The degradation of intellectual and creative human capital as the factor for deterioration of the economy competitiveness in Omsk region

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Abstract
The issue of the intellectual and creative human capital development is relevant because, firstly, the concept of long-term socio-economic development of the Russian Federation up to 2020 has been developed and it is effective. The creation of economic leadership and innovation is declared in it. Today the RF economy can be called a "commodity economy" and in compare with the developed countries, the human capital of the Russian Federation is no more than 50 per cent. Human capital is an important factor in the competitiveness of the region, providing innovative development of the regional economy. The article presents the results of the analysis of approaches to the concept of intellectual and creative human capital and the interpretation of its author. The proposed study, conducted in 2017 on the basis of statistical analysis of information, uses structural and integrated approaches to the assessment of intellectual and creative human capital of the Omsk region. According to the results of the study, the article offers recommendations aimed at the normalization of intellectual and creative human capital of the region, the creation of a new model of innovative development of the Omsk region.

For citation

Keywords
Creative potential, degradation of human capital, intellectual and creative human capital, statistical indicators, intellectual capital.

Introduction
The issue of the intellectual and creative human capital development is relevant because, firstly, the concept of long-term socio-economic development of the Russian Federation up to 2020 has been developed and is effective. The creation of economic leadership and innovation is declared in it. Today the RF economy is a "commodity economy" and in compare with the developed countries, the human capital of the Russian Federation is no more than 50 per cent.

Second, for the Omsk region, the prospects for further innovative development depend on the quality of human capital and, especially, its intellectual factor. The Strategy for socio-economic development of the Omsk region up to 2020 focuses on the fact that the leading path of economic growth is only possible on the basis of private initiative and intellectual capital development. However, as a result of the statistical analysis, human capital has been degrading.

To use and manage the intellectual capital of the labour force effectively, timely and correct accounting, as well as reasonable estimate is required. The current system of accounting and reporting intellectual and creative human capital does not meet the requirements of the modern innovation economy, as it was originally developed for companies working in industrial economy. In the Russian Federation, as part of the financial statements, there is information on only individual elements of the
intellectual human capital that are recognized as intangible assets of the company. This approach does not allow a full understanding of the real situation of economic entities to be formed by involved users.

The existing alternative approaches to the accounting and estimation of intellectual human capital are corporate and not widely used. Therefore, there is no single approach to category and methodological apparatus on using different systems of intellectual capital estimation. In this regard, there is an increasing scientific interest in estimating intellectual human capital in an accounting framework to optimize the management of intellectual human capital and achieve a complete understanding of the competitiveness increase and develop the modern innovatively active region.

Over the past 10 years, Omsk region has been undergoing the degradation of intellectual and creative human capital. This has severely restrained the competitiveness of the region, reduced its investment attractiveness and, consequently, a number of innovative and creative enterprises in the region. As a result of the latter, the regional budget suffers from the decrease in tax revenues.

The purpose of the study is to develop recommendations for the modernization of Omsk region intellectual and creative human capital management.

To achieve the purpose a number of tasks must be solved:
- to study foreign experience in the accounting and management of the regional intellectual and creative human capital;
- to improve the estimation model of the human capital in the innovation-oriented economic system;
- to adapt the system of indicators characterizing the potential and results of human intellectual and creative capital, and on this basis to develop human capital activities for the Omsk region.

In our research, we hypothesized that the degradation of intellectual and creative human capital reduces Omsk region economy competitiveness.

**Main part**

Theodore Schultz was the first to formulate the theory of human capital in "Investment in Human Beings" [Shultz, 1971]. He described human beings as a form of capital, a source of future economic benefits, being formed by the development of individual human capabilities through education in schools, university, the workplace, etc. However, it is not the same as the labour force, which is a measure of the total labour supply in the innovative economy. Theodore Schultz did not explore the creative, psychological and cultural characteristics of human being, but noted that the costs for capability development were investments that the individual was willing to make to earn higher income in future.

If we compare the concepts of human capital and human resources, there is also no equality. Human resources are a set of people whose mental and physical capabilities are used as a productive resource for the efficient operation of the economic system.

