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INDUSTRIAL CONCENTRATION IN THE REGIONS OF THE KYRGYZ REPUBLIC APPROACHES USING NEW ECONOMIC GEOGRAPHY

У роботі проведений теоретичний підхід до дослідження агломераційних ефектів у Киргизстані. На основі аналізу вторинних даних з питань регіонального розвитку в Киргизстані подана інтерпретація агломераційних ефектів для первинних галузей промисловості і представлені шляхи стимулювання регіонального розвитку.

Ключові слова: регіональний розвиток, регіональна політика, просторова концентрація, агломерація, агломераційні ефекти.

Introduction. It is uncontroversial that today agglomeration is one the form of economy and resettlement spatial organization. Agglomeration shall be considered as integral process of the innovative focused process of transformation of social and economic region development. In the early nineties theorists developed a new approach to understanding why some regions attract disproportionate big shares of economic activity. Current economy state of Kyrgyzstan is characterized by high extent of regional development differentiation that was shown theoretically and empirically in works of local scientists. The question of spatial development of Kyrgyzstan's is actively discussed, as there is a problem of own paradigm formation of regional policy and regional development of Kyrgyzstan.

All this indicates special thematic justification of research of agglomeration process in Kyrgyzstan's regions. Theoretically different success in regions development creates favorable environment for agglomerative processes development. As shown in global experience, agglomerations development turns the territory into an arsenal of stable and dynamic growth with considerable social and economic effect. We believe that the main problem of agglomeration processes research is the analysis of existence of agglomerative processes prerequisites, identification of the factors stimulating this process.

Basic theoretical provisions describing agglomerative process and agglomerative forces promoting economic activity concentration in which important conditions shall be considered as internal economy from scales, level of expenses and goods transportation, level of population expenses in response to salary difference, level of trade expenses between regions. From the empirical works confirming these theoretical provisions, there is part that disprove it. As it is noted in work [1], the assessment of agglomerative processes existence can be carried out, as from microeconomics positions (that is agglomerative effects calculation for enterprises of the region), and from positions of macroeconomic analysis.

Literature review. The totality all works in agglomeration we can divide into two groups: theoretical and empirical studies. In the theory of agglomeration of the processes, of course, is the fundamental work of P. Krugman. He tries to explain the existence of large urban agglomerations and the presence of significant trade flows that firms operate under increasing returns and imperfect competition in the product market. Furthermore, as a third variable, he re- added market size. It is in the new geography of economics today addressed to the issue as the size of the market is related to intra economies of scale and transport costs with formation of spatial economy. P. Krugman considers the impact on the processes of concentration economic activity factors such as foreign trade. He determines that trade liberalization should lead to an increase in industrial concentration in the region. There are research to the contrary (Forslid R., I. Wooton, 2003) prove reduction trading costs that only at the initial stage leads to an increase in concentration, and then diffuses production. In an effort combining approaches S. Harris and A. Preda. P. Krugman reveal patterns of occurrence of agglomeration in regions.

