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КЛАСТЕРНА МОДЕЛЬ НЕОІНДУСТРИАЛЬНОЇ МОДЕРНІЗАЦІЇ ЕКОНОМІКИ РЕГІОНІВ: ПЕРЕДУМОВИ, ЧИННИКИ, АКТУАЛЬНІ ПРИКЛАДИ

Актуальність. Невід’ємність модернізації та неоіндустріалізації промисловості, з огляду на прогнозованій матеріалістичний характер щого технологічного укладу, є безумовною. Адже п’ятий технологічний уклад, який започаткував еру нематеріального постіндустріального виробництва (інновації у галузі мікроелектроніки, інформаційних і біо-технологій, освоєння космічного простору (soft skills IT-technology), завершується у розвинених країнах світу. В свою чергу, щойно технологічний уклад (smart technology), відрізняється на синтезі використання матеріальних та нематеріальних ресурсів, широкому застосуванні нано- та біотехнологій, а також, якщо на стадії відкриття. Одним з перших приоритетів глобального розвитку неоіндустріального етапу є розвиток науково-освітнього простору. Інноваційні підходи, які базуються на вивченні зразків найкращою досягненнями, повинні адаптуватися до сучасних українських реалій як загальнонаціонального, так і регіонального рівнів, що і обумовлює актуальність дослідження.

Мета та завдання. Метою статті є аналітичний розгляд та визначення передумов і чинників формування кластерів в сучасних умовах неоіндустріальної модернізації економіки, розгляд прикладу самостійно організованого науково-освітнього кластера з переміщених ЗВО та надання дієвих рекомендацій з цього приводу для визначення реальних систем.

Результати. Ідея «smart спеціалізації» (RIS3, Research and innovation strategies for smart-specialization, S3) має наукове обґрунтування, довела свою ефективність у подоланні наслідків кризи глобальної фінансової системи, і, як наслідок, швидко набула популярності у європейських політиків. Окрім того, смарт-спеціалізація та кластерна модель розвитку економіки регіону, при розробці стратегічних документів, мають стати орієнтиром для старопромислових регіонів України.

Висновки. У статті доведена необхідність передбачення комплексного підходу до формування вектора інноваційного розвитку, що має у якості складових наукові та індустріалізаційні парки та спрямовані на інтеграцію до європейських та світових економічних та соціальних систем. З метою аналізу формування наукової основи, проведено класифікацію переміщених ЗВО та визначення дієвих рекомендацій з цього приводу для визначення реальних систем.

Ключові слова: модернізація економіки, кластерна модель, науково-освітній простір, державне регулювання економіки, smart-спеціалізація, науково-освітній кластер.
CLUSTER MODEL OF NEOINDUSTRIAL MODERNIZATION OF REGIONAL ECONOMY: PREREQUISITES, FACTORS, CURRENT EXAMPLES

**Topicality.** The urgent need for modernization and neo-industrialization of industry, given the projected materialist nature of the sixth technological mode, is unconditional. After all, the fifth technological way, which ushered in the era of intangible post-industrial production (innovations in the field of microelectronics, information and biotechnologies, space exploration) (soft skills IT-technology), is coming to an end in developed countries. Smart technology is likely to focus on the synthesis of the use of tangible and intangible resources, the widespread use of nanotechnologies and biotechnologies, and those still in the process of discovery. One of the first priorities of the global development of the neo-industrial stage is based on the study of best practices, must adapt to modern Ukrainian realities at both national and regional levels, which determines the relevance of the study.

**Aim and tasks.** The aim of the article is to analyze and determine the preconditions and factors of cluster formation in modern conditions of neo-industrial modernization of the economy, to consider the example of self-organized scientific and educational cluster of relocated free economic zones and provide effective recommendations for certain regional systems.