There are two prerequisites on which the human capital is based:

1) the allocation of investment resources according to relative rates of opportunity costs profit;

Gary Becker [Becker, 1962] defined human capital at the micro level as an asset requiring long formation period and costly investments for its development and maintenance. The same view was expressed by M. Kritskij [Kritskij, 1995] considering human capital as a long-term capital resource.

In the monograph “Human capital as a condition for the development of the regional innovative economy” G. Khmeleva [Khmeleva, 2012] noted that earlier human capital was considered to be the investment, and then as a reserve of skills, capabilities, to generate income, and now as a set of assets and as a factor of production.

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These definitions provide an opportunity to develop approaches to the estimation of individual and national human capital. Economic analysis uses the concepts of turnover and turnaround of human capital. Human capital turnover is divided into real turnover, total turnover, and turnover of working capacity. The stages of reproduction determine the structure of human capital turnover and its shapes.

All the above works consider human capital in terms of economic theory, which does not allow the tasks in company management to be solved in practice. This leads to a new branch in research – estimation and analysis of the business intellectual capital.

The definition “intellectual capital” was introduced by John Galbraith [Galbraith, 1969] and represents the result of a person's intellectual abilities. An empirical approach influenced on the development of intellectual capital views providing practical management and accounting recommendations. Later they evolved into scientific directions. Organizations lacked the concept of human capital to explain the difference between the market value and historical cost of companies. The difference between market value and historical cost was represented as the sum of the organization's intangible assets used to generate value and gain competitive advantage. In addition, the concept was characterized by profound theoretical nature, and the organizations could not adapt it to their basic needs. “The contribution of intellectual capital to US GDP by different estimates in 1995-2003 was about 11%.”

It is obvious that the concept of intellectual capital (IC) is much broader than that of human capital. Although there is no single point of view on IC among the scientific establishment and practitioners, three of its components can be distinguished:

– human capital, which is a combination of inborn aptitude, acquired skills and knowledge used to increase income;
– structural capital, which is an organizational structure and processes, an internal corporate culture;
– relational capital (relationship capital) is the relationship between those who are outside the company (suppliers, customers).

Thus, intellectual capital accumulates synergy between people, groups and state institutions.

Modern scientists cannot definitely interpret the obtained effect as a human factor. A number of scientists (Brown A., Osbom T., Chan J.) M., Jaganathan V., 2005) define intellectual capital as an aggregate of intangible assets not considered in the accounting.

A number of authors [Golubkin, Kleeva, Patoka, 2005] believe that IC is a resource of organization. But there is an intellectual capital counterview, which defines it through heterogeneous categories, such as knowledge, activities and skills, connected by the "intangibility". B. Lev [Lev, 2003] thinks that intellectual capital is intangible assets generating income in the future. Therefore, the concepts of intellectual capital and intangible assets are interchangeable.

We define the essential characteristics of the intellectual capital:

– has no material form but participates in company estimating and influences on its competitiveness;
– has a non-monetary nature of formation;
– cannot be copied and replaced by other resources.

Modern researchers express intellectual capital through either the concept of intangibility or categories of capital, knowledge, assets [Marr, Moustaghfir, 2005]. But we think that the first characteristic is not obvious to economic science, and other concepts do not express all the signs of intellectual capital as an economic category.

There are recommendations from the Ministries of Economy and Trade of Japan, Denmark, Germany and France on the creation of intellectual capital recording, but they are more aware of business processes than of intellectual capital elements.

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The structure of the regional intellectual and creative resources can identify five components (Figure 1).

![Diagram of intellectual capital components]

**Figure 1 – Components of intellectual capital**

Human capital consists of a set of knowledge, experience, competencies and the employee goodwill, the values of the team, etc. Structural capital includes organizational structure, business technology, trademarks, corporate culture, and the business and region goodwill. Client capital is the relationship of the external environment with the company and the region. Process capital is the total cost of processes involved and not involved in the creation of the value. Innovative capital is expressed in the company intellectual property and the ability to transform the organization.