Model cyclic movement of factors of A. Venables considering the economic development of the region from the perspective of the cyclic process leading to economic differentiation. In this model, each economy has three sectors. The first sector with perfect competition produces tradable goods. The other two sectors are characterized by monopolistic competition and vertically interconnected (one produces intermediate goods for consumption by others). At high transport costs manufacturers tend to be closer to consumers, and proceeding in both regions. When low transport costs, the goods are also produced in two regions-tries, resulting in the factor price equalization manufacture. With an average level of transport costs arise agglomeration processes due to the effect of clustering. In the model (Englmann, F.C. and U. Walz,1995) also discusses the two regions, but four kinds of products: traditional products which are produced by skilled and unskilled workers, industrial goods, products and services not sold in other regions and products R & D sector. Qualified labor mobility between regions, unskilled - immobile. Production function under monopolistic competition - common to both regions. Economic growth is based on endogenous technological change in the non-tradable sector. Model (Englmann, F.C. and U. Walz, 1995) addresses two critical case. The first case involves the distribution of externalities research and development, which occur in particular region. In this case, there is always a diagram of the "core-periphery" when a region with a large initial number of intermediate producers become an industrial center. The second critical case involves absolute dissemination of knowledge and technology between the egions where the knowledge moved by mobile Deeds Cove and interregional trade includes novel intermediates that Vary. Model with the second case can be corrected by making the necessary parameters.Further development of the model implemented D. Puga and Venables A.(1996, 1997). They explained the emergence of the phenomenon of "flying geese" -trends in the spread of industries from one country to another with increasing international region. Their model was to explain the process of industrialization. They have already considered N regions (countries), producing manufactured goods with increasing returns to scale, and agricultural products with a constant returns to scale. The labor force was considered as immobile in while shopping or travel expenses were present. Agglomeration forces in this model emerged as communication input-output between firms in the industrial sector. If agglomeration forces strong enough, then the concentration of industrial production occurs in one region. The level of wages in this region will be higher, but positive cash externalities compensate you let a high-cost firms in wages, and will compensate until it reaches a critical mass. In this case, many companies will have to shift their production to another region (country) in order to maintain profitability. This model determines the distribution of industrial production in the regions by moving companies. Thus, some industrialized countries will even if they are originally similar to each other.

Analyses of agglomeration in the case of the regions. Today the economy of Kyrgyzstan is the developing economy as well as many economies of former Soviet Union. Economic researches in sphere of regional development become especially important in connection with extending integration processes in the world. Processes of integration lead to creation of economy without borders therefore regions and cities become progressively interconnected. They should be considered as administrative units for analysis, but not as separate national economies.

In modern economy agglomeration in particular (with inherent agglomerative effects) becomes the main growth driver of national economies. At the same time agglomerations still doesn't play a role which is indicative for developed and most dynamically developing countries.

Economic agglomeration phenomenon allows to research influence of industry spatial concentration on economic activity and enterprises productivity, at the same time it should be noted that such restrictions and features which include rather small sizes of country, considerable in-country regional disproportions, farness from world markets, lack of sea communications access, lack of advantages in form of development factors of "first" and "second" nature, technological lag, weak innovative potential, etc. are inherent to Kyrgyzstan economy.

Agglomeration effect which was offered by Marshall (1920) which was presented as productivity achievement proceeding from spatial concentration. Thus two types of agglomeration are differentiated: (1) localized economic system with expressed branch character and with high economic activity concentration; (2) various economy as external effects. What could be said reviewing approaches to agglomeration research, as possible tool within regional policy. Appeal to spatial economy questions was described in various theoretical and empirical researches since Weber's (1929) time which to this day attract considerable interest as direction of new economic geography. At the same time it is possible to note, that researches focus changes in view of modern economic circumstances.

Scientific interest moved to agglomerations phenomenon, an explanation of which are the economic prerequisites of agglomerative processes? Meanwhile in Kyrgyzstan agglomerations development and its

structure and intensity transformation happen slowly and do not have positive effect. What is more, local theory isn't rich in system fundamental researches of agglomerative processes, and the available researches have mainly conceptual character, not empirically confirmed.

Agglomerative processes happening in Kyrgyzstan more like have unsystematic character as in general mechanisms of its development wasn't developed yet. Though it is possible to note that in certain Kyrgyzstan's regions agglomerative processes are observed, which are especially demonstrated in Bishkek city, Chui area, Osh city and Osh area.

If refer to theoretical aspects of agglomeration research, first of all, agglomeration can be presented, as economic activity concentration in certain territory. Neffke (2009) marks agglomeration factors as positive and negative effects of economic activity concentration. It is noted that agglomeration plays a significant role in resources distribution as attracts number of new economy that has to lead to growth of enterprises number. Today there are 483 agglomerations in the world with the population of more than 1 million people. Thus it is significantly to note agglomeration mechanisms described in works of Duranton and Puga (Duranton, Puga, 2004). Three sources of externality in theoretical sense can have identical effects on spatial distribution of economic activity. However the question of agglomerations development extent and agglomerative effects assessment stays debatable.

