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## Economic systems sustainable development spatial structures innovatization

### Abstract

The article discusses the need for economic systems sustainable development spatial structures innovatization; the paper also presents the characteristic feature of dynamic stability as an ability of an economic system to create and maintain its innovative structure-forming relationships.

**Keywords:** economic systems, spatial structures, innovatization of economic development, innovativeness, innovativity, innovative saturation of regional economic growth structures, structural elements of sustainable development of economic systems.

**JEL Classification:** O31.

### Objective

The objective of the study was to determine the nature, reveal the contents and forms of economic systems sustainable development spatial structures innovatization processes of spatial structures of economic systems sustainable development; to provide rationale for the dynamic stability as a key feature of an economic system, which allows it to create, accumulate and develop its innovative structure-forming relationships.

### Materials and methods

A holistic approach and the method of structural and logical decomposition have been applied to the investigation of dynamics of sustainable development of national economic systems, which made it possible to determine the nature, reveal the contents and forms of the economic systems sustainable development spatial structures innovatization processes to provide rationale for the dynamic stability as a key feature of an economic system, which allows it to create, accumulate and develop its innovative structure-forming relationships and to develop an innovatization algorithm of the structure-forming elements of regional economic systems sustainable development.

### Originality

The originality of the study lies in the fact that the innovatization of spatial sustainable development structures of economic systems is presented and justified as a process of accumulation, preservation, usage and development of innovative capacity of business entities of an economic system. Innovatization is manifested and implemented in two basic forms of economic activities of business entities: innovationality and innovativeness. Innovationality is

the creative ability and capacity of business entities to create various types of innovation by means of creative destruction (J. Schumpeter) of its technical, technological, organizational, managerial, social, ecological, economical, institutional and other forms of internal surrounding medium. Innovativeness is creative possibilities and abilities of economic entities to transmit and multiply various types of innovation by borrowing them from other technical, technological, organizational, managerial, social, ecological, economic, institutional and other forms of external surrounding medium. Sustainable acceleration of economic systems development is performed by a variety of methods of strategizing the main forms of innovatization that are the basis for raising the efficiency of economic activities of businesses and affect innovative saturation of regional economic growth structures.

### Introduction

The economical theory of innovatization of economic systems is one of the most popular present-day economical paradigms for most of developed and developing countries of the world, including Russia. This paradigm is now at the stage of its “genetic push”. Its “genetic code” is revealed, its fundamental principles and vectors of the dynamic development of innovatization processes of spatial economic systems are formed and systematized at the present stage. Adaptation and forming-up of the mechanisms of their innovational interaction in the hierarchical structures are in progress, with the purpose of optimizing solutions of theoretical and practical tasks on innovatization of regional economic systems.

The relevance of this study, according to the development of economical theory, lies in the fact that it offers to introduce a new category into the discourse of the economical science. It is the category of “innovatization”. We also offer to introduce a general economical theory of innovatization based on the aforementioned category – the theory basically is an ordered interacting set of tenets of various innovation theories existing in the modern academic discourse.

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The genetic origin of the general economical theory of innovatization, which resolves itself into a conclusive scientific result, can be found and traced while analyzing problems of the development of certain innovation theories belonging to various areas of economical discourse – mainly in the works of G. Hospers, R. Smits, M. Laranja, E. Uyarra and K. Flanagan [1]. In his work “Joseph Schumpeter and His Legacy in Innovation Studies” G. Hospers analyzed the results of J.A. Schumpeter’s legacy in the context of emerging theories of innovation within the framework of neo-classicist, evolutionary economical theory. R. Smits, in his article “Innovation studies in the 21<sup>st</sup> century: Questions from a user’s perspective”, separates the developing “process school” and “systematic school” in the studies of innovation. The fundamental work “Policies for science, technology and innovation: Translating rationales into regional policies in a multi-level setting” by M. Laranja, E. Uyarra and K. Flanagan analyzes the existing research areas (the neo-classicist endogenous growth theory, the new growth theory, the new-Marshallian cluster approach, the evolutionary and structural approach, the systematic institutional approach) in terms of recommendations for innovation policies.