Critical analysis of contemporary economic literature has enabled the authors to identify a number of approaches to the concept of intellectual and creative human capital.

In the author's interpretation, intellectual and creative human capital is the sum of non-monetary assets and liabilities, including innovations and information controlled or under the partial control of companies in the region and involved in the creation of economic benefits. Based on this definition of the intellectual and creative human capital (ICH) of the region, we shall estimate this capital for Omsk region.

There are certain methods of calculating intellectual and creative human capital in particular [Florida, 2006] using 3T-method (talent, technology, tolerance). It is not possible to apply this technique while estimating ICHC in Omsk region due to homophobic views that are common in Russia. In defining tolerance, R. Florida uses the men-homosexual statistics. The method for estimating human intellectual capital is also presented in the work of O. Loseva (2013), but it does not take into account the creative component of regional ICHC.

The human potential of the region is not only the development level of intellectual actors, but also the one for creative development. On the one hand, these opportunities are created by the staff of the organizations themselves in the process of their intellectual efforts. On the other one, they provide the movement of innovatively meaningful results.

In our study of the human potential in Omsk region we adhere the following methodology.

As a first step, we developed the system of statistical indicators defining the intellectual and creative human resources, conditions and opportunities for creative activities in Omsk region. Then we formed the system of statistical indicators characterizing the results of creative activities in Omsk...
region. In the statistical approach, however, the specificity of the region is sometimes diluted. In our case, the problem was solved by selecting indicators that reflect the specifics of Omsk region. We had the following requirements for them:

– the indicators should be relevant to the objectives of the estimation or informative in terms of functioning ICHC in assessing the competitiveness of Omsk region;
– the indicators should be representative, i.e., they represent in full the functioning of the regional ICHC in different areas of activity;
– the number of indicators should be limited, not to make analysis difficult or increase the labour intensity of data collection;
– the regional indicator values are derived from the data of Russian Federal State Statistics Service and its agencies;
– indirect estimates are allowed when statistics is not available;
– the indicators should be independent.

Further we used a structural approach based on the system of indicators covering three main areas of regional ICHC activity, forming, in our view, the possibility of creative development in the region, such as: research, innovative entrepreneurship, cultural and educational activities.

We combined these indicators into the following blocks:
1. indicators of human intellectual and creative potential (P);
2. indicators reflecting the results of the regional HC intellectual and creative activities (R).

In the next stage we made a factor analysis of the innovation activities dynamics in Omsk region.

In the final stage, we identify the dynamics of the Omsk region ICHC and develop an integral index of its development.

The analysis of the impact of ICHC on the regional creative development and competitiveness based on the calculation of certain indicators is presented in tables 1-3. (Regions of Russia). In selecting the indicators, the following assumptions guided.

Potential indicators are equal to the resulted ones. The different number of indicators in the areas under consideration is due to the feature of statistics collection in the Russian Federation, so we showed only the indicators for statistics available for a given period. The total number of indicators for all spheres is 22.

Table 1 provides the analysis of forming the intellectual and creative human capital in Omsk region in the innovative-business area during 2012-2014.

However, the creation of new value chains by developing and deploying unique technologies, goods and services cannot be achieved without research activities. The ICHC indicators in this area are shown in table 2.

The cultural and educational environment is formed by a regional system of education. Its traditions as well as genetically defined intellect of the employee are the natural basis for ICHC functioning. This sphere forms a creative culture of labour. Its low level has a negative impact on the activity of economic actors.

