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## PROBLEMS IN SPATIAL MODERNIZATION OF REGIONS: KAZAKHSTAN'S EXPERIENCE

*This study highlights the main problems of spatial modernization in regions, particularly in underdeveloped ones. These problems are associated with spatial constraints, differential levels of development of regions and low level of innovation to attract qualified personnel. The analysis shows that Kazakhstan has substantial differences in the levels of innovative capacity and dynamics of regional development. Based on this analysis we propose a model of innovation cycle, which takes into account the introduction of new products, restructuring and modernization of obsolete equipment. It is concluded that any modernization, especially catching-up modernization, has high costs and associated risks.*

*Keywords:* spatial limitations, territorial barriers, regional development, innovation cycle.

*JEL Classification:* O31, R11, R12.

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## ПРОБЛЕМИ ПРОСТОРОВОЇ МОДЕРНІЗАЦІЇ В РЕГІОНАХ (НА ПРИКЛАДІ КАЗАХСТАНУ)

*У статті описано основні проблеми просторової модернізації в регіонах Казахстану, особливо в слаборозвинених. Ці проблеми пов'язані з просторовими обмеженнями, різним рівнем розвитку регіонів і рівнем інновацій, низьким для залучення кваліфікованих кадрів. Аналіз показав, що в Казахстані є істотні відмінності в рівні інноваційного потенціалу і динаміки регіонального розвитку. На основі цього аналізу запропоновано модель інноваційного циклу, яка враховує впровадження нових продуктів, реструктуризацію і модернізацію застарілого устаткування. Зроблено висновок, що будь-яка модернізація, особливо "наздоганяюча", відрізняється високою вартістю і пов'язаними з нею ризиками.*

*Ключові слова:* просторові обмеження, територіальні бар'єри, регіональний розвиток, інноваційний цикл.

*Таб. 1. Рис. 1. Літ. 13.*

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## ПРОБЛЕМЫ ПРОСТРАНСТВЕННОЙ МОДЕРНИЗАЦИИ В РЕГИОНАХ (НА ПРИМЕРЕ КАЗАХСТАНА)

*В статье описаны основные проблемы пространственной модернизации в регионах Казахстана, особенно в слаборазвитых. Эти проблемы связаны с пространственными ограничениями, различным уровнем развития регионов и уровнем инноваций, слишком низким для привлечения квалифицированных кадров. Анализ показал, что в Казахстане есть существенные различия в уровне инновационного потенциала и динамики регионального развития. На основе этого анализа предложена модель инновационного цикла, которая учитывает внедрение новых продуктов, реструктуризацию и модернизацию устаревшего оборудования. Сделан вывод, что любая модернизация, особенно "догоняющая", отличается высокой стоимостью и связанными с ней рисками.*

*Ключевые слова:* пространственные ограничения, территориальные барьеры, региональное развитие, инновационный цикл.

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**1. Introduction.** The study of spatial problems in regions' modernization and spatial constraints of innovative development is one of the main tasks for economic geography and regional economy. Geographically, regions are unevenly placed by the R&D and social structure. To this end, regional development should be focused on future geopolitical conditions. That is, we talk about strategic adaptation achieved by the economic space modernization in regions. Therefore, its analysis and evaluation are of direct interest to economic entities involved in regional innovative process.

In the contemporary science (since 1995), this trend is reflected in various works of foreign and domestic economists. But most studies have not disregarded the post-Soviet works (a close group of works on the subject), which examined in detail the collapse of the Soviet Union. But in fact, this approach is not methodologically correct.

Therefore, the space factor is very important for a country such as Kazakhstan, since Kazakhstan possesses a vast territory, comparable to some continents. Despite the presence of research in this area, the problem of new methodological approaches to regional development through space modernization is now the least studied one. Therefore, we aim to develop new approaches, directed to removal of spatial barriers in regions' modernization, introduction of new products, services, and improving skills of personnel potential. Thus, it should be indicated that specific direction of this research is the development of underdeveloped and less developed regions.