**Research results.** The idea of “smart specialization” (RIS3, Research and innovation strategies for smart-specialization, S3) has a scientific basis, has proven effective in overcoming the effects of the crisis of the global financial system, and, as a result, quickly gained popularity among European politicians. In addition, smart specialization and cluster model of economic development of the region, in the development of strategic documents, provided by regulations at both national and regional levels. It is stated that the principles of modernization of industrial development, digitalization and stimulation of innovation and investment activities should become a guide for old industrial regions of Ukraine in search of relevant and viable smart priorities for cluster development in the direction of European integration and Euro partnership. Comparative analysis of the criteria of technological development of social systems allowed to present the available evidence of belonging of the current stage of socio-economic development of Donetsk and Dnieper regions to the first phase of the neo-industrial stage of development. It is determined that for Ukraine the way of innovative transformation of the economy is a necessary way to reduce the significant gap in economic indicators with other countries, because it affects the inflow of investment, job creation, small and medium business development, potential work in global joint European and global projects. Clusters are recognized as one of the mechanisms for implementing priority areas of innovation to ensure the development of territorial communities in the region. It is proved that for Ukraine in the post-war period, the most convenient way to attract a lot of foreign investment are industrial parks, as the next link in the chain of integration into the European and world industrial ecosystems after the science park. In order to analyze the formation of scientific and educational space, the classification of relocated higher education institutions by their location. The effect of self-organization of the scientific and educational cluster for Donetsk and Prydniprovsk regions is demonstrated.

**Conclusion.** The article proves the need to provide a comprehensive approach to the formation of the vector of innovative development, which has as components scientific and industrial parks and aimed at integration into European and world economic and social systems. In order to continue the ongoing reforms, effective formation and operation of scientific and educational clusters, implementation in the national scientific and educational space of the best achievements and practices abroad, proposals for the implementation of a number of measures ranked by level of implementation (national, regional, local).

**Keywords:** modernization of economy, cluster model, scientific and educational space, state regulation of economy, smart-specialization, scientific and educational cluster.

**Problem statement and its connection with important scientific and practical tasks.** The second half of the twentieth century was marked by significant changes in the world economy, which resulted in a number of reform programs in different countries and the formation of a new economic model. At the same time, the years of Ukraine's independence, unfortunately, were not marked by the implementation of structural socio-economic reforms that would contribute to the qualitative renewal and modernization of the economic system. The mainstream of the country's socio-economic development over the past almost three decades has been a mixture of market mechanisms and archaic state institutions, which Ukraine inherited during the Soviet system and adapted to new conditions only in fragments. It should be noted that the study of both successful and unsuccessful scenarios of change, as well as their preconditions and factors are
relevant and interesting for Ukraine, because they provide an opportunity to analyze third-party troubles, adapt to successful conditions of reform in other countries.

The principles of modernization of industrial development, digitalization and stimulation of innovation and investment activities should become a guide for the regions of Ukraine in search of relevant and viable smart priorities and for the development of clusters in the direction of European integration and Euro partnership. Thus, the Ministry of Education and Science has prepared for public discussion a draft Concept of Digital Transformation of Education and Science for the period up to 2026 [6], which represents a comprehensive systemic strategic vision of digital transformation of these areas, and the Institute of Industrial Economics territories of the Development Strategy of Donbass and Luhansk regions [7], the concept of neo-industrial modernization is proposed as a direction of modern revival of industry and infrastructure of Donbass and aims to implement projects "Industry 4.0", create a network of industrial parks, organize modern high-tech industries by joining European high-tech and global clusters, value chains, etc.

**Analysis of recent research and publications on the problem.** Issues of neo-industrialization, modernization of the economy and clustering on the basis of smart specialization were the objects of study of representatives of domestic economics, in particular, researchers of the Institute of Industrial Economics of NASU O. Amosha, Y. Zaloznova, V. Lyashenko, V. Vyshnevsky, N. Osadcha, I. Pidoricheva [14-16], Institute of Market Problems and Economic and Ecological Research of NASU B. Burkinsky, O. Loiko, etc. [17-19]. The given sources contain the analysis and practical recommendations on research of processes of innovative modernization of the industry in the conditions of decentralization of management; determining the potential of digital modernization of Ukraine's economy; the impact of state and regional deregulation policy on creating favorable conditions for entrepreneurial activity.

