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**THE IMPACT OF HUMAN CAPITAL
ON REGIONAL INNOVATIVE DEVELOPMENT**

The paper discusses the lack of efficient mechanisms for support and implementation of innovations in many regions of Kazakhstan. Parameters, determining the development of human capital assets and innovations in a region were analyzed. Standard ratios and an integral indicator for each region of Kazakhstan were calculated and the direct link between human capital assets and innovative development of regions was proved. Based on the performed analysis, the authors propose a solution to the problem of innovative development gaps between regions using human capital assets development.

Keywords: human capital; innovative development; regional development; Kazakhstan.

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**ВПЛИВ ЛЮДСЬКОГО КАПІТАЛУ
НА ІННОВАЦІЙНИЙ РОЗВИТОК РЕГІОНІВ**

У статті розглянуто проблему відсутності ефективних механізмів підтримки та впровадження інновацій у багатьох регіонах Казахстану. Проаналізовано параметри, що визначають розвиток людського капіталу та інновацій в регіоні. Розраховано стандартні коефіцієнти та інтегральний показник для кожного регіону Казахстану, а також доведено прямий зв'язок між людським капіталом та інноваційним розвитком регіону. На підставі проведеного аналізу запропоновано вирішення проблеми відставання регіонів в інноваційному розвитку за допомогою розвитку людського капіталу.

Ключові слова: людський капітал; інноваційний розвиток; регіональний розвиток; Казахстан.

Форм. 2. Табл. 1. Літ. 11.

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**ВЛИЯНИЕ ЧЕЛОВЕЧЕСКОГО КАПИТАЛА
НА ИННОВАЦИОННОЕ РАЗВИТИЕ РЕГИОНОВ**

В статье рассмотрена проблема отсутствия эффективных механизмов поддержки и внедрения инноваций во многих регионах Казахстана. Проанализированы параметры, определяющие развитие человеческого капитала и инноваций в регионе. Рассчитаны стандартные коэффициенты и интегральный показатель для каждого региона Казахстана и обоснована прямая связь между человеческим капиталом и инновационным развитием региона. На основе проведенного анализа предложено решение проблемы отставания регионов в инновационном развитии с помощью развития человеческого капитала.

Ключевые слова: человеческий капитал; инновационное развитие; региональное развитие; Казахстан.

Problem setting. Today's economic conditions in Kazakhstan, with its resource rich oil & gas sector, result in the transition from the raw material oriented to processing-oriented economy, based on innovation. In this regard, the Government of Kazakhstan is working on the development of national innovation system, but little progress can be seen in the country so far. According to the Knowledge Economy Index (KEI) (the level of knowledge economy development) Kazakhstan is at the

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same level as in such countries as Kenya and Mongolia, at the same time, Kazakhstan is among the countries with the average income level according to its macroeconomic indices (Isabek and Mukhambetova, 2014). This situation is caused by the fact that in many regions of the country, innovation support and implementation remain a weak link in the innovation system (Barlybaeva et al., 2011).

Recent research and publication analysis. Notwithstanding numerous researches on innovative development of Kazakhstan, the issue of human capital influence on the results of economic activity and on innovative development of regions remains discussible. Not all scientists agree with the opinion, that at the macrolevel human capital assets are a set of expertise, knowledge, and skills of population, promoting innovative development of regions (Ustinova et al., 2015). Analysis of foreign works shows the existence of significant influence of human capital assets on production (De La Fuente and Domenech, 2000; Krueger and Lindahl, 2001; Temple, 1999). The models these authors used derive a positive statistically significant interrelation between human capital and economic growth.

However, a number of other studies does not reveal such interrelation between human capital and economic growth. Non-linearity and indirect influence of human capital assets on economic growth is shown in (Romer, 1990; Benhabib and Spiegel, 1994).

The objective of this research is to determine the influence of human capital on innovative development of regions in Kazakhstan using multidimensional comparative analysis in calculation of the integral indices of "human capital assets" and "the level of innovative development of the territory".

Theoretical and methodological basis for the research are the fundamental works by local and foreign scientists in the area of economic growth and innovative development, regional economy, assessing the level of human capital development, as well as management of its formation and use.

Methodology for this research is based on multidimensional comparative analysis which allows studying objects considering the number of parameters simultaneously and this increases the efficiency of research. Also the technique of results visualization has been applied.

The results of our research emphasize the improvement of approaches to studying human capital, its structural components, human capital management, methods of studying innovation processes in economic systems. Our study also contributes to grounding the interrelation between human capital and innovative development of a territory and improvement of assessment tools detecting this interrelation.

Key research findings. We used the statistical data of the Committee for Statistics of the Republic of Kazakhstan, on the basis of which the indices of "human capital assets" and "the level of innovative development" were calculated (Statistics Committee, 2014). A multidimensional comparative analysis calculate the integral indices of "human capital assets" and "the level of innovative development of a territory".

Assessment of the innovative development level and human capital assets was based on the methods developed by the authors, which included a number of stages: determining the level of human capital development of a territory; assessment of the innovative development level, building the matrix "the level of human capital – the

level of innovative development of the territory". Formulas for calculating the standardized ratio (1) and the integral index (2) are well-known formulas used in multidimensional comparative analysis (Simchera, 2008).

At the first stage, assessment of the human capital level was performed in the following order: parameters for analysis were selected; the integral index was calculated using multidimensional comparative analysis.

The following parameters were selected for calculation of the integral index of "human capital assets":

- number of personnel, engaged in R&D per 1000 of population;
- assets ratio;
- the share of population with the income below the minimum subsistence level;
- the share of employees with higher education in the total amount of the employed.