Thus, according to the estimation of the ICHC impact on the regional creative development, the innovative-business sector was found to be in priority.

| Table 1 – ICHC indicators of Omsk region in innovative entrepreneurship during 2012-2014 |
|---------------------------------|--------|--------|--------|
| Indicator content               | 2012   | 2013   | 2014   |
| The potential of intellectual and creative human capital functioning |         |        |        |
| Fixed capital investment per capita | 55078,78 | 535160,86 | 53535,83 |

The degradation of intellectual and creative human capital…
<table>
<thead>
<tr>
<th>Indicator content</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of self-employed entrepreneurs per 1000 persons of the economically active population</td>
<td>42</td>
<td>39</td>
<td>31</td>
</tr>
<tr>
<td>Percentage of technological innovation costs in total turnover of organizations</td>
<td>3.12</td>
<td>3.13</td>
<td>3.61</td>
</tr>
<tr>
<td>Percentage of organizations using reference and legal systems (RLS) for automated production</td>
<td>22.8</td>
<td>22.9</td>
<td>20.3</td>
</tr>
<tr>
<td>Percentage of organizations using global information networks (GIS) in the total number of organizations</td>
<td>79.6</td>
<td>81.2</td>
<td>84.8</td>
</tr>
</tbody>
</table>

The results of intellectual and creative human capital functioning

<table>
<thead>
<tr>
<th>Indicator content</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Share of innovative goods, works, services in total goods shipped, work and services performed</td>
<td>2.7</td>
<td>3.7</td>
<td>3.5</td>
</tr>
<tr>
<td>Percentage of the population income from business activities in total cash income</td>
<td>9.1</td>
<td>8.7</td>
<td>6.9</td>
</tr>
<tr>
<td>Percentage of organizations carrying out technological, organizational or marketing innovations to the total number of surveyed ones</td>
<td>8.2</td>
<td>8.3</td>
<td>8.2</td>
</tr>
<tr>
<td>Number of advanced production technologies per 1000 persons of the economically active population</td>
<td>2.85</td>
<td>2.94</td>
<td>3.19</td>
</tr>
<tr>
<td>Share of training costs for ICT development in total ICT costs</td>
<td>0.42</td>
<td>0.45</td>
<td>0.3</td>
</tr>
</tbody>
</table>

Table 2 – ICHC indicators of Omsk region in scientific-research field during 2012-2014

<table>
<thead>
<tr>
<th>Indicator content</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>The potential of intellectual and creative human capital functioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of personnel engaged in research and development per 10 000 persons of economically active population</td>
<td>46.84</td>
<td>48.64</td>
<td>44.11</td>
</tr>
<tr>
<td>Percentage of researchers with academic degree in the total number of researchers</td>
<td>7.28</td>
<td>7.5</td>
<td>8.1</td>
</tr>
<tr>
<td>Percentage of internal research and development costs in total turnover of organizations</td>
<td>0.49</td>
<td>0.49</td>
<td>0.5</td>
</tr>
</tbody>
</table>

The results of intellectual and creative human capital functioning

<table>
<thead>
<tr>
<th>Indicator content</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of postgraduate and postdoctoral students defended their scientific theses in total number of completed ones</td>
<td>23.4</td>
<td>17, 8</td>
<td>14.4</td>
</tr>
<tr>
<td>Ratio of the number of advanced production technologies and issued patent applications per 1000 persons engaged in research and development</td>
<td>86</td>
<td>69</td>
<td>91</td>
</tr>
<tr>
<td>Ratio of the number of filed patent applications per 1000 researchers</td>
<td>96</td>
<td>86</td>
<td>94</td>
</tr>
</tbody>
</table>

Table 3 – ICHC indicators of Omsk region in cultural and educational field during 2012-2014

<table>
<thead>
<tr>
<th>Indicator content</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>The potential of intellectual and creative human capital functioning</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Percentage of employees in education, cultural services to the population in the total number of employed people</td>
<td>10.81</td>
<td>11.34</td>
<td>11.41</td>
</tr>
<tr>
<td>Percentage of employees with higher vocational education</td>
<td>27.1</td>
<td>26.5</td>
<td>28.0</td>
</tr>
<tr>
<td>Percentage of household spending on education, leisure and cultural activities in total household budget</td>
<td>6.7</td>
<td>6.9</td>
<td>7.1</td>
</tr>
</tbody>
</table>

The results of intellectual and creative human capital functioning

<table>
<thead>
<tr>
<th>Indicator content</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Graduation of specialists with higher education per economically active 10 000 persons</td>
<td>501</td>
<td>486</td>
<td>448</td>
</tr>
</tbody>
</table>

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The tables will construct a radar chart indexes

\[ i_p = \frac{P_{2014}}{P_{2012}} \]

ICHIC indicators of Omsk region in innovative entrepreneurship during 2012-2014.