This analysis has shown that, firstly, the principle underlying meaning of these works and other similar studies is providing rationale for the dynamic of accumulation, implementation and development of innovations – or, in other words, the innovatization process in various fields and levels of public life: the technical, technological, organizational, managerial, economical, institutional, political and other levels and fields.

Secondly, the existing studies suffer from the insufficient use of holistic approach, which examines the implementation of innovations as both a variable systematic innovational interaction of business, government and society and an integrated whole which is most adequately embodied in the category of “innovatization” on mega-, macro-, meso-, micro- and nano-levels. Moreover, on the meso-level, in definite local formations, these processes can be observed more clearly.

Thirdly, the analysis of the existing economical literature has also shown that the evolution of the general economical innovatization theory is characterized by the stages of its methodology principles’ formation in the form of key fractals. At the first stage (1910s-1940s), N.D. Kondratyev and J.A. Schumpeter conceived the key fractals for the basics of the general economical innovatization theory: the interrelation between innovations and long cycles, the “technological” explanation of long cycles, the fundamental principles of innovation

theory [2]. At the second stage of the general economical innovatization theory development (1940s-1970s) the main macroeconomical fractals were conceived after having been established at the first stage. For instance, J. Bernal’s analysis of the relation between the progress in science and technology and the society, the inclusion of the technology parameters in R. Solow’s neo-classicist models of growth, or S. Kuznets’ research of the epochal innovations problem in the context of economic growth [3]. The third stage (from 1970s on) is marked by a growing number of publications on innovational issues, emerging rationales for new key fractals, mainly associated with the innovatization of companies and organizational and managerial focus areas of business entities. At the third stage G. Mensch offered a classification of innovations, R. Foster developed a model of an 8-shaped curve, A. Kleinknecht analyzed the main problems of innovation clusters, C. Freeman developed a theory of industrial revolutions. Also, the Russian technological modes school was formed, R. Nelson and S. Winter developed the evolutionary economical theory, P. Romer’s works on endogenous growth theory appeared [4].

At the present stage (from mid-1990s) innovations are studied using methods of system analysis. It is in the present conditions when some new areas of innovational problems were established. These areas included the theory of innovation as a field studying renovation and innovational interaction in technical, technological, economic, institutional, organizational, managerial and other systems; the innovation economy as a field studying peculiarities of economic relations in the innovational sphere; innovatology as a science researching the genesis, formation and development of views, doctrines, theories on innovation; the general theory of innovatization of economic systems as the new paradigm of the development of economical theory and business practices. All this is confirmed by the significant increase of publications on innovational policies, creation of effective spatial innovational systems, as well as commercialization, transfer and internationalization of the innovations [5].

This paper analyzes the processes of innovatization of spatial structures of economic development.

### **1. Development structures innovatization and stability priorities**

The definition of innovatization priorities in our study is based on the following methodological principles: firstly, *innovatization* basically is the process of accumulation, preservation, usage and development of the innovational potential of business entities within the economic system.

Secondly, innovatization is manifested and implemented in two basic forms of business entities' economic activity: innovationality and innovativeness. Innovationality is the creative ability and capacity of business entities to create various types of innovation *by means of creative destruction* (J. Schumpeter) of its technical, technological, organizational, managerial, social, ecological, economical, institutional and other forms of internal surrounding medium. Innovativeness is creative possibilities and abilities of economic entities to transmit and multiply various types of innovation *by borrowing them* from other technical, technological, organizational, managerial, social, ecological, economic, institutional and other forms of external surrounding medium.

Thirdly, besides the novelty criterion (according to various academic classifications, disruptive, basic, ameliorative and complementary innovations), while choosing innovatization priorities for structures of sustainable development of a national economic system it is necessary to consider, which form is more preferable for it – the innovational or the innovative form. I.e., to decide whether it is better to create one's own innovations or borrow them from other economic systems. In addition, the conditions of innovatization of certain spatial economic systems require to clarify the question of basic forms of innovation being alternative to each other or complementing each other.