In regional section key principle which underlies agglomerative effect consists in influence on heterogeneous goods and labor of factors of three groups – there are increasing return from scale, transport expenses and labor migration.

Modern stage of agglomeration formation has its features. From our point of view agglomerative process is based not only on entirety of 3 above-mentioned factors, but also on development of horizontal connections between its separate elements. Agglomeration effect works in presence of external effects (externality), to which level of transport availability is also relative. In relation to this factor the airports number, density of auto roads shall not essential impact on agglomeration index in Kyrgyzstan.

I. An objective of this research is the explanation of agglomerative processes and agglomerative effect in Kyrgyzstan's regions. As the economy of the Kyrgyz Republic is open, we don't exclude possible influence of integration processes on compensation level in those border regions which are more liable to this process.

We carried out an assessment of agglomerative effects existence in Kyrgyzstan's economy from point of view of concentration of regions' economic activity. As methodological base of research the concentration indexes of Herfindal-Hirshman, Jeanie's index, concentration index of P. Krugman were chosen, which are widely used for concentration and specialization analysis. Use of concentration index of industrial concentration was expediently used by us for assessment of industrial concentration degree countrywide and in dynamics.

For concentration assessment the basic indicator as industrial output of Kyrgyzstan's regions is emphasized. Calculation of industrial concentration index of Herfindal-Hirshman showed that (fig. 1) some concentration growth on industrial output indicator is observed in recent years, in other words tends to strengthening that indicates necessity of deeper analysis of which economic sectors have the highest concentration degree. Its highest level is on 2011.

For definition which kinds of manufacturing industries have higher concentration degree, we took measurement of dynamics of economic activity concentration process on 11 main sectors of manufacturing industries on Kyrgyzstan's regions. As methodological tool we expediently used an indicator of concentration index of P. Krugman. [2], which indicates association of regional labor markets, i.e. production diversification that allows to reduce risk level (in this case unemployment risk). It should be noted that P. Krugman's works belong to tnew direction of new economic geography which found practical use in foreign practice.

$$CONS = \sum_i |S^c - S|$$

Where CONS - numerical size of concentration index of P. Krguman for industry sector of i;

S^c - share of occupied in economy in region i among occupied in national economy;

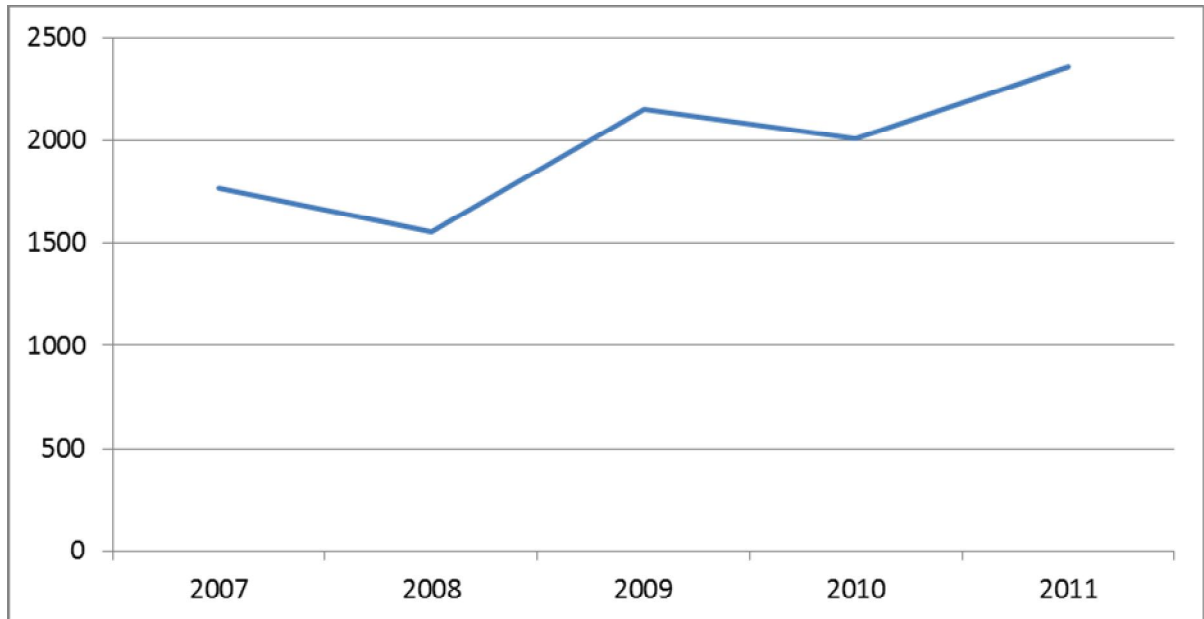S – share of total number occupied in national economy.

