КОНЦЕПТУАЛЬНЫЕ ОСНОВЫ НЕОБХОДИМОСТИ ФОРМИРОВАНИЯ ТРОЙНОЙ СПИРАЛИ КАК ИННОВАЦИОННОЙ ВЕРШИНЫ ЭФФЕКТИВНОЙ НАЦИОНАЛЬНОЙ ЭКОНОМИКИ

Е. А. Жуков,
Международная академия инновационного развития,
115114, Москва, Летниковская ул., 10, стр. 2

Т. В. Поспелова,
Московский государственный университет им. М.В. Ломоносова, Москва, Россия

Формирование творческого сотрудничества между наукой, государством и бизнесом способствует развитию и функционированию совместных проектов в различных социально-экономических сферах. Теория «Тройной спирали» вбирает в себя научное обоснование участия всех главных сторон в формировании и функционировании научно-технологических кластеров. В свою очередь, создание кластеров ведет к увеличению экономической активности различных регионов страны, где реализуются научные принципы «Тройной спирали», так как теория «Тройной спирали» – это приведение в эффективную систему роли всех участников реализации различных инвестиционных проектов с приведением их взаимоотношений в экономически рациональное русло, обусловливающее формирование эффективной национальной экономики государства.

Ключевые слова*: научно-производственные кластеры; интеграция; предпринимательский университет; «Тройная спираль»; модернизация экономики; инновационное развитие.*

Сведения об авторах*: **Евгений Алексеевич Жуков**, ректор Международной академии инновационного развития (115114, Москва, Летниковская ул., 10, стр. 2), доктор экономических наук, действительный член Международной академии профессионалов, Российской академии естественных наук и Российской академии транспорта; **Татьяна Васильевна Поспелова**, аспирант, Московский государственный университет им. М.В. Ломоносова, Москва, Россия (119991, Российская Федерация, Москва, Ленинские горы, д. 1).*

Контакты*: Евгений Алексеевич Жуков,* **evgenii.zhukov@mail.ru**; Татьяна Васильевна Поспелова, **pospelova_t@mail.ru**

Для ссылки*: Жуков Е. А.,* Поспелова *Т. В. Концептуальные основы необходимости формирования тройной спирали как инновационной вершины эффективной национальной экономики // МИР (Модернизация. Инновации. Развитие). 2015. № 1(21). С. 24–30.*

CLUSTER CONCEPTUAL FRAMEWORK AS THE EFFICIENT NATIONAL ECONOMY'S INNOVATIVE SUMMIT

E. A. Zhukov,
International Academy of Innovative Development,
Moscow, Russia

T. V. Pospelova,
Lomonosov Moscow State University, GSP-1, Leninskie Gory, Moscow, 119991, Russian Federation

The establishment of cooperation between the science, the state and business communities fosters the development and implementation of joint projects in various economic activity areas. The Triple Helix theory comprises the main participants forming research and technology clusters. In its turn, the development of clusters leads to the increase in economic activity of various regions of the countries where the Triple Helix is applied. Thus, the Triple Helix theory includes a whole system of players from various activity areas, with a relationship network established between them contributing to the formation of the efficient national economy.

Keywords*: Scientific-production clusters, integration, entrepreneurial university, Triple Helix, economic modernization, innovation development.*

Information about the authors*: **Evgeny A. Zhukov**, Rector of International Academy of Innovative Development, Doctor of Economics, Academician of International Academy of Professionals, Russian Academy of Natural Sciences and Russian Academy of Transport; **Tatyana V. Pospelova**, Postgraduate, Lomonosov Moscow State University.*

Contacts*: Evgeny A. Zhukov,* **evgenii.zhukov@mail.ru;** *Tatyana V. Pospelova,* **pospelova_t@mail.ru**

Reference*: Zhukov E.A., Pospelova T.V. Cluster Conceptual Framework as the Efficient National Economy's Innovative Summit. MIR (Mod. innov. razvit.), 2015, no. 1 (21), pp. 24–30.*