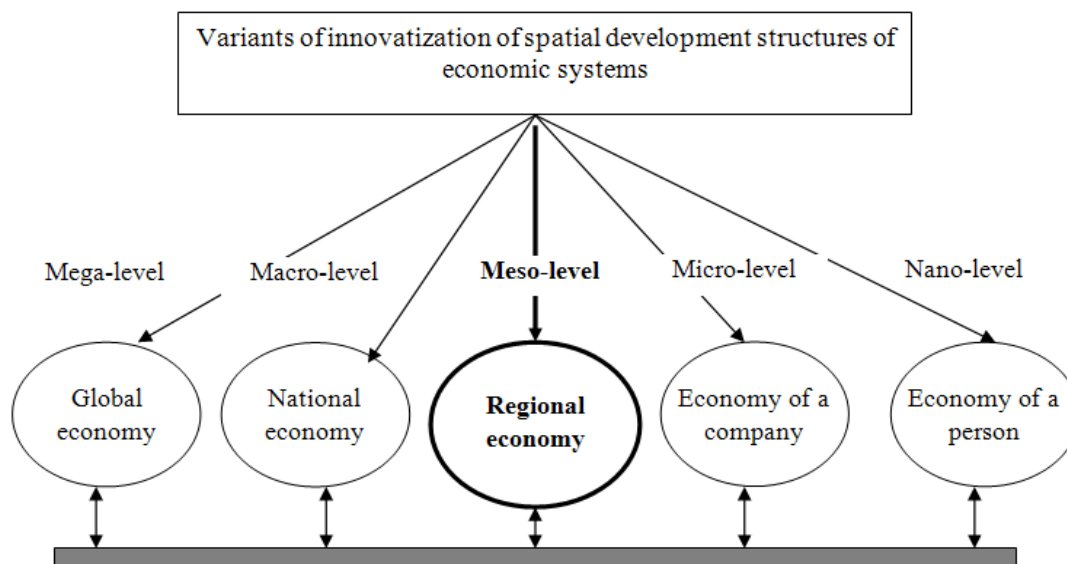
Commitment to creating and accumulating one's own disruptive innovations implies partner interaction between business structures, government and society, which is supposed to support the scientific research and development segment, as well as relevant infrastructure (technology parks, innovation incubators, centers of prototyping and commercialization of technologies, etc.). The choice of innovative development by means of borrowing technologies from other national economic systems requires other type of structural budgeting and strategizing within the given economic space. For example, the positive experience of Japan and South Korea shows that on the first stage of innovatization of spatial development structures of their national economic systems the innovative form, i.e. borrowing foreign technologies, dominated. Later it was balanced out by the innovational form, which is the dominant and priority form at the present moment. However, this form becoming dominant and gaining priority in the innovatization of development structures of national economic systems of these countries would hardly be possible with such dynamics and in such a short time without the USA actively supporting it, since the USA, due to the international geopolitical situation, are interested in conducting this sort of policy in this region.

The negative consequences of using the innovative form of innovatization strategizing of spatial development structures of national economic systems were discovered by C. Perez for the countries of Latin America. In the 1980s-1990s these countries, being considered peripheral, had outdated technologies of the previous (fourth) technological wave exported to them, while in the developed countries the technologies of the next, fifth, wave were already becoming widespread. As a result, the Latin American countries created an infrastructure of the same level as the technologies they borrowed. This infrastructure was not able to become fully efficient because of obsolete technologies of the fourth wave, which provoked a debt crisis in this group of countries.

Innovatization priorities of spatial structures of development of economic systems on all levels, all economic sectors and spheres of the Russian economy result from its specific nature. On the one hand, the country has a scientific and developmental base (contrary to Japan and South Korea in the middle of the past century) for the innovational form of development based on its own breakthrough technologies. On the other hand, there is a significant differentiation and misalignment between innovatization levels of spatial development structures of economic systems, and they are also seriously lagging behind the foreign countries' level. The strategizing of innovational form of development based on the country's own breakthrough technologies on the whole territory of Russia is too risky, whereas commitment to borrowing foreign technologies may not give the necessary results, thus confirming the country's peripheral position in the innovatization processes on the mega-level.