<table>
<thead>
<tr>
<th>Indicator content</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage of trained employees in the public and the municipal service in the total number of employees</td>
<td>58</td>
<td>64</td>
<td>52</td>
</tr>
<tr>
<td>Share of budget expenditure on socio-cultural activities in total budget expenditure</td>
<td>67.8</td>
<td>71.7</td>
<td>71.2</td>
</tr>
</tbody>
</table>

Figure 2 – The potential of intellectual and creative human capital functioning

Figure 3 – The results of intellectual and creative human capital functioning ICHC indicators of Omsk region in scientific-research field during 2012-2014

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Figure 4 – The potential of intellectual and creative human capital functioning

Figure 5 – The results of intellectual and creative human capital functioning

ICHIC indicators of Omsk region in cultural and educational field during 2012-2014.
When analyzing the effect of factors on the resulting estimate and selecting, we excluded linearly
dependent indicators with a high degree of relations to eliminate duplication of data. However, it cannot
be completely eliminated, as all these indicators characterize the process of intellectual and creative
activity.

We use relative values in our indicators:
1. Structures
2. Intensity
3. Level of economic development

We define the total change in the state of regional ICHC with private indicators representing a
hierarchical system. For each key point, the initial index is a function from the explained indexes and
their weights:

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\[ I = F(i_1, f_1, i_2, f_2, \ldots, i_n, f_n) \]  

(1)

where \( f \) is the weight of the corresponding index.

To analyze their total change, it is useful to use geometric average, taking in mind that all indicators are the same and the index weights are equal to one.

So we get the following index equations:

\[ I_p = \sqrt[\text{n}_j]{i_{p1} \cdot i_{p2} \cdot \ldots \cdot i_{pn}} \]  

(2)

where \( \text{n}_j \) is the number of indicators in j-th group.

The overall measurement of ICHC dynamics is determined by the change in all studied areas, but the influence of these spheres on the creative development of the region varies, affecting the choice of weights. The priority is the sphere with a large number of indicators. This is the innovative entrepreneurship, followed by the research field that is a basis for the generation of innovative ideas and technologies. The last is the cultural and educational sphere that forms an innovative and creative culture of labour resources.

The final index form is like:

\[ I_{\text{HC}} = \sqrt[3]{(I_{\text{IM}})^{3/2} \cdot (I_{\text{IH}})^{2/3} \cdot (I_{\text{KO}})^{1/2}} \]  

(3)

**Results**

We calculate the total indexes of potentials and results of the human intellectual and creative capital in Omsk region in selected areas.

\[ I_{\text{pIM}} = \sqrt[3]{1.034 \cdot 0.738 \cdot 1.15 \cdot 0.89 \cdot 1.06} = 0.963 \]

Similarly, we find

\[ I_{\text{pIH}} = 1.021 \]
\[ I_{\text{pKO}} = 1.043 \]

As we see, the innovative entrepreneurship in Omsk region is being degraded, but other areas are virtually unchanged within 2012-2014, indicating that they are stagnating.

Next, we find the results

\[ I_{\text{IM}} = 0.95 \]
\[ I_{\text{IH}} = 0.856 \]
\[ I_{\text{KO}} = 0.94 \]

The results in all areas of innovative and creative capital show further degradation of the intellectual and creative human capital in Omsk region.

**Discussion and conclusion**

None of innovative project has been implemented in Omsk region in recent times. The reason for this is the degradation of human capital, according to the authors’ study. In the previous work of the authors

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[Rudakov, Rudakova, 2015; Cherniavskii, Akhmetova, Makovetskii, 2016] the main factors that contribute to the degradation of intellectual and creative human capital were defined. These include:

- Low wage. 7500 rubles is the official minimum wage, which is below the subsistence level of 9222 roubles.