The 21st century confronts the mankind with an inevitable lifestyle choice: whether one shall keep leading a life according to the current insane chaotic laws, i.e. fiercely and continuously fighting with the surrounding world, the nature, other people in order to satisfy one's biological needs and desires, or shall begin living in peace and harmony with the surrounding world and other people for the sake

of wise noospheric civilization creation. The choice shall make it possible to answer the most important questions: (1) what is the reason of the world's unstable social and economic development, and (2) whether the current human civilization's term on the Earth is going to expire.

Performed without their guidelines' thoughtful and comprehensive scientific justification and under the motto of deideologization, liberalization and monetarism, wild global economic reforms at the turn of the 20th century caused any going social system debates to stop, and led a number of countries at a loss as to their social and economic state, the situation they still cannot find a way to escape. The point is most people are not mature enough to realize that positive or negative outcome of social and economic development depends, above all, on the society's ethical and intellectual level, and not on such and such political organization. The urgent need to replace the ideology of liberalism with an alternative humanist noospheric one complying with the life concerns of most of the Earth's inhabitants cannot be put off. The world community shall mainly pursue inspiring rational people of the Earth to fairly assess the historic path of development of the global human civilization as a leading force in the establishment of rational life on the Earth and in the Universe, and thus to proceed from the Global Chaos to the Global Harmony, supported by the space Epoch of Aquarius set in since 2003 and directed towards the triumph of the Universal Mind.

Socially oriented national economy is distinguished by its goal that is not to gain maximum return and ensure private entrepreneurs' superprofits from satisfying the demands of a small number of rich consumers, but to expand the range and the amount of useful quality goods and products satisfying the mass demand of the total population. Only the economy controlled by a complex of laws equally considering the interests of producers and all their consumers, i.e. of the whole country's home market, may achieve the goal.

Implementation of large social and economic development investment projects is impossible without a motivated partnership between state authorities and private business, i.e. without mobilization of domestic and foreign private entrepreneurs' funds. Applying private-governmental partnership (PGP) machinery to the social and economic development of the society allows, on the one hand, to avoid the drawbacks of direct governmental control and, on the other hand, to ensure the implementation of the most important and costly national social and economic programs.

Many experts believe that the formation of the innovation ecosystem is a natural process that does not require the interference of the state, which, otherwise, could lead to a negative effect [Desrochers, 2011; Martin et al., 2008; Duranton, 2011]. However, the experience of modern countries shows that the development of the innovation ecosystem requires infrastructure, which should be a responsibility of public authorities. Development and implementation of public infrastructure programs should be strictly scientifically justified and controlled by the state. There has to be an elaborate system of support, including reduced rent, microcredit systems, venture capital funds, and advisory services to small companies on business issues. A number of American examples, including Silicon Valley, Ohio Innovation Center, educational cluster around Boston (Harvard University), MIT (Massachusetts Institute of Technology), and others, prove conclusively that the socio-economic development of these regions was carried out under the auspices of the state and with significant financial investments from its budget [E.S. Kutsenko].

The main argument in support of the PGP is that the governmental (public) and the private sectors of economy have their unique features and advantages the combination thereof may create an opportunity to act more efficiently and to achieve better results in the very areas where the "flawed" or inefficient governmental control are particularly noticeable (usually, these are the social sphere, environmental problems, transportation, infrastructure, etc.). That is why creation of conditions and organizational frameworks for the interaction between the private and the governmental (public) sectors, as well as for the involvement of non-budgetary investments in the solution of social and economic development problems, both regionally and countrywide, is the key and topical task to perform in order to enable the modernization and stable growth of the economy.