Section 2 proposes to consider the theoretical aspects of spatial obstacles on the path of regional economies' modernization. Section 3 sets out the guidelines for the innovative activity analysis in the regions of Kazakhstan, the innovation cycle model. Section 4 is concluding.

**2. Theoretical aspects of spatial limitations in the modernization of regions.** Today the problem of the structure economy diversification in Kazakhstan and removing its dependence from natural resources is one of the main tasks for economic geography and regional economy. Even in safe years before the crisis it was clear that economic growth should be provided with the transient factors and it is necessary to take steps in the direction of transition to steady growth based on modernization and innovations. The global financial and economic crisis which has begun at the end of 2008 has showed a significance of this problem, and also the need to provide the regions' developments in Kazakhstan on the basis of innovative modernization.

Among the reasons for the need for the regions' economic space modernization is the international competition. The position and role of any country in the world economy are determined by the ability to adapt its economic regions to a market.

It should be noted that active participants in the innovation process is not only state but also regions. As it was correctly noted by A. Scott and M. Storper, "cities and regions are active and causal elements in the economic growth process" (Scott and Storper, 2003). The process of economic activities globalization makes its own changes to the innovative processes development at the regional level. The essential components of the regional research theory in the field of scientific and technological development are connected with many special economic and social theories.

Long ago the regional science conclusively showed that spatial inequality emerges as an objective effect of competitive advantages concentration in certain territories and lack of these advantages in others. The tendency to concentrate the eco-

conomic activity on the territories with the conditions favorable for business was discovered by G. Myrdal in the middle of the XX century (Myrdal, 1957). The core-periphery theory (the theory of polarized development) by J. Friedmann has become an important contribution to understanding of spatial development patterns (Friedmann, 1966). The model shows that underdeveloped and poor in resources regions will inevitably become a hindrance to development of innovation and modernization of a country.

Thus, the core-periphery model by J. Friedman shows that important roles in the development of a country are played by cities. These cities are not only an "important support", but they are also the main "engine" which can move modernization to the periphery. Underdeveloped regions will inevitably become a brake on innovation diffusion (Friedmann, 1966).

The history shows that Kazakhstan possesses a vast territory, and is therefore complicated for modernization. P. Krugman wrote that regions are developing very slowly, using only natural resources. But if regions use human and technological resources, they can achieve great results, so these factors play a major role in space modernization (Krugman, 1991).

For instance, the importance of the regional modernization model pointed out by Fujita and Krugman (Fujita and Krugman, 1995). The modernization is faster in the regions, where there are better conditions for the diffusion (development) of innovations: the higher concentration of population, more developed infrastructure and lesser economic distance, and also low level of institutional barriers. The necessity to reduce all the barriers to spatial development is obvious, but they are long-standing and have a stable nature. It is very difficult to effect changes in space; therefore the choice of directions for the stimulation of modernization in Kazakhstan is limited by the fairly low levels of capabilities, especially under the influence of deteriorating world market conditions and the crisis (Kireyeva, 2005).

So, we think the key for solving the problem of individual regions' modernization is finding and developing competitive advantages in average and underdeveloped regions of a country in conjunction with support measures of alignment of social and economic disparities between the territories.

### **3. The current level of socioeconomic and innovation processes in regions.**

Kazakhstan possesses a vast territory, so in many regions there are uneven research and development (R&D) elements which form the innovation system and the influence of modernization. The innovation of a region is its ability for self-renewal, adaptation to changes and generation products of scientific and technical progress (Dunenкова, 2003).

This process causes a constant transformation, leading to structural changes in the economy. They indicate the change in the proportions between the elements of the territories and changing in their composition, that is in essence, is the basis for economic reforms. It would thus be of interest to analyze and evaluate the innovative capacity of regions involved in regional innovation process.

Table 1 demonstrates the level of innovative activity in the regions of Kazakhstan.