The selection of indices to calculate the integral index was done according to the objectives and tasks of this research. In addition, the structure of human capital assets, which fundamental components are health capital and professional capital (abilities, skills, knowledge, professional experience and the record of service etc.) were considered. In addition, it was noted, that formation of the components of human capital assets requires investments, the significant part of which consists of personal contributions of population (to this extent, it is necessary to consider the parameters, associated with the amount of income and the level of its differentiation).

For the integral index, substantial interpretation of each parameter was taken into account as well:

$$StK_i = \frac{X_i}{X_{kz}}, \quad (1)$$

where X_i – the input value of the parameter for i -region; X_{kz} – the average value of the parameter in the Republic; StK_i – the standardized ratio;

$$STK = \sqrt{\frac{\sum_{j=1}^m (StK_j)^2}{m}}, \quad (2)$$

where STK – the integral index; m – the number of parameters, considered in the calculation.

The average value in the Republic was selected for each parameter of the integral index and was compared with the indices of Kazakhstan's regions. The derived standardized ratios were squared; the square root (formula 2) was obtained from all the indices (by their amount). The calculated value is an integral index, taking the values from 0 to 1.

From the analysis performed it follows that most of regions in Kazakhstan are included into the group with the average level of human capital development, thus, management of these regions is required to adopt a set of measures, aimed at searching for reserves and their activation for better formation and use of human capital.

According to the values of certain parameters, included into the integral index "human capital assets", the presence of the regions in the group with low level of

human capital development can be explained by a small share of employees with higher education, small number of personnel, engaged in R&D. However, among the regions with high level of human capital development we have the opposite situation. Insignificant number of workers with higher education is the criterion to assign a region to the group with the average level of human capital development.

At the second stage, assessment of the level of innovative development by regions of Kazakhstan was performed by means of multidimensional comparative analysis of statistical data on:

- innovative activity of enterprises;
- the share of the R&D costs in gross regional product;
- the amount of innovation products in the total volume of shipped products.

In addition, here, according to the formulas (1) and (2), the integral index, taking the value from 0 to 1 was calculated.

Within these limits, five levels of innovative development were separated: high, above average, average, below average, low. The group "high" includes Almaty, Akmola, Karaganda and South Kazakhstan regions.

At the third stage, the matrix "level of human capital asset – level of innovative development of the territory" was built. The advantages of using the matrix approach include universality and adaptability of the applicable data, opportunity to take into account the properties of the object under study, performing quantitative comparative assessment of the observation units, object grouping by matrix of relations between them (detection of relations between the groups), positioning, determining typical development strategies of the object under study, determining the combination of factors subject to territories' specificity, ensuring their innovative development.

Depending on the level of innovative development of human capital, all regions were divided into several groups. Most regions and cities with high level of human capital development are characterized by similar level of innovative transformations as well.

Regions with the level of human capital "above average" have "average" or "above average" level of innovative development. Regions with "low" level of human capital have "average" or "below average" levels of innovative development. Thus, generally, the level of human capital development within any territory influences innovative transformations. This dependency became even shaper in "polar" groups and less evident in the regions with average levels of human capital development (Table 1).

The performed research allowed us formulate the following **conclusions**:

- the methodology of determination of interrelation between human capital and innovative development of a territory enables setting a differentiated system of managerial impacts to activate innovative processes using direct and indirect methods. It was developed basing on the data of multidimensional comparative analysis and tested on statistical data of the regions in the Republic of Kazakhstan;

- it was established that regions with high level of human capital development are characterized by high or above average level of innovative development, therefore. While territories with low level of human capital are characterized by low or below average innovative activity, thus, the role of human capital in ensuring the innovative development of territories is grounded.

Table 1. Regional integral indices of the human capital level and innovative development, authors'

#	Region	Human capital development	Innovative development of the region
1	Akmola	0.981	0.945
2	Aktobe	0.892	0.758
3	Almaty	0.935	0.899
4	Atyrau	0.853	0.730
5	East Kazakhstan	0.798	0.635
6	Zhambyl	0.764	0.611
7	West Kazakhstan	0.682	0.589
8	Karaganda	0.901	0.866
9	Kostanay	0.603	0.547
10	Kyzylorda	0.711	0.597
11	Mangistau	0.596	0.456
12	Pavlodar	0.755	0.682
13	North Kazakhstan	0.862	0.801
14	South Kazakhstan	0.917	0.872

The results of the performed analysis for the regions of Kazakhstan demonstrate the direct relation between the level of human capital development and innovative development of regions. The detected factors impeding innovative transformations provide an opportunity to propose the following activities:

- to develop a concept of personnel training for innovative economics with special mechanisms for its implementation (considering such aspects as aiming at generation of scientific and technical innovations and searching for the ways of their practical implementation; focusing on preparation of highly qualified professionals, system managers for innovative activity, creation of the system for continuous study and personnel development, integrated into the system of innovative production);
- to perform monitoring of human capacity of the innovative sector; monitoring of the enterprises demand for R&D; monitoring aimed at detection of factors, facilitating creation and dissemination of innovations, getting necessary and objective information about innovative capacity of territories and innovative activity of population.

Improvement of the system of formation and development of human capital, raising the effectiveness of its work is the key target in formation of a solid national innovative system. this would help Kazakhstan become one of 30 most competitive countries of the world, which is the main aim of the Strategy for Development of the Republic of Kazakhstan until 2050 (The Strategy for Development, 2012).

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