lack of complex research on the features of innovation processes financing. Despite the numerous methodologies developed by the aforementioned authors regarding management systems for financing of advanced technologies, this area remains under-investigated. In the scientific literature as well, there is insignificant coverage of theoretical and methodical management of funding for science and technology. Many of the research outputs and publications reflect concerns related to individual structural elements for financing and investing in the implementation of advanced technologies, but many issues remain unresolved, especially concerning the introduction to innovative products to market. In this context it seems relevant to conduct a comprehensive study of modern trends and mechanisms for financial regulation in innovation sphere.

The main focuses of this paper are the following:

- an academic survey of the structure, instruments and mechanisms related to governmental funding for research and development (R&D);
- a general review of the evolution and development of innovation in the Central Asian countries; and
- identification and elaboration of a system for financing innovation through the prism of public policy.

This paper is structured as follows: The Section Introduction contains an overview of relevant scientific literature. Section 2 is dedicated to empirical analysis and focuses on developing unique financial mechanisms for sustainable innovation. Section 3 contains the author’s proposed models for financing innovation, reviews comments on the results, and discusses their robustness. The last section offers summary conclusions.

2. Structure of government policy oriented towards obtaining sustainable innovation

The history of the world economic system shows that the ability of any state to withstand external shocks is largely determined by its economic and financial power, the ability to respond in a timely manner, and by wisely using its available financial and monetary instruments of economic regulation. Innovative development programs require appropriate government support for effective implementation. One of the important tasks of the state innovation policy is to encourage the transfer of research results from the field of science to production, using stimulation for the commercialization of some technological tools (financial, economic and legal).

Government policy may consider a wide range of options to increase access to financing for innovation. Some of these instruments are related to the use of budget money, while others, probably with better effect, are simply consistent with changes in the regulatory or legislative framework. Among the most popular recent interventions is the direct provision of capital to firms, or the indirect provision of capital financial intermediaries. The government needs to respond to these current challenges by making bigger and wiser investments into research and innovation. I offer below a schematic depiction of a standard system for financing innovation. This scheme builds on the external finance literature, and draws as well from existing structure in Kazakhstan, with a focus on large public companies.

The scheme may be divided into three levels:

**System level** (national innovation system, NIS)

The generation of new knowledge and technologies and their effective implementation in social and economic development determine the role and place of the country in the global community, both in terms of achieving an adequate standard of living and ensuring national security. Several factors have contributed to the emergence of national innovation systems as
the institutional basis for innovative development: greater economic pressure on countries; the growing interconnection between capital markets and new technologies; the strengthened social orientation of new technologies; and the global nature of the development and adoption of knowledge, technologies, products and services. These processes, as a response to global challenges, have created the prerequisites without which it would be impossible to inherently connect innovation and the subjects and objects of innovation activity into a unified, integrated system, or NIS. The main methodological principle of building an NIS follows Joseph Schumpeter’s vision of competitive corporate innovation being the main factor of economic dynamics, with the institutional role in innovation activity being an additional factor directly affecting its content and structure [10]. The NIS can be classified in terms of public policy, institutional factors and external factors and constraints.

Organizational level (organizations and intermediaries)

My approach to this level is as follows:

- Institutional structures, created generally for the implementation and necessary adaptation of innovation policy through various instruments (usually state or non-profit organizations). These structures strengthen state support for the commercialization of intellectual property results, including pre-production, production and “market placement” of innovative products.

- Other organizations acting as intermediaries in innovative activities as sources of financing (private, public, international and mixed).