There have always been and there will always be only three sources of material and spiritual benefits production capable of satisfying the social needs: (a) human resources, or manpower; (b) main production assets (past, or reified labor), and (c) material and power resources, i.e. natural resources. It is well-known that each of the three above mentioned production resources may develop and be used in two general directions: extensive (quantitative) one, and intensive (qualitative) one. However, most economically developed countries have virtually exhausted the quantitative development and utilization factors for all the three production sources, and their further social and economic progress shall be mainly conditioned by the intensification (modernization), i.e. by the qualitative direction for both development and application of each production factor. The latter is only possible on the basis of scientific organization of labor, production and management based on the scientific and technical advance, i.e. on science and education.

As evidenced by global practice, the formation of scientific production clusters has been rather active

within the last two decades. Development of clusters an integral component of many states' innovative policies as regards the economic modernization. Competitive recovery by means of cluster technology implementation is becoming the basic element of the social and economic development strategy for the overwhelming majority of countries worldwide. The progressive experience accumulated in this sphere demonstrates that high competitiveness of the advanced nations is grounded on their strong positions gained with the help of strong clusters.

The cluster approach in planning and implementation of national socio-economic development of regions is becoming more widespread and popular in many advanced foreign countries, including Russia. The most striking examples in Europe are: Austria (Styria), Germany (North Rhine-Westphalia (BioRegio InnoRegio), Italy (Veneto), France (Competitiveness Clusters), and in Asia: Singapore, Indonesia. With the intensification of globalization and competition processes, the systemic world economic crisis, the predominance of information and cybernetic technology and knowledge economy, such organizational forms of social and economic regional development as clusters appear naturally and objectively.

The emergence of clusters (theoretical part)

The idea of clusters originates in the XIX century Italy, where in order to reduce production cost companies dealing with similar activities joined together. As a result, this approach, which proved to be very cost-effective, then often led to the formation of large inter-industry cartels. Thus, B.-O. Lundvall and B. Yonson [Pilipenko I.V.] in their works devoted to theoretical studies of clusters provide conceptual foundations for "blocks of development" that represent a set of enterprises with interdependent and mutually productive sectors, or territorial production associations, which are the source of competitive advantage and the development of regional national economy.

Marshall and M.Porter are considered to be the ancestors of the cluster theory. At the end of XIX century, A. Marshall described in his work "Principles of economic science" relationship between efficiency and geografical location of production, having urban aglomerations and industrial regions as an object of his study [Marshall A.]. It was A. Marshall who proved that the productivity of enterprises depends on their location and geografical proximity of economic agents. The modern version of the cluster theory was formed in the 80s of XX century and is well-displayed in the works of M. Porter, devoted to the theory of competitiveness and, in particular, its romb model of assessment (the Diamond Model) presented in his book "The competitive advantages of nations" (Porter, 1990.)

Porter's research proves competitive advantages of the cluster approach in the economic development of the regions over other approaches (the appearance of additional synergetic effect because of the geographical concentration of professionals of the same or similar activities), and over non-network agglomeration types; however, it does not reveal the mechanism of their occurrence. Therefore, in the 1990s, the concept of "cluster" was seen primarily as an analytical construct (one of 4 sides of the "diamond"), and the emergence of cluster nets as a result of the natural evolution of the market space not arising, according to the views of M. Porter, from any deliberate efforts of the authorities [Smorodinskaya N.]. Later, Poter's plan was developed by politicians and managers who transformed the Diamond Model into an independent concept, where clusters were considered as an object of purposeful construction by market participants (proposing of cluster initiatives) and the state (cluster policy and formation of cluster programs) . In the 2000s, projects on artificial creation of clusters were commenced. As a result, clusters have become a polifunctional practical tool of industrial, innovative and regional policies (Solvell, 2009).

Such a transformation of the idea of clusters became known in the literature as the Porter's paradox (Solvell, 2009). Referring to the merits of Porter, his cluster theory has been refined by several researchers and specialists. For example, instead of "competition" they began to consider the factor of cooperation, instead of "evolutionary formation" an artificial one appeared, instead of "creating a friendly environment for spontaneous cluster economy by the state" cluster programs occured.