Table 1. Innovation activity rate in Kazakhstan's regions, 2008-2011, %

	2008	2009	2010	2011
<b>The Republic of Kazakhstan</b>	<b>4,8</b>	<b>4,0</b>	<b>4,0</b>	<b>4,3</b>
Akmolinsk region	2,1	1,2	1,2	0,7
Aktobe region	5,6	4,1	4,0	6,1
Almaty region	2,1	1,9	1,4	0,9
Atyrau region	3,7	2,7	2,9	3,7
West-Kazakhstan region	4,9	4,9	4,5	4,6
Zhambyl region	8,8	6,0	4,4	7,8
Karagandy region	6,1	6,5	6,2	7,0
Kostanay region	2,5	2,0	1,5	2,6
Kyzylorda region	2,4	3,0	1,5	6,1
Mangystau region	2,3	1,9	1,4	1,1
South-Kazakhstan region	2,8	2,4	2,2	3,4
Pavlodar region	8,1	3,6	3,8	5,1
Nord-Kazakhstan region	2,2	2,5	2,6	2,4
East-Kazakhstan	5,6	4,3	5,9	6,4
Astana city	3,0	1,8	2,1	2,6
Almaty city	7,2	6,4	6,7	5,4

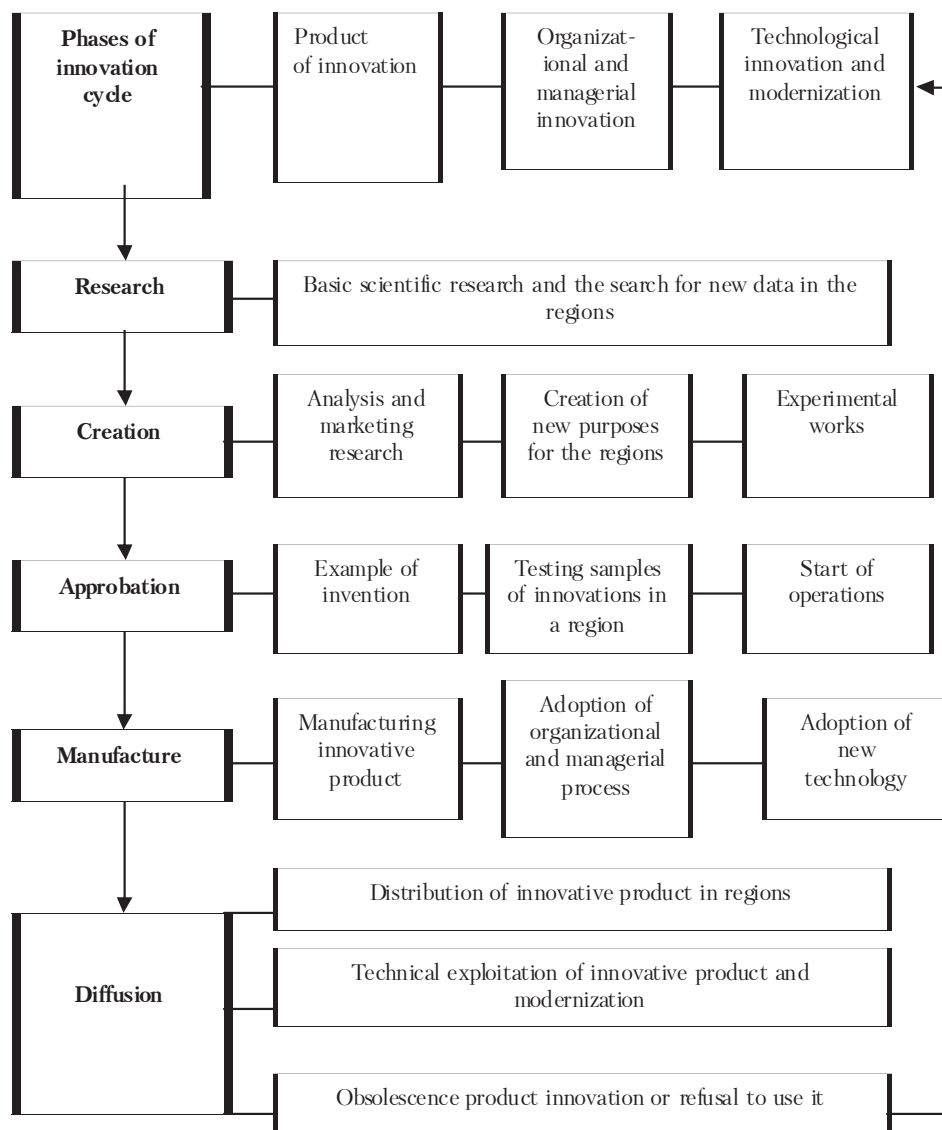
Two-thirds (2/3) of the regions have positive values in the innovative development in the analyzed period (2008-2011) and one-third (1/3) of the regions have negative values. The positive values indicate that the data objects can be classified like innovation active regions. However, Akmola, Almaty, Mangystau and North-Kazakhstan regions show a very low level of innovative activity. This fact indicates a low level of innovation development of the region or the incomplete disposal of existing innovative resource.