While choosing the innovatization priorities for spatial structures of development of the Russian national economic system, it is very important to monitor their innovational potential in the sphere of creating or borrowing new technologies. The analysis has shown that part of the regions of Russia can reproduce the development model based on creating breakthrough technologies, while the other part can specialize on borrowing the already existing technologies. This will facilitate the diversification of innovatization of spatial development structures of the national economic system of Russia, which will allow reducing the risks of implementing various parts of its innovational policy.

The innovatization priorities for spatial development structures of national economic systems in some of the most powerful nations of the world are mainly associated with providing the dynamic stability of these processes on different levels represented in Figure 1.



**Fig. 1. Economic systems spatial development structures innovatization support levels**

The national economic systems spatial development structures innovatization only began receiving state support in the foreign countries relatively recently (from the second half of the 1990s – early 2000s), but this support has already become widespread. Appropriation of federal budget funds for the innovatization of spatial development structures of the national economic systems in most developed and some developing countries is, at present, one of the basic elements of their regional policy. Namely, this policy is conducted in EU for the purpose of harmonization and consistency in the interaction and development of certain territories, and it is financed via European structural funds. It is believed that co-financing the innovatization of spatial development structures of the national economic systems, scientific research and practical implementation of its results will create additional possibilities for the social and economic development of EU regions without the distortion of the economic entities' market incentives. This also helps to increase their competitive ability on the mega-level [7].

The global experience of supporting innovatization of the local structures of development of the national economic systems shows that it is at its most effective on the meso-level, with certain regions and cluster formations concentrated on it. The support and stimulation of innovatization of their development structures, depending on their specific nature, can be implemented both by means of alternative approaches and by complementary forms and methods which provide the stability of innovatization of the local development structures for the national economic systems.

The problem of stability and its solution are based on maximizing the innovational potential of the sustainable development structures of a national

economic system. In this regard we come across the need to define, regulate and preserve the stability outlined by presuppositions and principles of innovatization.

There are various approaches to defining the stability of development of an economic system. On the one hand, this category can be defined to be a guarantee of a system's purposeful movement. On the other hand, the stability is understood as invariability of the movement trajectory of an economic system, as well as a form of commensurability of social reproduction.

We think that the fundamental feature of the national economic systems development structures stability is their ability to generate innovativeness and innovativeness of conditions, factors and background on every level of the economic system's hierarchy. We understand stability in this case as the ability of an economic system to create and maintain such fractal relations between basic structural elements, which allow it to keep all the necessary parameters of its dynamic renovation on a certain level for the purpose of the system's effective functioning in a competitive environment.

Besides, it is important to note the unity of stability and variability, the balance and the unbalance of the structures of dynamic development of an economic system. Due to that, the innovatization of the sustainable development structures of an economic system is represented by the stable initial criterion of a national economy going from variability, unbalance and misalignment to a state of a stable, balanced and consistent dynamic development. And this is exactly what predetermines the innovatization algorithm of the sustainable development structures of economic systems.

## 2. The strategizing algorithm of the sustainable development structures

The strategic transformation of economic development structures is aimed at serving the interests

of broad strata of the society, and it is based on the innovatization of the development structures of an economic system. The algorithm of this process is represented in Figure 2.