As a result, there has been a heated discussion in the world of science about the mechanisms of transition to innovative development between supporters of Porter's school and the school of economic geography, led by Paul Krugman. The Porter's supporters connect this transition to general clusterization of economy to achieve synergetic effects of the competition growth, while the Krugman followers have a critical attitude to the idea of clusters, especially the practice of the method of constructing them from above, giving the priority to the effects of agglomeration and the policy of support of any localized production complexes (Ketels, 2009).

This argument continues today, but despite of that, over the last 10–15 years the ideas about their institutional organization and life cycle have become more distinct. The experience of Northern Europe and Southeast Asia has demonstrated that during the formation of innovative clusters it is very important to consider not only market peculiarities of a region, but also the mechanism of the Triple Helix concept (further TH), which to a large degree assured the nowadays

success and achievements of Syllicon Valley. Porter's research on clusters and the development of the Triple Helix concept were actually happening at the same time; nonetheless, they turned out to be complementary [Drucker P.F.]. While combining those two theories, a unique effect is achieved: the success of clusters is achieved due to institutional connections, while the transition of economics to innovational growth is reached by clusterization. The Diamond Model controls such mechanism of growth on "the way out" (as a result of the excistence of clusters), while the Triple Helix Model monitors it on "the way in" (as a condition of their appearance.) At the moment there are three approaches to the essence of economic clusters in economic literature: a) a cluster is seen as a complex of business entities centered around big enterprises on a certain territory; b) a cluster is viewed as a special industrial chain, consisting of enterprises and organizations participating in the production of a certain product, which includes all stages of production from research and organization of resourse supply to sales and after-sales service, and c) an interindustrial cluster[Tsihan T.V.].

The main definition of the innovative regional cluster is as follows: "Innovation clusters means groupings of independent undertakings — innovative start-ups, small, medium and large undertakings as well as research organisations — operating in a particular sector and region and designed to stimulate innovative activity by promoting intensive interactions, sharing of facilities and exchange of knowledge and expertise and by contributing effectively to technology transfer, networking and information dissemination among the undertakings in the cluster. Preferably, the Member State should intend to create a proper balance of SMEs and large undertakings in the cluster, to achieve a certain critical mass, notably through specialisation in a certain area of R&D&I and taking into account existing clusters in the Member State and at Community-level" [1].

Russia's experience in the formation of cluster policy

Recently in Russia there has been a shift from conceptual policy framework to practical measures to support cluster initiatives. The concept of long-term socio-economic development and strategies of innovative development of Russia, established for the period up to 2020, provide that cluster policy will stimulate the growth of business competitiveness through the effective interaction of cluster members, improved access to innovation, technology, know-how, specialized services and highly qualified personnel, reduction of transaction costs, and implementation of joint cooperation projects [Kutsenko E.S.]

Currently, a large-scale program for the development of clusters in Russiais is being realized; it's basic documents are the concept of long-term socio-economic development of the Russian Federation for the period up to 2020 and the strategy of innovative development of the Russian Federation for the period until 2020. These programs provide the formation of two types of clusters: high-tech innovative (in urban areas) and territorial-industrial (in poorly developed areas, focused on deep processing of raw materials and energy production using modern technology) [2]. Funds amounting to 1.3 billion rubles will be allocated on the implementation of this program. Grants in the amount of 5 billion rubles will also be awarded annually for four years, starting in 2014.

The first stage includes the launch of pilot programs to support cluster initiatives. The selection of innovative clusters took place in 2012 in two stages. At the moment 25 projects on territorial clusters development are approved; 14 of them were entitled to a state subsidy [Dezhina I.]. Co-financing for the implementation of this program comes from the federal budget of regional small business support programs and financial support from the regions that invest in the creation of innovative ecosystems. The implementation of this stage is scheduled for 2011–2013. As a result of successful implementation of the first phase it is planned that by 2016 there will be more than 30 specialized centers created in the Russian Federation, which will contribute to the development of clusters [3].

