Evolutionary aspects of innovation development

Elena Fiodorovna Nikitskaya, Anastasia Anatolyevna Safronova, Olga Nikolaevna Zhidkova, Andrey Anatolyevich Ivanov, Ludmila Nikolaevna Ivanova-Shvets and Natalia Aleksandrovna Mamedova

Moscow State University of Economics, Statistics and Informatics (MESI), Nezhinskaya str., 7, Moscow, 119501, Russia

Abstract. The paper explores the evolutionary approach to the study of innovation processes at all levels of the economy. One of the new trends of the evolutionary approach is the global evolutionism, which examines the process of evolution as an inclusive process - from the creation of the universe to the present state of nature and society. The theory of global evolutionism is expressed in the general trend of dynamic processes towards progressive change and is inextricably linked with the theory of evolution based on the adaptation mechanisms. The difference between these theories is connected with the fact that the global evolutionism admits regression as a form of variability. Possibility of evolutionary progress or regress in innovation depends on the effectiveness of public policy.

[Nikitskaya E.F., Safronova A.A., Zhidkova O.N., Ivanov A.A., Ivanova-Shvets L.N., Mamedova N.A. **Evolutionary aspects of innovation development.** *Life Sci J* 2014;11(8):516-519] (ISSN:1097-8135). http://www.lifesciencesite.com. 69

Keywords: innovative development, evolutionary processes, global evolutionism, adaptive behavior, diffusion of innovations, stages of development

Introduction

Efficient system of innovative development cannot be realized on the basis of assumptions about change of stationary and equilibrium states of the economy, postulated in neoclassical theory. There is a view in modern economy that the equilibrium state is an abstraction rather than a description of real processes, as everything is subject to change and evolve. According to exact expression by Popov V.P. and Krajnjuchenko I.V., stationarity is some idealization, justified in terms of a "short-lived" observer of slow-paced changes [1]. Social and economic reality is in continuous and irreversible change, and therefore, the balance can be considered in theoretical terms as an economic model that greatly simplifies the reality, but in practical terms by taking into account the constraints imposed on the equilibrium model as "stagnation" in the development of system. On this basis an integrated system of evolution, called global (universal) evolutionism is built in modern science, whereby fundamental similarity, unity of the various types of self-organization dynamics are established. The components of the holistic process are physical and chemical, biological, social, economic, socio-cultural processes.

The main part

As a key premise of studying innovation economy, it makes sense to use the theory of global evolutionism that appeared in science in the early 80s and is now gaining general recognition in the global knowledge system. The theory of global evolutionism is inextricably linked to the economic theory of evolution, which was founded by R. Nelson and S.G. Uinter, outlined their views in their book "An Evolutionary Theory of Economic Change", published in 1982. In one of the works devoted to the analysis of the theory of R. Coase, S.G. Winter highlighted the essential feature of evolutionary theory, which claims that "theory emphasizes the inevitability of wrong decisions in a world where uncertainty reigns, and prominent "active" role of the economic environment both in the identification of "errors" and in the silencing of the errors identified" [2]. The main conclusion that can be drawn from the theory of global evolutionism follows: all that is characterized as a "process" is subject to the principles of evolutionary dynamics, having the general progressive direction, which is reflected in the movement from chaos to order, from simple to complex, from the less perfect to the more perfect. This strengthens the assertion made by D.Nord: "Stability is a necessary condition for the complex interactions between economic agents, but it is not enough for efficiency" [3].

The process of evolution is often identified with the theory of Charles Darwin, but it is Darwin who had an idea of sharing an evolutionary approach to other areas of science. In this regard, V.S. Sopin notes: "The universality of the Darwin's approach is dictated by the fact that, initially claiming the status of development of the theory of biological objects, which explains some of the common mechanisms in the field of wildlife, it became a system of ideas, which is applicable to all open, complex and evolving systems"

[4]. Principles of biological evolution and natural selection are implemented in the evolutionary approach to economic dynamics proposed by A. Alchian, which is based on the hypothesis of incomplete information, imperfect foresight and adaptive processes. According to Alchian "The economic system is interpreted as a kind of adaptive mechanism which chooses actions that are being tested as a part of the adaptive process aimed at achieving "success" or "profit". At the heart of the evolutionary changes in the economy, according to the views of Alchian, there is adaptive behavior of economic agents, which means that "... the probability of survival and growth will be those whose inner state will be closer to the new but unknown optimal state" [5]. Alchian opposes his concept to principle of profit maximization, assuming compliance criteria for positive rather than maximum profit sufficient for "approving" behavior of the economic system. However, this position cannot be accepted in full, as positive earnings may be insufficient to ensure a positive effect value of entrepreneurial activity in a situation of attracting credit resources.

Global evolutionism is comprehensive, as it claims to cover all the world's global processes. There are following basic steps of global evolutionism: (1) cosmic evolution (Metaprocesses associated with the formation of atoms and molecules, the formation of galaxies, stars and planets, etc.) → (2) chemical evolution (formation of chemical elements and compounds, including organic compounds) → (3) geological evolution (formation of crustal structures, mountains, water, etc.) → (4) the evolution of protocells (biopolymers self-organization and storage of information at the molecular level, etc.) → (5) Darwinian evolution (development of plant and animal species, the emergence of ecosystem on the Earth) → (6) human evolution (development of labor, language and thinking) → (7) the evolution of society (the division of labor, social organization, technology, social structures, etc.) → (8) the evolution of information and exchange of information (enrichment and storage of knowledge, the development of communications, science, etc.) [6]. Thus, Darwinian evolution is only one of the phases that is one of the manifestations of global evolutionism. A modern picture of the world is characterized by the extension of its regularities on the development of science, equipment, technology, methods of transmitting information. We would like to note that the first five phases are carried out in a general sense to the laws of Nature, and the evolution of human society, information is the result of vigorous activity of society.