**Allocation of previously unsolved parts of the general problem** At the same time, economic and socio-political conditions are rapidly changing and require an appropriate scientific response to the processes of state formation.

**Formulation of research objectives (problem statement).** The above indicates the need to consider the preconditions and factors of cluster formation in modern neo-industrial modernization of the economy, consideration of an example of self-organized scientific and educational cluster of relocated higher education institutions and providing effective recommendations for certain regional systems, which formed the goals of the article.

**An outline of the main results and their justification.** In the world technical and economic development so far we can distinguish the life cycles of five technological systems, which successively replaced each other [1]. Microelectronics and IT technologies are the key factors for the current technological way of life. Today, this technological way is close to the limits of its growth: the rise and fall of energy prices, the formation and collapse of financial bubbles - signs of the final phase of the life cycle of the dominant way and the beginning of structural adjustment of the economy. in the next two to three decades. he T process of replacing technological systems begins with a sharp rise in prices for energy and raw materials due to their excessive consumption in the technological chains of the previous system. This surge in prices corresponds to the maximum deviation of energy consumption from the age trend, which was studied in the 70-80s of the 20th century. (Fig. 1.)
The jump in prices for energy and raw materials leads to a sharp decline in the profitability of production in the technological aggregates of the dominant technological system. This serves as a signal for the mass introduction of fundamentally new, less energy- and material-intensive technologies. At the same time there is a release of capital from the achieved limits of growth of production of the old technological way. In the final phase of the life cycle of this technological system, which has become dominant, there is a decrease in economic growth, as well as a relative, and possibly an absolute decrease in the efficiency of social production.

However, it is not only economic or technological factors that cause cyclical fluctuations. Their study shows a significant influence of civilizational, institutional, social factors. M. Kondratiev in the study of long waves in the economy proved the existence of certain patterns of interrelation of economic and social cycles. In particular, he identified four trends in the development of large economic cycles: a) before and at the beginning of the upward wave of each major cycle, there are profound changes in the economic life of society; they are expressed in significant changes in technology (which is preceded by significant technical discoveries and inventions), the involvement of new countries in world economic relations, changes in gold production and money circulation; b) the periods of the ascending wave of each major cycle account for the largest number of social upheavals (wars and revolutions); c) periods of declining wave of each major cycle are accompanied by a long and pronounced depression of agriculture; d) in the period of the rising wave of large cycles, the average capitalist cycles are characterized by the brevity of depressions and the intensity of rises; during the downward wave of large cycles, the opposite pattern is observed. The author emphasized the intensification of social processes during the waves of increase, but does not notice their changes in the descending waves [3].

The facts of socio-political life during the long historical development show that on the rising wave of the Kondratiev cycle there are socio-political cataclysms (wars and revolutions), and on the falling wave - "explosion" and flourishing of culture (Fig. 2).

The Napoleonic Wars of the Russian Empire with Turkey, The American Revolutionary War, The Patriotic War of 1812, the Decembrist movement

The French Revolution of 1830, the Chartist movement in England, Cultural phenomenon of national geniuses in Russia and Ukraine (O. Pushkin, T. Shevchenko, M. Gogol)

Revolutions of 1848-1849 in France, Hungary, Germany, Crimean War of 1856; Polish uprisings of 1830/1831 and 1863; The American Civil War of 1861/1865; Revolutions of 1830, 1870 in France; Formation of the German Empire in 1871; the formation of the British colonial empire, the birth and formation of socialism and the labor movement.

The "Golden Age" of Russian literature, the construction of Ukrainian Art Nouveau buildings in Kiev, the introduction of hard currency in 1897, the entry of countries into world markets: the first major stock market crash in 1873; completion of the industrialization of Western Europe and America; militarization of Europe - the formation of a system of two warring blocs, an active stage of cultural revival of the great empires of the world, the rise of politicalization, emergence of the first political parties in Ukraine.