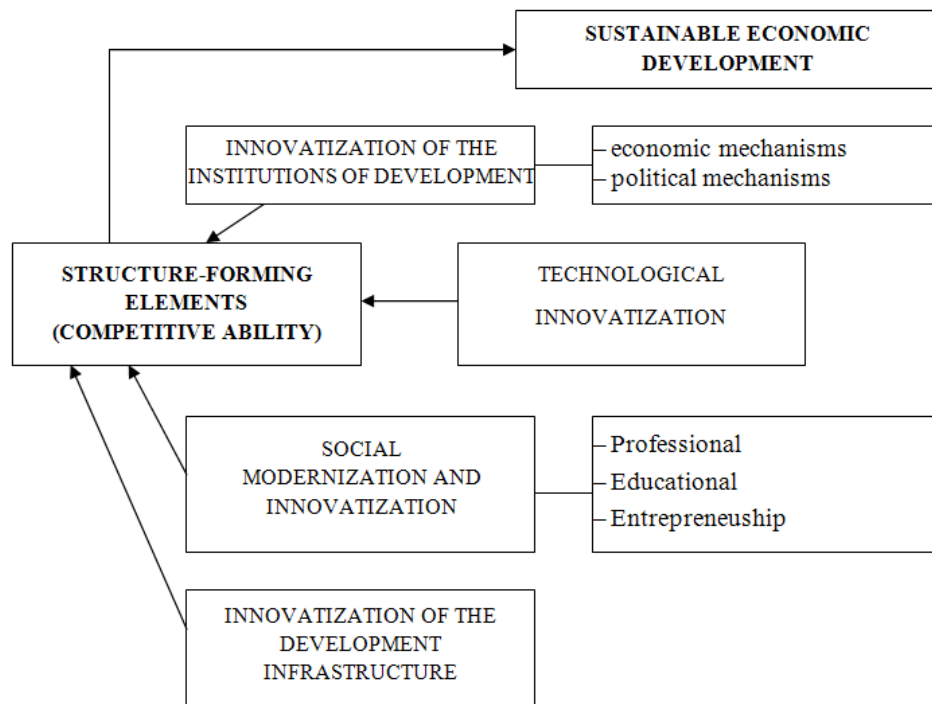


Fig. 2. Economic systems sustainable development structures innovatization algorithm

For the present-day situation this correlation is as follows: 65% – natural resources segment, 15% – human assets, 20% – physical capital. However, the structure of national wealth of most Western countries has an inverse ratio: 65% – human assets, 15% – natural resources segment, 20% – physical capital [8]. Thus, while examining the innovatization of sustainable development structures of an economic system in terms of the correlation of its structural elements, it is necessary to choose an effective correlation of these proportions, which provide a high level of the system's competitive ability.

There is a direct relation between the level of competitive ability, the stability of an economic system and the innovatization of its development structures, because the competitive ability implies the ability of business structures, government, society and infrastructural organization to come to a sustainable development. The fundamental principle of the competitive ability and sustainable development of a national economy is a set of stable economic growth rates.

Thus it is possible to say that the sustainable development basically is a structural balance between internal and external elements of an economic system, which guarantees its continuous permanent growth and competitive ability.

Taking into consideration the transformation of the paradigm of modern economic growth, we can state that sustainable development is impossible without the innovatization of its structure-forming elements. Social transformation and modernization (professional, educational and entrepreneurial) become of crucial significance in this relation. It is the innovatization of human assets and education that contributes to the increase in labor productivity and the creation of products with higher added value, which is the basis for the economic growth. The innovatization of the technological element forms the basis for sustainable development by improving the efficiency of economic activity and giving rise to internal and external competitive ability. The qualitative ground for the informational and technological element makes it possible to achieve a competitive advantage in the system of the international division of labor and increase the value of the national economic system in the world. The innovatization of the informational and technological element is impossible without the participation of a personal, social element, because the former is the product of the latter. This condition determines the need to change the state of the labor resource supply in terms of upgrading the level of intellectual and professional capacity, as well as motivation priorities, which determine the quality and effectiveness of

business activities. Accordingly, the reproduction of social welfare is based not only and not so much on material welfare accumulation, but on the accumulation of knowledge and innovatization of human and IT resources. The variety of institutional and infrastructural conditions today is determined by modernization and innovatization of the institutional structure model, which reflects the degree of economic development, the level of research, and the specific features of the society, culture and history.

Large scale processes of interaction of national innovation system's structural elements are based on the rules and regulations carried out through by organizational mechanisms. These rules and regulations form the conditions of the institutional structure innovatization and represent one of the fundamental elements of an innovational type of growth and development. The innovatization of institutional structures and the infrastructure of sustainable development relies primarily on the establishment of an appropriate institutional matrix. Tendencies and common factors of innovatization of the institutional matrix of the economic development are expressed in intellectualization, intensification and strengthening of interdependence of all structure-forming institutions. The innovatization of institutions provokes the formation of a complex process of economic, social and political interrelations, contributing eventually to the creation of appropriate structures and demanding the formation of an innovational institutional matrix. Consequently, the institutional structure (matrix) of the innovational economic development is a set of

interdependent institutions, which form the mechanism of progressive sustainable innovational economic and social development.