Fig. 1. **Dynamics of an index of economic activity concentration in Kyrgyzstan's regions in 2007–2011.**

Let's consider dynamics of received P. Krugman's index on Kyrgyzstan's regions on 11 branches of manufacturing industries for period of 2007–2011. (fig.2) (calculation is carried out by the author according to official data of National Statistical committee of KR).
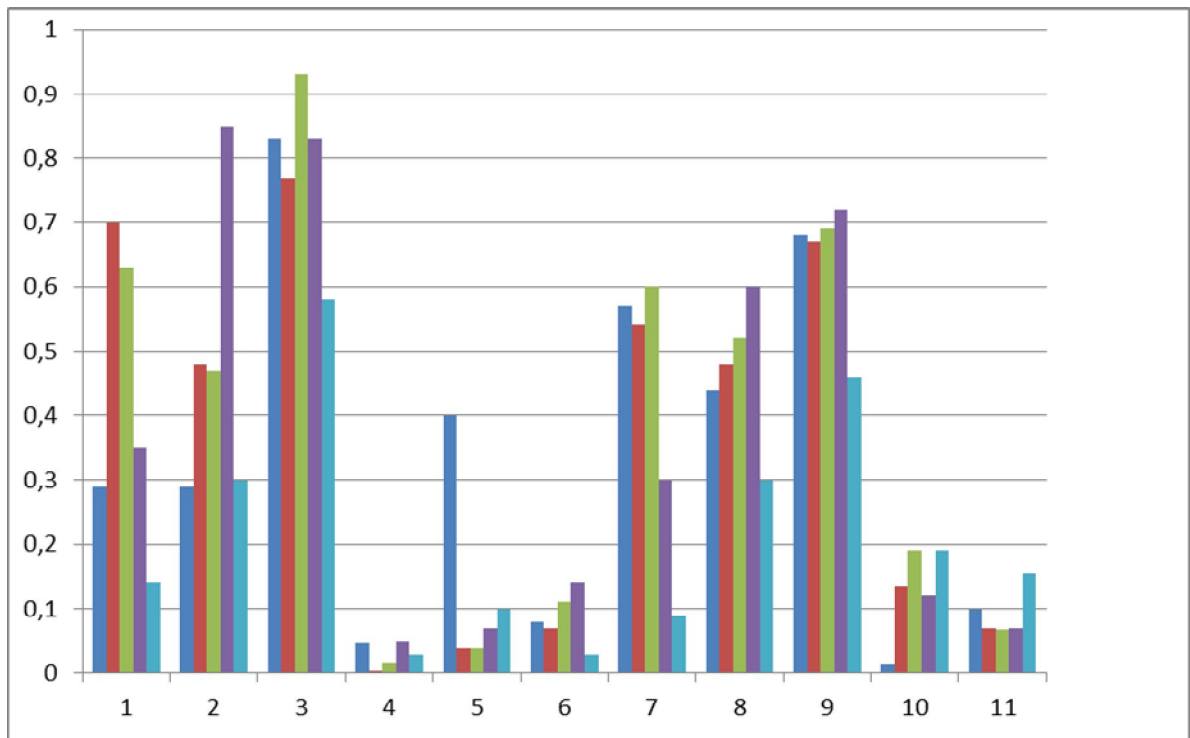