Russo-Japanese War, World War I, three revolutions in Russia: formation of monopoly companies in different countries of the world; a wave of revolutions in European countries at the end of the First World War; active spread of new philosophical and artistic directions - modernism, constructivism, etc.

"Silver Age of Russian Literature", "Ukrainian Revival of Culture", NEP, easing of international tensions: the collapse of the stock exchange in 1929 and the Great Depression of 1929/1933; formation of totalitarian systems in Europe; the shooting generation and cultural reflection on the catastrophe of the last war; a company of collectivization and forced industrialization in the USSR.
Stalin's repression in the USSR with peak executions in 1937-1938; World War II; intensification of political life in European countries on the eve of the war; formation and popularization of the Keynesian economic model; the emergence of the US and the creation of a system of collective security of the world, new achievements of technological progress, stimulated by the war and postwar reconstruction.

Unemployment social insurance in 1914-1915 - in Europe, America, Austria, New Zealand; European Integration; Khrushchev's domestic policy; The beginning of the Cold War - a bipolar confrontation between capitalism and communism; a new round of technological progress and the creation of a basis for the transition to a post-industrial society; the emergence of dissent and social movements in the USSR; wave of wars and revolutions in 3 countries crisis of the Keynesian economic model.

The Cold War in the world, the collapse of the USSR, the neoconservative turn in the economy and politics of Western countries; the beginning of world computerization; the emergence of the Internet; perestroika in the USSR; a wave of bloody "social" revolutions in the countries of the socialist bloc and its collapse; reunification of Germany; Deng Xiaoping's reforms in China; the final formation of the Far Eastern tigers; further development of philosophical and cultural thought - the emergence of postmodernism, the mass emergence of new subcultures of tolerance and acceptance of diversity; radicalization of the Islamic world; end of the great cultural revolution of the mid-20th century.

The market transformation of the post-Soviet countries, the core revolution in Georgia, the Orange Revolution in Ukraine, the corruption of power, the easing of international tensions - the surge in democracy, the acute demand for liberalization leaders; the final formation of a globalized world in the political, cultural and economic field; the global economic crisis of 2008; rising tensions in the Middle East - Syrian civil war, bloody disintegration of Yugoslavia, revolutions against post-communism.

Source: compiled by the author

Fig. 2. Examples of combinations of processes and phenomena characteristic for large economic and social cycles

Depending on the phases of the life cycle of the dominant technological system, the driving forces of economic modernization change. In the period of formation of a new way of life, the leading role is played by innovators, who are the first to master its basic innovations. In the phase of growth of the technological structure, the trajectory of its development becomes quite definite, the role of innovators decreases, the routine activity of imitators begins to prevail. These phases are characterized by different mechanisms of economic growth, which differ in the ratio of the roles of financial and industrial capital. Public investments, the achievements of scientific educational centers and venture financing institutions play an important role in the formation of the new way of life. In the process of replacing ways of reducing investment in the production of the dominant technological way of creating a significant surplus capital, which seeks scope [4].

Clustering of the economy is a very dynamic process. In this case, the state plays the role of facilitator in the initial stages of cluster development, later, transferring these functions to the relevant institutions of innovative development [5].

It should be noted that in accordance with the criteria for classifying the development of countries and regions as areas of neo-industrial development (Table 1), as well as indicators of the dynamics of the share of gross value added (GVA) of services in GRP in Donetsk and Dnipropetrovsk regions (Fig. 3, 4, 5), evidence of belonging of the current stage of socio-economic development of Donetsk and Dnipropetrovsk regions to the first phase of the neo-industrial stage of development.