## Conclusion

In summary, the innovatization of structure-forming elements of a national economic system's development will increase the level of its competitive ability by speeding up and stabilizing the innovational activity level and by fulfilling a number of paramount functions:

1. The reproduction function of innovatization of sustainable development structures of a national economic system is expressed in encouraging production with high added value as the basis for economic growth and development;
2. The transformational function of innovatization of sustainable development structures of a national economic system is represented by the need to modernize the original economic background, conditions and processes;
3. The structure-forming function of innovatization of sustainable development structures of a national economic system involves the spread of new knowledge, IT and intellectual potential of all elements of economic growth and development.

Thus, the defining characteristic feature of the modern state of innovatization of sustainable development structures of a national economic system is the complexity of the structure, the acceleration of scientific, technological and innovational changes in accordance with the expansion of globalization of world economic relations.

## References

1. Hospers Gert-Jan (2005). Joseph Schumpeter and His Legacy in Innovation Studies. Knowledge, Technology & Policy, Fall 2005, 18 (3), pp. 20-37.
2. Smits, R. (2002). Innovation studies in the 21st century: Questions from a user's perspective, *Technological Forecasting & Social Change*, 69, pp. 861-883.
3. Larajaa, M., Uyarra, E., Flanagan, K. (2008). Policies for science, technology and innovation: Translating rationales into regional policies in a multi-level setting, *Research Policy*, 37, pp. 823-835.
4. Kondratyev, N.D. (1922). Mirovoye khozyaystvo i ego konyunktura vo vremya i posle voyny [World economy and its market environment during and after the war]. Vologda: Oblastnoye otdeleniye Gosudarstvennogo izdatelstva.
5. Kondratyev, N.D. (1925). Bolshiye tsikly konyunktury [Long cycles of market environment], *Voprosy konyunktury*, 1 (1), pp. 28-79.
6. Kondratyev, N.D. (1926). Die langen Wellen der Konjunktur, *Archiv fuer Sozialwissenschaft und Sozialpolitik*, 56 (3), pp. 573-609.
7. Schumpeter, J.A. (1912). Theorie der Wirtschaftlichen Entwicklung, *Industry and Innovation*, 9.
8. Schumpeter, J.A. (1939). *Business Cycles. A Theoretical, Historical and Statistical Analysis of the Capitalist Process*. New York; Toronto; London; McGraw-Hill Book Company.
9. Schumpeter, J.A. (1934) *The Theory of Economic Development*. Harvard University Press, Cambridge, MA.
10. Schumpeter, J.A. (1943). *Capitalism, Socialism and Democracy*. Harper, New York.
11. Bernal, J.D. (1939). *The Social Function of Science*. London: George Routledge & Sons Ltd.
12. Kuznets, S. (1955). Economic Growth and Income Inequality, *American Economic Review*, 45 (1), pp. 1-28.
13. Kuznets, S. (1971). Lecture to the memory of Alfred Nobel, December 11.
14. Solow, R. (1956). A Contribution to the Theory of Economic Growth, *Quarterly Journal of Economics*, 70, pp. 65-94.
15. Solow, R. (1957). Technical Change and the Aggregate Production Function, *Review of Economics and Statistics*, 39, pp. 312-320.