The selection of pilot programs and the development of clusters in Russia comply with international standards. It is important that the program focuses on infrastructure projects whose development is planned on the basis of higher education institutions and deals with the establishment of interaction between higher education institutions and business companies. However, the use of foreign instruments in the Russian context requires a careful analysis of the objective barriers that limit the effectiveness of innovative development programs. It is proved that the strategy of direct borrowing of institutions and mechanisms from the practice of developed countries rarely leads to the expected results. Even when using advanced policy instruments to achieve effective results, it is important to take into account the specific environment of the "recipient", pay special attention

[1] http://www.innoviscop.com/en/definitions/innovation-clusters

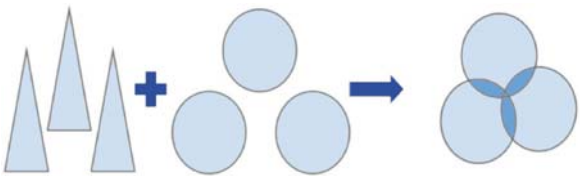
[2] Russian Government Decree, 2008.

[3] Russian Government Decree, 2011.

to the details, rather than just general outlines and principles of incorporated institutions.

Despite the current interest of the state, there are still a number of problems that hamper the development of clusters in practice, the main of which is the lack of tools for constructing clusters. It is extremely important to solve these problems, otherwise, without serious reflection, the cluster approach risks being superficial, retouching the problem rather than solving it, and will be quickly replaced by other "trendy" concepts without having a significant impact on the solution of problems of innovation development in the regions. One of the factors that hinders the development of clusters is that in the modern economic theory there are no mechanisms that contribute to justifying incremental steps towards the development of clusters as innovative logistics systems. One of such mechanisms may be the Triple Helix theory, based on the role of major players (the state, universities and enterprises) in the process of innovation.

In recent years, the unique Triple Helix theory uniting the state with universities and business communities is winning more and more supporters. The increasing popularity of the Triple Helix Model is explained by the change of a paradigm, and the update of not only the mode of production (transition from an industrial to post-industrial époque), but the entire social structure (transition from the capitalistic to post-capitalistic system.) This civilizational shift has been caused by three interrelated factors: globalization, the 5th scientific-technical revolution and the 3d social communication revolution. The world is moving to a new superplastic structure and new method of connection coordination (chart 1) [Smorodinskaya N.].



Hierarchical systems with vertical subordination (the model of connections is too rigid)

The system of traditional market with price signals (the model is flexible, but too atomic)

Cluster-network models of an open type with horizontal connections (more flexible and intergrated model of coordination without the control center

Chart 1. Evolution of types of connection coordination in the world economy Industrial paradigm Postindustrial paradigm
(offline economics) (online economics)

Cluster formation is a long-term process demanding efforts of a lot of participants/objects. It should be reminded that we are talking about the innovative cluster formation. In practice, the relationship during the creation or use of innovations often has a character of a dual helix, such as:

- the state- science;
- Science-business;
- Business-the state

In case of complication of innovative processes such bilateral relationships become ineffective. The establishment of cooperation between science, the state and business community leads to the development and fulfillment of joint projects in different fields of economic activity. The Triple Helix concept includes three main participants who form innovative clusters. The development of clusters in turn leads to the development of economic activity of different regions where the Triple Helix concept is being implemented. Thus, the Triple Helix theory includes the entire system of representatives of different fields whose proper interaction contributes to the formation of effective national economy. Further, the key participants of the innovative cluster formation on the basis of the Triple Helix concept will be analyzed.

The place and role of the state in the process of activation and development of clusters

Clusters represent a new approach to the formation of an innovative economy. At the same time, some experts believe that it is impossible to create clusters artificially. As it was mentioned before, cluster formation is a long-term process. Therefore, the question is not whether the government should participate in it or not, but rather what spheres it should be active in and what management tools it is better to use. The government's role in the process of activation and development of clusters is to be one of three equal sides performing their specific functions. Additionally, its role is to act as an active intermediary, and as a result, remove some of the market failures.