According to the OECD methodology, the classification of industry by the level of knowledge intensity divides all branches of industrial production into four groups: high science intensity; medium-high knowledge intensity; medium-low science intensity; low science intensity. The group with medium-high science intensity includes: production of machinery and equipment not included in other groups; manufacture of computers, electronic and optical products; the group with high science intensity includes: production of coke, refined products; production of motor vehicles; production of pharmaceutical products...
and drugs. Regarding Dnipropetrovsk region, the above indicators have the following infographics of dynamics: Fig.3, Fig.4. [7,8]

Table 1

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Phases of the neo-industrial stage of development</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1-preparatory</td>
</tr>
<tr>
<td>The share of value added in industries of high and medium-high knowledge intensity in GDP (GRP)</td>
<td>≤20%</td>
</tr>
<tr>
<td>The share of employees in industries of high and medium-high knowledge intensity in the total number of employees</td>
<td>≤20%</td>
</tr>
<tr>
<td>Proportion of value added in the field of progressive and creative services in GDP (GRP)</td>
<td>≤20%</td>
</tr>
<tr>
<td>The share of employees in the field of progressive and creative services in the total number of employees</td>
<td>≤20%</td>
</tr>
</tbody>
</table>

Source: [9]

Fig. 3. The share of industrial production of high knowledge intensity of Dnipropetrovsk region in GRP, %

Fig. 4. The share of industrial production of medium-high science-intensive Dnipropetrovsk region in GRP, %

Regarding the compliance of Donetsk region with the criterion indicators Table. 1, we give the dynamics (Fig.5)

Given the above, it is for the Donetsk and Dnieper regions, provided the political will and ensuring the limitation of subjective influences on economic and political development, the priorities of global development of the neo-industrial stage are relevant, including: development of science and higher education, financial infrastructure, development of logistics (transport, communication), tourism, social infrastructure (medicine, vocational education).

These facts correlate with the national paradigm of de-oligarchization, further limitation of subjective influence on the economic development of the state, corresponds to the draft Law "On Prevention of Threats to National Security associated with excessive influence of persons of significant economic or political importance in public life ", Initiated by the President of Ukraine [10]. Large capital in Ukraine...
controls a number of areas that significantly affect both the filling of the state budget and the general situation in the economy - energy, mining, metallurgy, oil and gas industry, food industry. The most difficult thing is that the concentration of capital leads to the spread of the oligarchs' influence on related spheres of life, and can be limited only by very competitive market relations.

According to The Global Innovation Index (GII), prepared jointly by Cornell University, the INSEAD School of Business and the World Intellectual Property Organization (WIPO), Ukraine has improved its creativity, business experience, and market performance in 2020 (Figure 6).

![Dynamics of GII indices for Ukraine for 2017-2020](source)

Source: [12]

According to the annual Bloomberg Innovation Index, Ukraine's place in the components of the Bloomberg Innovation Index in 2018-2020 is determined by the following indicators (Table 2).

Thus, for Ukraine, the path of innovative economic transformation is a necessary way to reduce the significant gap in economic performance with other countries, because it affects the inflow of investment, job creation, small and medium business development, potential work in global joint European and global
projects. Clusters are recognized as one of the mechanisms for implementing priority areas of innovation to ensure the development of territorial communities in the region.

At present, at the world and European levels, the triangle "education-science-innovation" stands out, which will be decisive in the formation of spiritual and intellectual potential of man, as well as to form the vector of orientation of the European integration course of Ukraine. It is a well-known fact that education, science and innovation are the drivers of modernization of any country's economy, and in general, the driver of the formation of the infrastructural environment in the context of the fourth industrial revolution.

**Ukraine's place in the Bloomberg Innovation Index in 2018-2020**

<table>
<thead>
<tr>
<th>Years</th>
<th>General index</th>
<th>Intensity of research and development (costs of R &amp; D on in relation to GDP)</th>
<th>Productivity</th>
<th>Penetration of high technology (the share of innovative companies in the total enterprises)</th>
<th>Concentration of researchers (number of scientists per 1 million inhabitants)</th>
<th>Value-added production (added value production in relation to GDP)</th>
<th>The effectiveness of higher education (the share of freelance graduates in the total number of educational graduates institutions)</th>
<th>Patent activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>2018</td>
<td>46</td>
<td>47</td>
<td>50</td>
<td>32</td>
<td>46</td>
<td>48</td>
<td>21</td>
<td>27</td>
</tr>
<tr>
<td>2019</td>
<td>53</td>
<td>54</td>
<td>60</td>
<td>37</td>
<td>46</td>
<td>58</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td>2020</td>
<td>56</td>
<td>57</td>
<td>57</td>
<td>35</td>
<td>49</td>
<td>57</td>
<td>48</td>
<td>36</td>
</tr>
</tbody>
</table>