- Inadequate social and transport infrastructure for a number of territories in the region. The underground in the region centre and the international airport "Fiodorovka" have been constructing for 35 years. Also the road service between Omsk and a number of settlements is not available.

- Employment challenges in a number of specific population groups.

- The spread of alcoholism and drug addiction.

- The low level of conformity of training with the needs of the labour market.

In Omsk region, a despair circle has emerged on the degradation of human capital, which is as follows: the low productive capacity of human capital causes a low level of economical competitivity. This, in turn, results in crises in the regional economy. As a result, socio-economic conditions are deteriorating, creating poverty and degrading human capital. In addition, developing or degrading due to the modifying effects of the external environment, the creative potential of the employee determines the development direction of the entire system with further self-accepting. Also, the social infrastructure has been damaged in Omsk region. This has a negative impact on attracting a creative class to the region.

It is worth noting that little attention is paid to institutional factors in Omsk region to increase the efficiency of labour regeneration. The growing labour shortage has been emerging since 2014: in 2014, the shortage is 12.7 thousand, in 2015 - 17.8 thousand, in 2016 - 22.9 thousand.

To change this situation, the following priority directions should be implemented:

Firstly, a sustainable balanced development of regional ICHC requires a more efficient economy by creating conditions for economic growth. In this area, new industrial production giving priority to the development of high-tech industries should be organized. The emergence of new jobs with competitive wages would contribute to the economic development of the region, which in turn would enhance its investment attractiveness. To attract investment to the economy of the region is possible by the investment projects tenders, the creation of a bank with the most attractive projects to be promoted interregionally and internationally, attracting investors, etc. At the same time, it is important to develop and support small businesses and to organize tourism in Omsk region at the appropriate level.

The work in this area is connected with the formation and development of the infrastructure:

- The development of the housing and public utility sector is a direct condition for improving the life quality of present and future generations.

- Provision of urban amenities.

- The development of communications infrastructure.

- The development of construction, including housing one.

Secondly, the state of the social infrastructure in Omsk region influences on ICHC, so it is necessary to develop it to ensure the efficient reproduction and use of human capital. It is the reformation of the regional health system and human capital recovery (including the availability of sanatoriums and dispensaries). The development and implementation of healthy lifestyles will help to reduce morbidity. The involvement of businesses producing goods with negative impact on public health (tobacco, alcohol companies) to develop the regional sports infrastructure can be a tool for this area.
The systematic stimulation of birthrate. It is also important to develop activities to raise the family role in modern society and to change people's consciousness relating to large families.

Support for regional education systems, including extended one, as well as the study of labour market needs.

Omsk region began the new millennium without creative and intellectual potential, the intellectual and creative labour force, which play a primary role in the modern information society. It is worth noting, however, that if the issue of mobilizing the intellectual and creative potential of the population is not further addressed at the regional and federal level the degradation of human capital over the next 3-5 years will be irreversible.

References


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Аннотация
Проблема интеллектуального и творческого развития человеческого капитала представляется очень важной, что отражено в концепции долгосрочного социально-экономического развития Российской Федерации до 2020 года. В ней говорится о достижении экономического лидерства и создании инноваций. Сегодня экономику РФ можно назвать «товарной экономикой»; по сравнению с развитыми странами, человеческий капитал Российской Федерации составляет не более 50 процентов. Человеческий капитал является важным фактором для конкурентоспособности региона; он обеспечивает инновационное развитие региональной экономики. В статье представлены результаты анализа подходов к понятию интеллектуального и творческого человеческого капитала. Предлагаемое исследование, проведенное в 2017 году на основе статистического анализа, использует...
структурные и комплексные подходы к оценке интеллектуального и творческого человеческого капитала Омской области. По результатам исследования в статье предлагаются рекомендации, направленные на нормализацию интеллектуального и творческого человеческого капитала региона, на создание новой модели для инновационного развития Омской области.

Для цитирования в научных исследованиях


Ключевые слова

Творческий потенциал, деградация человеческого капитала, интеллектуальный и творческий человеческий капитал, статистические показатели, интеллектуальный капитал.

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