Market failures arise from a mismatch of private and public costs and benefits. One cluster problem is a weak coherence of cluster objects. The problem occurs because during the interaction inside a cluster, actors create externalities for other cluster members. The participants who create these externalities do not receive any benefits. Therefore, they are not willing to cooperate with the cluster participants [Solvell O.]. As a result, companies in the cluster do not use all the available advantages. This problem occurs due to the high transaction costs.

Ideally, in this case the government helps to decrease transactional costs. It acts as a guarant of the fulfillment of obligations, as it itself is involved in some of the projects, where it partially takes risks and make investments. Here, there is a difference from the Triple Helix concept where all three participants are equal.

The role of the government in cluster development is overwhelming.

The role of universities in the formation of clusters

Edicutional and scientific organizations are also parts of the clusters. In the system of clusters they perform as the main providers of new knowledge and modern technology; they are the foundation of the competitiveness of cluster members. It is widely known that universities play a special role in the Triple Helix Model. It is the university that has the dominant position in the innovation development system, as it performs as a moving force in a knowledge-based society. According to Henry Etzkowitz, modern universities are on the verge of upcoming changes, where they will perform an absolutely new function. Universities are involved in the cluster formation process which gives them new opportunities: they transform from being traditional to research-and-development and entrepreneurial ones. The main distinctive feature of such a university is the performance of three missions: education, research and socio-economic development of the region. Thus, the new university presents a modern phenomenon: the scientific community takes the responsibility for realizing a new production mode, based on continuous implementation of organizational and technological innovations.

The interest of postindustrial countries in concept of the entrepreneurial universities can be explained by the following postulates:

- Entrepreneurship is the main source of economic growth and competitiveness;
- Higher education and science are the basis of innovative development of entrepreneurship;
- Policies and programmes can be designed to raise intentions towards entrepreneurial action and impact upon the conversion of these intentions into successful action of entrepreneurial activity.

There are two ways of building an entrepreneurial university which contribute to the engagement of a university in the work of clusters:

- Creating conditions and motivation to work in partnership with industrial participants of a cluster. Paying attention to inventions and research is more effective than just preparation of scientific publications.
- Paying attention to interdisciplinary research and undergraduate and graduate student engagement into this process [Ghoshal, 2005].

Building an entrepreneurial university is a process demanding formal and informal transformation, which includes not only changes in organization and organizational relationships, but also in the system of management and culture.This transformation cannot happen in a short period of time; it is a result of a long-term intensive work, as well as pressure from cluster participants and interference of the state. [Ivashchenko N.P., 2013]. It is necessary to set a framework for the monitoring of fundamental institutional change as it relates to policy goals so that progress can be monitored over time.

The role of industry in the clusters

Small and medium businesses are key cluster participants.T he international evidence as to the contribution of small businesses (seen by Schumpeter, 1943, and others as a key component of the entrepreneurial economy) to employment growth in the US and Europe over the past two decades is substantial although the impact across Europe has been rather uneven (EC, 2005). Schumpeter, J.A. (1943) "Capitalism Socialism and Democracy".

The connection between universities and business has a significant role in cluster formation. In the work of clusters universities become strategical partners of enterprises. An entrepreneurial university is an academc institution controlled by the state and business. Universitites hold a dual position. On one hand, they lose their traditional role and independence, as they begin to work in close cooperation with enterprises and the state, and therefore, become, to a certain degree, accountable to these institutions. On the other hand, since universities gained a more significant role in innovation processes, they status and power should grow. Due to the fact that the university is expanding its entrepreneurial activity of research commercialization, business can simultineously consider it as a competitor and as a partner [Pospelova T.B.].