Source: [13]

Ukrainian practitioners believe that a university is not a building, not equipment, or even people. It is part of an industrial cluster that is threefold in its stakeholders: industrial enterprises (as potential employers and applications of theoretical assets), scientists (as entities providing the necessary and in-demand knowledge) and student youth (as direct recipients of education and future engines of modernization progress) [19]. Such a trinity must be provided comprehensively, which is the main problem for our country. The biggest of the three problems, but a necessary condition for the existence of such a triumvirate is the efficient operation of industrial clusters, and with this in Ukraine there are large-scale problems.

The world experience is indicative, when, with the use of state funds and complex funding programs, industrial complexes and industrial clusters were created, which, for effective work, needed high-quality personnel, the latest technological solutions. The demand for students was formed during their studies and the demand for scientific-technical innovations almost instantly launched them into production.

The experience of leading countries shows that leading educational institutions, world-renowned universities occupy the first levels of rankings due to the fact that they are part of a focused cluster system consisting of thousands of companies, research centers, investment funds, banks, think tanks (think tanks), entire industries and institutions.

Investing in innovation is a resource- and financial-intensive process. But interested business and the state are able to look for and find mechanisms. The key obstacles may not be material difficulties, but the lack of desire of the main actors in the process to get out of cognitive traps and believe in the success of various paths of development.

According to the scientific developments of the Institute of Industrial Economics [20], the innovative development of the region is determined by a number of factors that are closely interrelated, support and activate each other in the implementation of innovative development:

- continuous and steady growth of socio-economic processes in the region based on innovative activity of enterprises, smart-specialization of the region, achieving a high level of competitiveness, adaptation to market changes, flexible response to infrastructure challenges and political conditions,
- constant self-development on the basis of constant growth of social needs of the region, which must be ensured by constant commercialization of innovations, as a consequence - the formation of new social needs of higher quality and tsiklichnost subsequent innovative development,
- causal relations, which are reflected in the interaction and motivation of regional development stakeholders.
According to statistics, as of the end of 2019 / beginning of 2020, the top five regions by the number of innovative enterprises: Kharkiv, Dnipropetrovsk, Zaporizhia, Lviv, Kyiv regions. Donetsk region did not even enter the top ten. Regions with a stable increase in the number of innovative enterprises in recent years - Vinnytsia, Donetsk and Poltava regions, steadily reduced the Volyn and Kherson regions, other regions had positive / negative fluctuations in the number of such enterprises in the region.

At the same time, the absolute number of innovative industrial enterprises in the region does not indicate the level of innovative development, the real picture can be represented by the relative share of innovative industrial enterprises in the region at the end of the reporting year, which is presented in Fig. 7.

In general, in Ukraine, as evidenced by Fig. 7, the share of innovative enterprises in the total number of industrial enterprises of medium and large business (codes B + C + D according to the Classifier of economic activities) does not exceed 2.5%. This indicates an extremely low technological level of industry in the regions of Ukraine. Thus, in the regions of Ukraine there is no stable dependence of the level of industrial development and the level of innovation activity, which, moreover, undergoes significant fluctuations even in statistics from year to year.

The level of state participation in the management of innovation processes in the region has a significant impact on the level of innovation development in the region. In order for national goods to have unhindered access to EU markets, state support must meet specific requirements. The decision in the EU on state support for private business is made only after obtaining the permission of the European Commission after careful study of its impact on the market by competition authorities (like our Antimonopoly Committee), even when it comes to overcoming the effects of the Covid-19 pandemic on business. For Ukraine in the post-war period, we believe that the most convenient way to attract a lot of foreign investment is industrial parks (hereinafter - SP), as the next link in the chain of integration into the European and global industrial ecosystems.