The underdeveloped regions are situated in the Northern and Eastern parts of Kazakhstan. These regions were developed in the Soviet period, but had the hardest hit by the world financial crisis. Therefore, we must understand that it is necessary to change the current policy and focus on the future which is related to modernization and development of transport, innovation and communications.

It follows that the most crisis damaged regions are busy in metallurgy, mining of mineral resources, oil and gas (Zhanaozen, Balkhash, Temirtau, Arkalyk and other). For the regions with specialization in metallurgy the world financial crisis has really become an ordeal, metallurgical production fell manyfold. In this case it was difficult for steel companies to cut jobs.

**4. The innovation cycle model.** In general, we have proposed a model of an innovation cycle in a region, which includes several innovation types and the main types of process innovation — technological and managerial. This model is shown in Figure 2.

The proposed model consists of 5 main stages of research including the innovations diffusion. This model reflects the transformation of the innovation process results starting from new knowledge and till the rejection of innovations. This should demonstrate which steps of innovation cycle are needed to be upgraded. This model allows determining the nature of interaction among the participants in the process of innovation development of a region, establishing a procedure for information exchange and the sequence of tools required for efficient formation of innovative areas of the region.



Source: Author's.

Figure 1. Innovation cycle model

Such structural and technological changes occurring in the economy (innovations) are labeled by P. Romer. He pointed out that an innovation cycle creates a new theory of growth (Romer, 1986). In this context, it can be identified that the development of regional research and practical use of regional models are carried out in 2 main areas:

1. functioning of regional economy through the development of specialized and integrated models (innovation, modernization of production);

2. creation of complex models aimed at application in practical activities of regional innovations.

**4. Conclusion.** In fact, the analysis suggests that less developed regions require assistance, but we should clearly understand the boundaries of opportunities and mechanisms to choose, even if a country has the financial resources for a large-scale redistribution. This means that the key to solving problem of regions modernization is finding and developing competitive advantages of average and less-developed regions of the country supporting also the regional policy.

Thus, we argue that the mechanism of innovation management organizations providing the increased costs of innovation in the region and the provision of innovative products and services is formed in Kazakhstan. But this mechanism is not able to expand the sources of funding and increase the level of innovative organizations activity. The results of this study raise some important questions for the development of a program to strengthen measures which should include: improving the legislation and statistical accountability; creation of an information portal on innovations in the regions.

Also we have proposed an innovation cycle model in the region. This model has shown that diffusion is an important process of the cycle, which is not possible without modernization. Although the space is increasingly seen as a barrier to modernization, since Kazakhstan has a huge size and vast areas. Summarizing the results of the study, we propose 3 major vectors of spatial modernization. First, the acceleration of innovations diffusion requires the reducing of institutional and infrastructure barriers. Second, promotion of competition in the regions by means of investment and human resources. Third, increase the population mobility at the expense of state.

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