Fig. 2. **Concentration of industrial production on kinds of activity in Kyrgyzstan's regions for period of 2007–2011.** (1 – production of food products, 2 – textile production, 3 – leather production, leather products, 4 – chemical production, 5 – production of other non-metallic mineral products, 6-pulp-and-paper production, 7 – processing of wood and other wood products, 8 – metallurgical production and production of ready-made metal products, 9 – production of electric equipment, electronic and optical equipment, 10 – cars and equipment production, 11 – other branches of production).

In fig. 2 it is shown that the lowest concentration is observed in chemical production, production of other nonmetallic products, in pulp-and-paper production, in cars and equipment production. High degree

of concentration is received in leather production, leather products, in textile production, production of food products and in production of electric equipment, electronic and optical production. It should be noted considerable decrease in concentration degree for analyzed period on many branches. Thus, the productions gaining considerable effect from economic activity scales (as well as in most cases in practice) have the greatest concentration degree.

The undertaken analysis showed that against increase of growth of Herfindahl-Hirschman index, gradual decrease in P. Krugman index is observed (in the majority of branches) that provide evidence of creation of primary prerequisites in formation in economy of a certain system of the relations when resources tend to moving to regions with stronger concentration. Thus, the enterprises of manufacturing industry will start concentrating only in a case when start receiving additional benefit from this association. In our opinion in the conditions of Kyrgyzstan, on mobility of resources, in particular human capital assets factor, endogenous factors have greater impact. Thus, it once again proves, existence of the system "core - outskirts" in Kyrgyzstan; and without due attention of bodies of state administration, it can lead to aggravation of regional differentiation in accordance with the level of social and economic development in the country.

Table 1 – **Dynamics of P. Krugman index concentration of separate kinds of processing industry in Kyrgyzstan** (2007–2011)

Kind of manufacturing industry:	Concentration index (average value for period)	Regions with the greatest concentration	Maximum index (year)
Textile manufacture	0,478	Chui area, Osh area	2010
Food production	0,422	Chui area, Osh area	2011
Leather production and leather products	0,786	Issyk Kul area, Osh area	2009
Pulp-and-paper production	0,086	Chui area, Issyk Kul area	2010
Wood processing and wood products	0,366	Dzhalal-Abad area, Osh area	2009
Metallurgical production	0,468	Issyk Kul area, Dzhalal-Abad area	2010
Production of electric equipment	0,644	Dzhalal-Abad area	2010
Chemical production	0,028	Chui area, Batken area	2010
Production of other non-metallic products	0,13	Chui area, Batken area	2011

[author's calculations]

Thus, to the enterprises of manufacturing industry it is expedient to concentrate in case they receive additional benefits from it. The main benefit arising from agglomerative process is manifestation of a scale effect (or economy of scale) at various stages of life cycle of products. Level of a scale effect depends directly on specifics of production.

In literature agglomerative effects are subdivided into the following types. Economy from localization (MAR externalities - Marshall (1920), Arrow, Romer) – externalities caused by concentration of the enterprises of a certain branch in the territory. Economy from diversification (Jacobs externalities) – externalities connected with mutual influence of enterprises of various branches on territory (Jacobs, 1969). Economy from urbanization – externalities connected with the city size (Rosenthal, Strange, 2004; Neffke, 2009).