![Fig. 7. The share of innovation-active enterprises in the total number of industrial enterprises by regions, for 2017-2019, %](image)

(For enterprises with an average number of employees of 50 people and more, as well as for codes B + C + D in accordance with the NACE-2010 Classifier)

Source: compiled by the author

However, the effective operation of the SP requires certain conditions for existence, namely:
- creation of an appropriate legal framework,
- compliance with the principles of the rule of law,
- provision of preferential tax, customs, tariff conditions, etc.

At the same time, certain risks and threats to development are: low level of economic and political stability, as a result - a small horizon of enterprise planning; small inflow of foreign investments and domestic reinvestments, disordered regulatory framework, outflow of labor, lack of tools to support individual entrepreneurs.

The Economic Committee of the Parliament has developed a number of bills20,21, which should provide favorable conditions for producers who want to come to Ukraine and work on the basis of industrial parks. These are tax, customs and financial incentives.

The impact of the destructive processes provoked by the protracted military conflict in eastern Ukraine has resulted in a serious transformation of Ukrainian society, including in its social, educational, and scientific dimensions. The progressive Ukrainian scientific community is quite capable of generating ideas that will be immediately used by entrepreneurs who, as employers, can form an educational demand, thus depriving the labor market of professionals who are not in demand in the labor market. Examples of effective responses to life's complex challenges include the emergence of displaced higher education institutions in the autumn of 2014.

These are 18 state and private higher education institutions, which were forced to change their location due to the anti-terrorist operation in Donetsk and Luhansk regions or the annexation of Crimea. In total, taking into account Research Institutes and Postgraduate Education Institutions, 31 scientific and educational institutions from the military conflict zone, namely Donetsk and Luhansk oblasts, changed their location (Table 3, Fig.8).

### Table 3

**Universities have been relocated to their current location in the territories of old industrial economic regions**

<table>
<thead>
<tr>
<th>Relocated universities</th>
<th>Dnieper economic region</th>
<th>Donetsk economic region</th>
<th>Other regions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Donetsk National University named after V. Stus</td>
<td>1</td>
<td>2</td>
<td>3</td>
</tr>
<tr>
<td>Donetsk National Technical University</td>
<td></td>
<td>Pokrovsk, Donetsk region</td>
<td></td>
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<tr>
<td>State Institution «Luhansk State Medical University»</td>
<td></td>
<td>Kostiantynivka, Bakhmut (separate subdivisions)</td>
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<td>Donetsk National Medical University. M. Gorky</td>
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<td>Mariupol, Lyman, Kramatorsk, Donetsk region</td>
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<td>Mariupol, Donetsk region (training center)</td>
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<td>State Institution “Luhansk National University named after Taras Shevchenko”</td>
<td></td>
<td>Starobilsk, Luhansk region</td>
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This course of events allows us to state the fact of spontaneous self-organized scientific and educational cluster in the old industrial regions (Prydniprovsky and Donetsk), and given the nature, conditions and subject of activity, it has signs of innovation. Among the system characteristics of the innovation cluster: integrity, organicity, dynamism, self-organization, etc. (Fig.9).
Thus, the emergence of the phenomenon of such a scientific and educational self-organized cluster in the economic space of the old industrial regions became an example of the process of social mobilization.

Relocated research and educational institutions, research institutes in difficult, unfavorable, compared to pre-war, conditions form a new experience of educational and scientific activities, which forces them, along with traditional methods, to actively and widely implement creative methods.

**Conclusions and perspectives for further research.**

Summarizing the above, we note the following. The cluster model of organization and effective regulation of the scientific and educational space, which integrates a number of stakeholders of different forms of ownership, in the conditions of neo-industrial modernization, has unconditional advantages for actual implementation. The use of the opportunities of the scientific and educational cluster, taking into account its complex potential, should become the focus of attention for the development of state strategic initiatives for the near future. In order to continue the ongoing reforms, effective formation and operation of scientific and educational clusters, implementation in the national scientific and educational space of the best achievements and practices abroad, we consider it appropriate to implement a number of measures at national, regional and local levels.

**ЛІТЕРАТУРА**

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