Individual level (directly innovators and innovations)

With the further development of countries and their globalization, the role of motivation for creative work increases, and stimulation for high-tech, competitive innovations and innovative activity continues to expand. Innovation is less the fruit of collective effort than from individual responses to innovation challenges. This «creative» level is perhaps one of the most neglected and difficult arguments to explain. It depends neither on the political regime, nor on the level of GDP, nor on the size of the country and its natural resources—nor even on the prestige or professional rank of the individual inventor. One stereotype is that the profit motive lies behind most breakthroughs in innovation. However, many scientists in the USSR did not even have exclusive copyrights to their inventions: this was the prerogative of the state. At that time, the inventor could maybe count on a slight salary bonus. Is education important? A Soviet «hillbilly» with just nine years of schooling designed the Kalashnikov rifle, which is now included in the Guinness Book as the most widespread weapon in the world. Bill Gates obtained his alma mater diploma 30 years after leaving university. In other words, the success of an invention or innovation depends to some extent on luck, specific circumstances, and the inventor’s belief in his or her idea.

One group of researchers asserts that an individual’s ability to innovate at work is influenced by several factors, which can be classified into three levels of analysis: the individual, group, and organizational level [11]. While their findings are not generally integrated, there are certainly strong links between the definitions, mainly related to the goals and functions of the organization or the inventor’s idea.

Chart 1 (below) shows the relationship between government policy, innovation, and business angels. The system for financing innovation, as conventionally presented with direct and indirect instruments, is not used to its full potential. For example, the case of indirect tools is analyzed mostly in terms of “light” taxation, accelerated depreciation, indirect funding offices and government guarantees. We find, however, that it is extremely important to use financing
for so-called future innovation. In accordance with the specifics of the chosen path of development, the government should develop and implement programs covering not only the final performers – e.g. universities, research centers, schools and pre-schools. It is also necessary to develop sections that specialize in public support. It is difficult to disagree with Borrás and Charles that innovation policy instruments must be designed and combined in ways that can best address problems within the innovation system [12].

On theoretical grounds, we take both an optimistic and a skeptical view of innovation subsidies. To our knowledge, empirical evidence to date does provide not definite resolution to this debate. Based on theoretical background developed by Virginie and Michele, three main types of instruments have been identified:

- direct and indirect «science and technology support measures» – the main financial and fiscal instruments used in isolation or combination to stimulate R&D;
- «science and technology diffusion measures» – instruments used to create infrastructure that encourages a rapid spread of awareness and knowledge of innovation; and
- «science and technology regulatory framework measures» – public actions that aim to improve general economic performance to indirectly enhance competitiveness and innovation [13].

Gail Hurley, from the UNDP Bureau for Development Policy, outlines four broad categories of innovative finance mechanisms:

1. Taxes, dues or other obligatory charges on globalized activities.
2. Voluntary solidarity contributions: under such initiatives, consumers are given the option to donate a small sum to international development at the point of product purchase.
3. Frontloading and debt-based instruments: an initiative that makes public funds available at an earlier date for development purposes.

4. State guarantees, public-private incentives, insurance and other market-based mechanisms: these include initiatives that leverage public funds to create investment incentives for the private sector – for instance, through state subsidies or commitments to purchase a particular product at a set price [13].

What we mean in the context of this paper when talking about a «mechanism for financing innovation» is a system of financial methods and tools aimed at financing innovative projects and firms through the transformation and redistribution of financial resources essential for creating and implementing innovations. There are at least two factors driving the need for public support for scientific research and experimental development: on one hand, the important role of technological progress in accelerating economic growth; and on the other, the fact that the private sector is not always willing to provide funding, especially when it comes to risky areas like agriculture. It is very important to develop a flexible structure for all stages of innovative enterprise- one that matches risk profiles with potential payoffs and is also compatible with external equity or equity-type financing. The main representatives of such financing are “business angels” and venture capital funds, although most venture capital funds typically focus on companies with already developed products.

The essence of the direct control methods identified in Chart 1 is that the government takes the initiative in selecting priorities related to scientific and technological development, which include financing and the provision of stimulus for the development of important national innovation programs. To accelerate market potential, the state can stimulate interstate industry to facilitate coordination and cooperation regarding innovation. Meanwhile, a decentralized control strategy is a complex mechanism of state participation in the innovation sphere. In this strategy, the state has plays a leading role but there is no strong policy link.