Studying of agglomerative effect are based, first of all, on approaches of Hall and Solow (Hall, Solow). Later researches were added with an explanation of the fact that in industries the size of the city, territory of branches location has considerable impact on productivity. As a rule, doubling city size will be connected with increase in productivity from 4-8%. There is a question, is it possible that density of the territory attracts manpower of great quality? It can be explained from positions of New Economic Geography. The main researches in the field of an assessment of effect of agglomeration are carried out mainly in relation to firms.

Throughout the long period of time the regional policy of Kyrgyzstan undergone a lot of changes. However, to this day there is no consensus about what has to be the optimum regional policy. Along with policy of the polarized development, so-called development of "growing points", considering aspect of regional policy, it should be noted that agglomerative effects exist, they can be strengthened by developing innovative points of growth, thereby to prove the need of state investments into development of regional locomotives. In modern realities agglomerative effects are shown in more difficult interactions. And the main problem in research and assessment of agglomerative effect is complexity of

interpretation of positive correlation between agglomeration and labor productivity. First, labor productivity can increase because of agglomerative effects, at the same time agglomeration can be itself consequences of high efficiency.

If consider a total quantitative score of influence of external economy on productivity, in many empirical works agglomerative effects are measured by the scale of concentration of productive forces. Thus, if in the region rather big concentration of firms or employment in a certain field of activity is observed, it is possible to draw a conclusion that agglomerative effects in this region are rather high.

According to the approach of authoritative scientific economists, the quantitative assessment of agglomerative effect represents the greatest complexity in the general diagnostics of spatial concentration.

In literature some characteristics for measurement of degree of spatial concentration are offered. In this work we use the model offered by Allison and Glazer (1997) [1]. This model compares observed distribution of economic forces with a zero hypothesis of accident of such distribution. It is important to note that we will apply such approach when economic activity is concentrated on a small amount of enterprises that is observed in the majority of branches of manufacturing industry in Kyrgyzstan. Allison and Glazer's index of emergence of agglomerations is explained by existence of strong casual shocks which give rise to development of economic activity in certain regions. We will carry out comparison among industries, not only from the point of view of description, but also the nature of spatial concentration by Ellison's and Glazer's index. In practice value of an index indicates force of agglomeration of external factors. Thus value more than 0,05 indicates on the high level of agglomeration, from 0,05 and to 0, 02 assumes moderate agglomeration and the assessment less than 0,02 shows uniformity in development. We will calculate Ellison's and Glazer's index by the below formula:

$$\gamma_i = \frac{G_i/(1-\sum x^2)-H_i}{1-H_i} \quad [1.]$$

where H_i - Herfindal's index for i branch which is calculated as the sum of shares squares of sectors in economy of the region, G_i-Jeanie's coefficient which characterizes distribution of employment of branches in the region.

Conclusion and results of the research. Further we will discuss the received values of an index of Ellison and Glazer, in practice the value is above 0,05 means high concentration, values in the range of 0,02 to 0,05 - as intermediate concentration and values below 0,02 represent low concentration. The importance of industrial concentration can be reflected in a quantitative assessment of agglomerative effect, algorithm of calculation which is offered in work [3, pg. 32] by the formula:

$$Y = \frac{G_i - H_i}{1-H_i} \quad [2]$$

where, G_i - index of geographical concentration of Ellison – Glazer;
H_i - index of industrial concentration by Herfindal.

High value of Y testifies the excess concentration in branch that is caused by excess of geographical concentration over market (industrial). In its turn, the emergence of new forms in branch conducts to increase of this parameter.

The given assessment of agglomeration effect on the basis of primary of the industry branches data showed that metallurgical production, production of other nonmetallic products, production of cars and the equipment, production of foodstuff, textile and sewing production are the branches which are insufficiently concentrated for agglomerative effect. Unlike which, production of vehicles and its equipment, chemical production, production of oil products concentration is more characteristic, but has unstable character.