Conclusion

It is important to consider the following factors during cluster formation:

- Availability of local companies and schemes of their interaction (not just investment planning, but linking the plans of companies and the state);
- Small and medium business, as well as research and education institution involvement
- Creation of innovative infrastructure: a technology transfer center, technoparks, scientific cities, business-incubators. Infrastructure is an important element of cluster formation. The availability of developed infrastructure is a crucial factor in attracting private capital which in turn is important for business involvement [Motosova P.A., Yatsechko S.S.].

To sum up, cluster policy shifts the focus from individual branches to a group of related industries, and the interaction between science, business and the state.

Список литературы / References

1. Allan Gibb, Emeritus / Towards the Entrepreneurial University? / University of Durham 10 Kimblesworth Grange Durham DH1 5SL/UK
2. Bulatova A.S. / Economics: Textbook / Edited by M.: Yurist,1999. pp. 96–99
3. Drucker P.F., 2001. The Next Society: a survey of the near future. The Economist, Vol. 361, No. 8246, 3–9 November.
4. Dezhina E. / Gaidar Institute for Economic Policy Scientific Works No 164P // Technological platforms and innovative clusters: together or apart?
5. Dezhina E., Kisileva V. / The Triple Helix in the innovative system of Russia. / 2007.
6. Ghoshal and Gratton (2002) 'Integrating the Intrapreneurial Enterprise' MIT Sloan Review Vol. 44 No. 1 pp. 31–39.
7. Ivashchenko N.P., Pospelova T. / The process of formation of entrepreneurial universities in Russia. MIR (Mod. innov. razvit.), 2013, no 2 (14), pp. 66–70 / ISSN 2079-4665.
8. Kleiner G.B., Kachalov R.M., Nagrudnaya N. B. The synthesis of cluster strategies based on systematic integration theory. Industry markets, 2008, no 5–6 (18), (September-December) / http:// www.kleiner.ru/arpab/klaster.html
9. Kutsenko E.S./ Rational cluster strategy: maneuvering between the failures of the market and the state / 2011.
10. Kutsenko E.S./ Rational cluster strategy: maneuvering between the failures of the market and the state / 2011 / Russian Government Decree, 2008.
11. Kulikova O.N., senior research assistant of the sector of priority directions of science and technology development of Russian Scientific Research Institute of Economy, Policy and Law in Science and Technology/ The Role of Innovative Territorial Clusters in the Development of Integration of Science and Education.
12. Newman J. H. (1852) 'Knowledge, Learning and Professio0nal Skill' in Alden, R.M. (edt) (1917) 'Readings in English Prose of the 19th Century'. Cambridge Press. Mass. USA PP. 418-439
13. Marshall A. Principles of economic science. M.: Progess, 1993.
14. Motosova P.A., Yatsenko S.S. / THE IMPLEMENTATION OF THE MECHANISM OF THE TRIPLE HELIX MODEL AS AN INNOVATIVE ELEMENT IN THE DEVELOPMENT OF SCIETIFIC-EDUCATIONAL CLUSTER/ Federal State Budgetary Educational Institution of Higher Professional Education «Volgograd State Technical University» Volgograd city, Russia DOI: 10.12737/3252
15. Pilipenko E.V. Competitiveness of countries and regions in the world economy: theory and experience of small countries of Western and Northern Europe. Smolensk: Oykumena, 2005. pp. 115–125.
16. Pospelova T.V./ Master's thesis «Perspectives of cooperation of science, business and the state in the formation of innovative economy in Russia» / Moscow, 2012.
17. Smorodinskaya N./ The Triple Helix as a new matrix of economic systems/ Institute of Economics of Russian Academy of Sciences, the head of the sector of growth poles and special economic zones
18. Solvell O. Clusters – Balancing Evolutionary and Constructive Forces. 2009. p. 63, 70.
19. Tsihan T.V. The cluster theory of economic development. Theory and practice of management, 2003, no 5.