Indirect methods of state support can provide incentives for implementing innovation processes and create favorable economic conditions for innovative activity. The essence of indirect financing is to provide innovative projects with necessary material, technology, and human- and information resources. Innovation working in tandem with entrepreneurship is widely recognized as a foundation for economic growth and job creation. For example, government can create institutions for financing innovation, which creates jobs and additional infrastructure for innovative projects.

3. Results and discussion

There is a case to be made that countries with a common past have faced similar problems, and that they therefore have similar opportunities to use the same instruments and mechanisms to influence or finance innovation. Other countries, meanwhile, have faced a completely different set of economic trends, and they support their scientific, technological and innovative potential in completely different ways. In this section, we review three conceptual research models.

The international community consistently signaled a clear interest in both the scaling up of existing innovative initiatives, as well as the development of new ones. Obviously, each country uses its own «set» of forms, methods, and mechanisms of state support for financing innovation. However, in different countries, the system of state financing of the innovation sphere has similar features, which makes it possible to identify distinct models.

Blastula, model «A»
The main characteristic of the «blastula» model is a minimal level of state involvement. This model is inherent in a system with an undeveloped market economy. It is endemic of the so-called transitional states that experienced a change of political regime following a crisis of power. As a rule, existing innovative programs are financed from foreign sources. Domestic investment is often accompanied by high levels of nepotism and corruption. Other common characteristics include «vague» programs for innovative development and the absence of related infrastructure.

**Patronage model «B»**

In the «patronage» model, the main internal source of financing for innovation remains the state. Where innovation is concerned, there is always some sort of uncertainty. We never know in advance the real, inherent potential of the innovation, idea or project. Even breakthrough innovations can be so unusual or ahead of their time that finding financial sources and proving their profitability is sometimes very difficult. Most often, investors have low interest in high-risk projects, or in social projects that can bring shared positive effects. The state, therefore, applies certain regulators and stabilizers aimed at supporting scientific and technological research projects in risky or unattractive industries for investors (for example, in agriculture). Also, an inherently state-driven mechanism for financing is a great for financing innovations in fundamental research of strategic significance for the state (space research, nuclear physics, molecular biology etc.)

**Model «C»**

The «smart» model comes into play when the state takes an active part in innovation but with minimal state spending. Instead, there is a strong emphasis on mechanisms and instruments that work as catalysts for development. Such a policy has a long-term impact perspective for the dynamic development of society and the economy of the country in general. It creates favorable opportunities for sustainable innovations, entrepreneurship, the scientific and technical progress continued development of the country at large. External financing in this model are important too, but it doesn't central as in A model.

The scientific literature supplies a wide variety of financing models, depending on the sources of funding, the phase of innovation, or a specific cluster. Financial schemes for the implementation of innovative projects and programs to establish financial security depend to a large extent on the «state» model. In the «administrated economy» of the former socialist countries, directive management methods were decisive or, at least in certain periods, exceptional methods of state regulation of the economy. The archaic scientific and technical structure inherited from the Soviet era is a poor fit with today’s market-driven economy. All of the old problems have come to the fore: gap between science and production needs, economic susceptibility to scientific and technical progress, technological backwardness of many industries and enterprises, and acquired new problems no less difficult to solve.

The concept of «innovation» as an economic category was introduced by Schumpeter. According to the famed economist and political scientist, the task of entrepreneurs is to reform and revolutionize the way of production through the implementation of inventions, and more generally through the use of new technologies for the production of new goods or former goods, but with a new method (Schumpeter 1939). Schumpeter argued that innovation and novelty are integral parts of entrepreneurship, and that innovation must be present for business activities to succeed.

Schumpeter defined entrepreneurs as the driver of innovation at a time when business and international were not nearly as complex as they are today. Historically, entrepreneurship in the
USSR was not welcomed. From 1927, the Soviet government carried out a series of economic and administrative measures aimed at ousting private capital. Private trading was banned, as was the transportation of passengers and cargo — including materials for clothing and footwear. The ban then spread wholesale to encompass all trade, intermediation and processing. The situation changed only after the 1987 adoption of the law «On individual labor activity».