16. Mensch, G. (1979). *Stalemate in Technology – Innovations Overcome the Depression*. New York, NY: Ballinger.
17. Foster, R. (1986). *Innovation: The attacker's advantage*. New York: Summit Books.
18. Kleinknecht, A. (1987). *Innovation Patterns in Crisis and Prosperity. Schumpeter's Long Cycle Reconsidered*. Foreword by Jan Tinbergen. L.: Macmillan Press.
19. Freeman, C. (1974). *The Economics of Industrial Innovation*. Harmondsworth, UK: Penguin.
20. Anchishkin, A.K. (1986). *Nauka – tekhnika – ekonomika [Science – Technology – Economy]*. Moscow: Ekonomika.
21. Nelson, R.R., Winter, S.W. (1982). *An Evolutionary Theory of Economic Change*. Harvard University Press.
22. Romer, P. (1991). Endogenous Technological Change, *Journal of Political Economy*, 98 (5), pp. 71-102.
23. Romer, P. (1994). The Origins of Endogenous Growth, *Journal of Economic Perspectives*, 8, pp. 3-22.
24. Mankiw, G., Romer, D., Weil, D. (1992). A Contribution to the Empirics of Economic Growth, *Quarterly Journal of Economics*, 107 (2), pp. 407-437.
25. Freeman, C. (1995). The National System of Innovation in Historical Perspective, *Cambridge Journal of Economics*, 19, pp. 5-24.
26. Etzkowitz, H., Leydesdorff, L. (2000). The Dynamic of Innovations: from National System and “Mode 2” to a Triple Helix of University-Industry-Government Relations, *Research Policy*, 29, pp. 109-123.
27. Hirooka, M. (2006). *Innovation Dynamism and Economic Growth. A Nonlinear Perspective*. Cheltenham, UK – Northampton, MA: Edward Elgar Publishing.
28. Nelson, R. (ed.) (1993). *National Innovation Systems. A Comparative Analysis*. Oxford University Press., New York/Oxford.
29. Qingrui, X., Jin, C., Zhangshu, X., Jingjiang, L., Gang, Z., Yong, W. (2007). Total Innovation Management: a novel paradigm of innovation management in the 21<sup>st</sup> century, *Journal of Technology Transfer*, 32, pp. 9-25.
30. OECD and European Commission (1997). Proposed Guidelines for Collecting and Interpreting Technological Innovation Data: The Oslo Manual // Productivity Growth and the New Economy. Paris.
31. Perez, C. (2002). *Technological revolutions and financial capital: The dynamics of bubbles and golden ages*, Edward Elgar Publishing.
32. European Regional Development Fund, available at: [http://ec.europa.eu/regional\\_policy/thefunds/regional/index\\_en.cfm#2](http://ec.europa.eu/regional_policy/thefunds/regional/index_en.cfm#2).
33. Pavlov, P.N., Zharinov, A.A., Kaukin, A.S. (2012). Empiricheskiye issledovaniya innovatsionnykh ekonomik [Empirical research of national economies] Moscow, “Delo” Publishing company of the Russian Presidential Academy of National Economy and Public Administration, 216 p.
34. Postalyuk, M.P., Zhalbe, S.V. (2013). Dvizheniye inostrannogo kapitala kak forma innovatizatsii regionalnoy ekonomicheskoy sistemy (na primere Respubliki Tatarstan) [The movement of foreign capital as a form of innovatization of a regional economic system] // Kazan, Russia: Vestnik KAI.
35. Postaliuk, M., Vagizova, V., Postaliuk, T. (2013). Implementation forms of institutional support of traditional and innovative national economies development, *Investment Management and Financial Innovations*, 10 (4), pp. 88-94.
36. Sukharev, O.S. (2009). Strukturnaya politika i sistema strategicheskogo planirovaniya. [Structural policy and the system of strategic planning] // Institute of economics of the Russian Academy of Sciences. Date Views 23.11.2013 [www.finanal.ru/034/strukturnaya-politika-i-sistema-strategicheskogo-planirovaniya](http://www.finanal.ru/034/strukturnaya-politika-i-sistema-strategicheskogo-planirovaniya).
37. Fagerberg, J., Srholec, M. (2008). National Innovation systems, capabilities and economic development, *Research Policy*, 37, pp. 1417-1435.
38. Furman, J.L., Porter, M.E., Stern, S. (2002). The Determinants of National Innovative Capacity, *Research Policy*, 31, pp. 899-933.
39. Vagizova, V.I., Lurie, K.M., Ivasiv, I.B. (2014). Clustering of Russian banks: business models of interaction of the banking sector and the real economy, *Problems and Perspectives in Management*, 12 (1), pp. 83-93.