Therefore, high values for the following branches: mining, production and distribution of electric power; manufacturing industry and the remained branches have steady concentration of production which can be characterized as agglomerated. Thus, the conducted research showed that effects of agglomeration are present, and they can be used and strengthened further if construct the corresponding infrastructure, construct roads and by this to provide communication of small cities with the center of agglomerations.

Table 2 – **Assessment of agglomeration effects in regional economy of Kyrgyzstan (2010–2011)** (author's own calculation according to official statistics)

Branch of industry	Ellison-Gleyser index	Number of enterprises	Herfindal-Hirshman index	Estimation of agglomeration effect Y_i

Mining industry	1,330	142	0,0319	1,354
Mineral production, except fuel and power	1,268	67	0,015	1,272
Production of electric equipment and optical equipment	1,043	56	0,016	1,04
Extraction of fossil fuels	0,531	75	0,026	0,52
Pulp and paper production, publishing	0, 528	142	0,015	0,523
Vehicles and transport equipment production	0,479	7	0,014	0,47
Chemical production	0,444	57	0,0135	0,43
Mineral oil production	0,422	8	0,028	0,41
Wood processing and wood handicrafts production	0,279	51	0,047	0,24
Metallurgical production and finished metal products manufacturing	0,196	101	0,12	0,08
Manufacturing of other non-metallic products	0,190	189	0,04	0,09
Leather production, leather products and shoe making	0,136	13	0,013	0,15
Processing industry	0,0857	1456	0,017	0,12
Equipment production	0,00825	99	0,017	0,006
Other branches of production	0,0761	80	0,068	-0,009
Food products manufacturing, including drinks and tobacco	0,0753	372	0,04	0,0086
Textile and clothing manufacture	0,0696	128	0,019	0,0036
Rubber and plastics articles production	0,0602	152	0,02	0,04
Electric energy, gas and water production and distribution	- 0,588	344	0,059	0,56

[author's calculations]

However, it is necessary to consider the overestimated expectations of the agglomerative effects connected first of all with non-market instruments of placement of productions and low mobility of a manpower within the country. Therefore to the direction of further researches of processes of agglomeration we consider expedient the carrying out of an assessment of sources and an explanation of agglomerative effects from positions, both firms, and macro level.

On the basis of the conducted research we can formulate some recommendations which are expedient to relate to the measures promoting development of centripetal forces in the region;

– the measures directed on decrease in transport expenses (infrastructural, institutional; decrease in trade barriers, adjustment of interregional partner communications, etc.);

– creation of conditions for development of a full production cycle in the territory of the region in the presence of natural resources;

– in case of border position of the region (or existence of large transport knots) use of the given competitive advantage to attraction of economic activity in the region;

– contribution to development of interconnected types of industrial production in the region (even for companies competing among themselves), creation of favorable institutional and infrastructure conditions for emergence of clusters in the region;

– universal stimulation of innovative and research activity in the region as most important factor of growth of economic activity concentration.

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Промышленная концентрация в регионах Кыргызской Республики, подходы с использованием новой экономической географии.

Б.А. Сатывалдиева

В данной работе приведен теоретический подход к исследованию агломерационных эффектов в Кыргызстане. На основе анализа вторичных данных по вопросам регионального развития в Кыргызстане дана интерпретация агломерационных эффектов для первичных отраслей промышленности и представлены пути стимулирования регионального развития.

Ключевые слова: региональное развитие, региональная политика, пространственная концентрация, агломерация, агломерационные эффекты.

Industrial concentration in the regions of the Kyrgyz republic approaches using new economic geography

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In this work theoretical approach to research of agglomerative effects in Kyrgyzstan shall be considered. On the basis of secondary data analysis on regional development in Kyrgyzstan, the interpretation of agglomeration effect for primary branches of industry for regional development stimulation shall be given.

Keywords: Regional development, regional policy, spatial concentration, agglomeration, agglomeration effects.