Certain particularities did exist beforehand in the sphere of innovation. In 1974, under the leadership of Brezhnev, «rational proposal» status for individuals was forfeited in favor of «organizational and technical solutions», after which performance-based bonuses were stopped. Copyright certificates were issued for the main part of inventions and rational proposals. A 15-year patent was «awarded» to the inventor, who then had to pay an annual fee for the honor. Moreover, the patent's owner did not have the right to remuneration provided for copyright certificates. It is therefore not surprising that almost all that invented Soviet inventors had a status of copyright certificates. In issuing copyright certificates, the state reserved the right to implement inventions, but instances of implementation were extremely rare, and most inventions simply gathered dust. Also from 1974, scientists could procure additional income from inventions 20 to 200 rubles for a single invention, but no more than 50 rubles for individuals. Copyright certificates and right of implementation remained with the state.

In the post-Soviet countries, large-scale innovations have been and continue to be carried out at the expense of the state. The «Soviet system» has cultivated a generation of scientists and innovators in «greenhouse» conditions who are not adapted to the challenges of the market-based system and its attendant needs. How has the situation in the Central Asian countries changed after independence? Each country has chosen its own development path, focused on the market economy, entrepreneurship and innovation.

In Kazakhstan, as elsewhere in the post-Soviet countries, the transition to the market occurred spontaneously, without preparation. Economic policy was developed in a short time by a limited group of specialists, and was based, mainly, on the experience of developed market countries. Price liberalization, the introduction of hard currency in foreign trade, tight monetary and fiscal policy of the state, privatization, and transition from a command to a market economy led to a period of a qualitatively new stage in the development of the Kazakh economy. Over the course of 26 years of independence, many dozens of decrees and laws have been crafted to enhance the development of entrepreneurship and to establish an innovation sector.

The state's main involvement in implementing innovation is through the “Damu” Entrepreneurship Development Fund. To date, there are more than 200 accredited foreign and international organizations on the territory of the Republic of Kazakhstan that are providing material, methodological and informational support to Kazakhstani small- and medium-sized businesses, as well as to public organizations and state institutions. The broad spectrum of interests of these organizations includes: supporting public associations working with socially unprotected strata of the population; participating in international projects in the fields of fundamental and applied scientific research; solving environmental problems in this region; and supporting and developing small- and medium-sized businesses. Kazakhstan's international business potential is quite promising, and economic reforms, the reconstruction of tax policy, and customs legislation reform have led to increased interest from foreign entrepreneurs. Chart 2 (below) shows the participation of 39,028 organizations from 162 countries in the Kazakh economy. The participant share of CIS countries is 46.2% [14].

In recent years, several large-scale innovative and industrial programs have been developed and implemented in Kazakhstan, including a cluster development program. Simultaneous
implementation, however, presented difficulties and limited the effectiveness of certain activities. As a result, all the projects planned within the program’s framework were merged into the State Program on Forced Industrial and Innovative Development (FIID) of the Republic of Kazakhstan for 2010–2014. Essentially, it was a five-year plan related to state involvement in the economy and innovation. A two-level system of «technoparks» exists in Kazakhstan: there are six national technoparks and seven others in major regional cities. A distinctive feature of national technology parks is the presence of a sectoral focus in their activities within the regime of the Special Economic Zone with preferential taxation.

A characteristic feature of the regional technology parks is their location on the territory of large enterprises with the involvement of leading universities and research institutes. In Kazakhstan, technoparks have a mixed ownership structure in which the public and private sectors jointly participate in the implementation of high-tech projects. Some of the Kazakhstani industrial parks include business incubators. A second type of structure in Kazakhstan, involving clusters for promoting innovation, turned out to be inefficient and unprofitable. It was decided in the event to create a single operator, the JSC «National Agency for Technological Development», to coordinate processes of innovative development at the national level and provide state support measures in this area.

The government has changed priorities, from the dissemination of achievements to attracting foreign innovation. The program has shifted emphasis from an attempt to build an industrial-innovative economy towards attracting resources into already existing and potentially most profitable sectors in Kazakhstan. Kazakhstani structures in the sphere of innovation lack systematized experience, weight and influence that can be creatively or widely applied on the world market. At the same time, there is an opportunity to attract innovations from Kazakhstan: several organizations, scientific schools and individual scientists remaining from the Soviet era...
have conducted quite successful research in high-tech and other breakthrough fields of knowledge, such as nuclear physics, petrol chemistry and space technologies.

During its years of independence, Uzbekistan has managed to rebuild the national economy by establishing an automotive industry and developing its textile industry. In recent years, Uzbekistan has established a broad system of legal guarantees and privileges for foreign investors, and has developed a holistic system of measures to stimulate the activities of enterprises with foreign investments. The national innovation system of Uzbekistan is in the initial stages of formation. Organizations that carry out scientific, technical and innovative projects at the expense of budget funds are exempt from VAT. Work on the organization and support of projects is carried out at the regional level by eight territorial centers for innovation and technology transfer.

In January 2017, the President of Uzbekistan initiated the consideration of establishing two innovative parks. A draft decree on the establishment of pharmaceutical industrial zones («Boysun-farm», «Bostonlik-farm», «Zaamin-farm» and «Syrdarya-farm») was also proposed this year. Other advances to date include three free economic zones: the «Navoi» free industrial and economic zone, established in 2008; the «Angren» special industrial zone in the Tashkent region, formed in 2012; and the «Djizak» special industrial zone in central Uzbekistan, set up in 2013.

In the sphere of innovation, a market-based approach implies that scientific results will be transformed into competitive, high-technology products. However, as is evident from our assessment of the overall situation, there is, at present, no system in place to facilitate competitive innovation. The main reason for this is underdevelopment, which implies a lack of interaction between elements and mechanisms that form the basis of any innovation system. Even so, the means of ensuring that innovation can take place in an «innovation friendly» environment have yet to be improved. In practice, the current «innovation» system was built with tools and mechanisms that were applicable during the Soviet era. This being the case, Uzbekistan is not yet positioned to assert itself in terms of innovation.

A similar situation regarding the development of entrepreneurship and the national innovation system is emerging in Tajikistan and Turkmenistan. According to the «UNECE Innovation Performance Review», the Tajikistani Government should continue to strengthen the links between all the elements of its NIS and foreign partners to facilitate the transfer of knowledge and technology, and thereby to improve market access for innovative products from Tajikistani firms. Measures could include the further simplification of bureaucratic requirements and procedures regulating inward foreign direct investment, additional incentives, and decreased tax rates. Policymakers should also develop a comprehensive internationalization strategy for innovation, research, and education [15].

According to the Innovation Index, which comprises two broad categories: inputs to innovation (which measures innovation capacity) and outputs of innovation, Kazakhstan holds 75th place, Tajikistan 86th, and Kyrgyzstan 103rd. Unfortunately, the index provides no data about Turkmenistan and Uzbekistan (see Chart 3 below).

According to official sources, Tajikistan has made great efforts to integrate itself into the world economy. The economic reforms carried out in recent years, have brought significant results in terms of improving business and the investment environment. Institutional reform continues apace, real market-economy infrastructure is being formed, and government bodies are being reformed. To date, four free economic zones have been established in Tajikistan: «Sughd», «Panj», «Dangara» and «Ishkashim». At the same time, no industrial parks and
technoparks have been created on the territory of the FEZ of Tajikistan, nor are there any plans for their creation in the near future.

Chart 3: Global Innovation Index 2016 (by rank)

The difficulties of assessing the potential of entrepreneurship and the national innovation system of Uzbekistan, Tajikistan, and Turkmenistan lies in the inconsistency of information about these countries because of their closed nature. As a general indicator, one can distinguish economic dysfunctionality and inadequate reform processes. Comprehensive state control over trade and key enterprises, lack of a market economy, a non-competitive entrepreneurial segment, and high levels of migration of the population to neighboring countries are other factors to consider.

After the collapse of the USSR, Turkmenistan was a «raw materials-producing appendage» with a poorly developed manufacturing industry. The mainstay of Turkmenistan's economy at present is the fuel and energy complex, which brings the vital foreign exchange earnings and external commodity turnover. The peculiarity of the Turkmen economy is determined by several factors. First is the availability of large reserves of natural resources. Second, the country has a closed type of economy: foreign investors are allowed in only to undertake difficult fields of production. Third, Turkmenistan is geographically landlocked, which makes it difficult to promote domestically produced hydrocarbons on the world market. Until the end of 2009, Russia was the main exporter of Turkmen gas, through pipelines which it supplied to European markets. Despite its relevant marginalization compared to other CIS countries, Turkmenistan has made notable developmental achievements.

The post-Soviet period was also dynamic in Kyrgyzstan. After gaining independence, Kyrgyzstan proceeded to transition to a democratic system of state administration, while carrying out radical economic reforms. To date, the economy of Kyrgyzstan does not have sufficient ability to overcome the consequences of negative processes in the world financial and commodity markets. The ability of Kyrgyzstan to respond adequately to increasing external economic challenges is an important condition for economic development. The main problem is insufficiently developed competition in certain sectors of the economy. The existing structure of the economy is focused, mainly, on agricultural production, extraction of mineral raw materials,
and production of services. It is neither innovative, nor aimed at creating knowledge-oriented and technology-oriented industries.

The initial stage in the formation of intellectual property in the Kyrgyz Republic was the implementation of the State Program "Intelect" (until 2010). The program resulted in the formation of a regulatory legal framework in the field of intellectual property, and provided some legal protection of intellectual property. Further, the "Concept for Scientific and Innovative Development to 2022" was developed. The concept is designed to answer challenges facing Kyrgyzstan in the field of innovative development by building a clear system of goals, priorities, and tools of state innovation policy. The first law «On a Free Economic Zone in Kyrgyzstan» was adopted in 1992. Changes to the were made nine times, but they could not smooth out all the contradictions. There are four free economic zones (FEZs) in the Kyrgyz Republic: «Bishkek», «Karakol», «Maimak» and «Naryn». But the established FEZ has continued to function in an unsatisfactory manner. The new law «On Free Economic Zones of the Kyrgyz Republic» was signed in 2015 to improve the situation. The «Technopark» project was presented to authorities in May 2017. The Technopark will showcase industrial achievements in science and innovation in the FEZ. This project site will be on the 11-hectare premises of a former kozhzavod (leather factory) in Tokmok city.

The crisis in the innovative sector was caused by the outflow of qualified specialists from the country, lack of financing for innovation, and reduced R&D capacity. The peculiarity of the transitioning to innovative types of development in the Kyrgyz economy is that, with the strengthening of competition between enterprises and countries in the world market, Kyrgyzstan lacks modern mechanisms for implementing technological innovations in education, as well as for bringing them to market. There is also a definite lack of necessary infrastructure for the development of small-scale, innovative entrepreneurship.

4. Conclusion

According to the abundant scientific literature, the financing of innovation is a major element in promoting economic growth and sustainable innovation process in various sectors of the economy. However, the existing research mostly aims at estimating the additional effects of subsidies and other direct and indirect methods of innovation financing. This paper has tried to move one step further, combining several dimensions of innovative performance aimed at obtaining sustainable innovation.

The Central Asian countries share a common historical and economic past that has been left behind, but each has taken its own road towards social and economic development. At the same, these countries inherited large R&D sectors from the Soviet era.

It can be summarized that these countries have achieved significant results in terms of improving the regulation of entrepreneurship and innovation. We should also note that they began, from 1989, in nearly equal conditions in which business activity was practically banned and there was no legal and economic mechanism for regulating private property. The concept of innovation was not clearly defined, and investors who had an «author's certificate» in their hands had neither the opportunity to implement nor the exclusive rights to their innovations. During Soviet time, the prerogative of implementation, including the use of inventions, has remained the state's. Scientists could receive only a small material reward and social recognition. The current situation is clearly driven by a social need for innovation. Almost all Central Asian states have established business and innovation-support structures, such as business incubators, business support centers and technoparks. The mechanisms of tax incentives,
optimized forms of tax reporting and reduced tax rates are being used, and the sheer number of taxes is falling.

Government can play leading role in stimulating innovation activity only through the implementation of appropriate policies and the formation of necessary institutional structures. It is vital as well to increase the role of universities and publicly owned research organizations in the innovation activity of companies. Another priority in the realm of science and technology policy is to strengthening the links between scientific institutions and business. For countries in the post-Soviet space, the commercialization of scientific research results is of primary importance. Governments should steer more of their attention towards the creation of new, innovative firms and high-tech SMEs through combinations of incentivizing measures.

The essence of the NIS is to provide and institutional basis for innovative development of the national economy, and to creating the necessary conditions and resources for effective scientific, technical and innovative activities in the country. It covers the whole set of subjects and objects of scientific and innovative activity within the conceptual spheres of the economy: science, education, production, the market, and a complex of legal, financial and social institutions that support innovation processes.

Direct methods are more suited to promote basic and applied research, while indirect methods are more effective in commercializing results. New scientific research can assist in developing recommendations for improving existing methods of financing innovation, leading to methods that are more accurate and reliable in ensuring widespread and effective development of innovative enterprises. The main limitation of the existing structure is that it is interested only in financial benefits. The proposed scheme, however, allows us to optimally allocate resources and to increase positive impacts from innovation.

The importance of state support in the innovation process cannot be overstated. State support can be expressed in different ways, and with financial and non-financial instruments. Non-financial mechanisms are sometimes much more important for the development of sustainable innovation. The success of implementing innovations directly depends on state policy, innovative infrastructure, and tools for supporting entrepreneurship. In using the old Soviet system to support scientists (as is the case in some countries of the CIS and Central Asia), the state is repeating old mistakes. It is impossible to build an economy focused on innovation if the state does not create a basis for entrepreneurial development. When the main levers of power and the economy belong to a certain regime that has not changed for several decades, and when opportunities for entrepreneurship exist only for a narrow circle of people, then innovation exists only on paper. In cases, scientists will wear full state subsidies as a «millstone around the neck» because there can be no competitive market for the results of their discoveries.

Innovation always carries with it a degree of uncertainty. We can never know in advance the real, inherent potential of an innovation, idea or project. Despite the fact that innovative financing mechanisms are similar in principle to other financing processes, there are important differences that call for the application of specific mechanisms that address the unique interactions between innovative enterprises and financing mechanisms.

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ИНФОРМАЦИОННЫЕ СИСТЕМЫ,
КАК СФЕРА ИНФОРМАЦИОННЫХ УСЛУГ

INFORMATION SYSTEMS AS A SPHERE OF INFORMATION SERVICES

Key words: Information systems, information and digital resources, information services, digital economy, e-learning.

Развитие информатизации в мире стала мощным фактором воздействия на все стороны современного общества, в том числе и на его экономическую составляющую и тем самым обеспечивая благоприятные условия для создания и развития государственных, региональных, отраслевых информационных систем, электронных ресурсов. Интегрированные информационные системы государственных, региональных объединений, в том числе информационные системы органов государственной власти, ведомственных органов, задействованные в различных сферах образования, науки и других структурах, сконцентрировавшие высокие информационные технологии и инновации, позволяет бурно развивать информатизацию экономики на макро и микро уровнях.

Сфера информационных услуг возникла в ответ на потребность в получении определенной информации, как отдельных потребителей (пользователей), так и хозяйствующих...
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