Global evolutionism refers to general and universal theories; hence, it can be applied to both the world as an innovative process in general and the socio-economic processes in particular. Consequently, innovative development, while being a kind of evolutionary process, obeys basic principles of global evolutionism. This assumption is confirmed by simple comparison of the state of science, equipment, technology, ways of communication, say, 100 years ago with the state that has developed now, especially in technologically advanced countries [7]. According to the concept of global evolutionism, innovation process on a global scale can be regarded as a single process developing in time in which national economies are linked through information exchange, international cooperation aimed at joint search of capabilities of realization of common interests. Through the process of innovations diffusion there is an interpenetration of the highest achievements in science, engineering and technology via international cooperation in scientific and technological fields. The guide of Oslo, universally accepted in the world practice methodological publication in innovation, indicates that a powerful driving force for the deployment of innovative evolution are the processes of globalization resulting in "... innovative processes in many respects are international. Knowledge and technology flow across borders. Companies interact with foreign companies and universities. Many markets in composition of enterprises and their competitors are global. Internet has greatly increased the possibilities of communication and doing business with firms from other countries" [8].

At the same time, we must remember about the global competition to attract investment resources in innovative projects, whose role in the global technological development is ambiguous. Evolutionary processes in the social and economic spheres occur at all levels of the economy. Prominent scientists such as N.D. Kondratyev, J. Schumpeter, W. Rostow, A. Toffler, S. Glazyev and others devoted their fundamental works to study of evolutionary changes in the economic and technological spheres both globally and at the macro-levels and meso-levels. Despite the continuity of social and economic changes, it is customary to allocate separate steps or stages of development, wherein each successive stage is formed from the previous one, both similarities and differences respectively. W. Rostow distinguished five phases: a traditional society; creating preconditions for the beginning of rise; beginning of recovery; movement towards maturity; the era of mass consumption [9], wherein the notion of a traditional society in this case has a broad interpretation. In his later work "Politics and the stages of growth" (1971) W. Rostow added to the previously selected five stages the sixth stage of "search for quality of life" when the spiritual development of man is put in the

first place [10]. Based on evolutionary principles and the approach proposed by W. Rostow, at the initial stage of the innovation development in the economy there are four stages:

1) Innovation stagnation, which manifests itself in the innovation inertia;

2) Innovative "acceleration", characterized by activation of the innovation process;

3) Expansion of the innovation production in the areas of basic technologies and products of mass consumption;

4) Permanent innovative mode associated with the transition to sustainable innovative development [11].

Significant contribution to the development of methodology for the study of evolutionary processes at the meso-level was introduced by M. Porter, who created the concept of the evolution of the industry, attributing changes significant to that strategy of major market players. As the main factors responsible for industry evolutionary change, Porter identified a number of dynamic processes, including directly related to innovative changes, in particular:

• Distribution of owner's (being the exclusive property of) knowledge;

• Development of new products;

• Innovations in the field of marketing;

• Innovation of technological processes;

• Structural changes in the related industries [12].

In the area of social, economic and political relations, global evolutionism can manifest itself with a "minus" attribute, i.e. it can take the form of evolutionary regression. Examples of it can be international terrorism, corruption, fraudulent schemes in the economic sphere, hacker attacks, which are becoming more sophisticated and technologically advanced. Countering these phenomena requires the diversion of all kinds of resources. Evolutionary regression in innovation processes may occur only due to economic reasons. In accordance with the concept put forward by J. Shumpeierom, depression often covers much more industries and businesses than the rise [13]. For example, innovative production in the Russian economy is experiencing stagnation, and the reason is that Russia has experienced a technological failure in the 90s, when the high-tech industries in the early years of radical market reforms have fallen by 80-90%. Inhibition in the development of innovation is admittedly due to the lack of an effective system of management. At the same time, the main macroeconomic indicators nowadays show a gradual stabilization of the Russian economy as a whole, i.e., the evolutionary progress. However, indicators of innovative development demonstrate the absence of significant positive changes. Thus, it would be wrong to conclude that, in accordance with the concept of global evolutionism innovation process can develop automatically, without active control interventions at all levels of the economy. One must remember that evolutionary processes can be manifested both in the form of evolutionary progress and as the evolutionary regression.

In order to make evolutionary progress sustainable, efforts should be focused not only on the immediate development of innovative production, but on the formation of innovative capacity. Innovation potential can be interpreted as a set of necessary and sufficient conditions (premises), providing for the future possibility of moving the economy to a higher technological level nationwide. The essential features of the innovation potential include:

• Focus on the medium and long term;

• Indirect impact on the current state of innovation development;

• Probabilistic nature of the incarnation in innovative results and associated high risks;

• High capital intensity and scale [14].

Solution to innovation problems implemented before emergence of the necessary social and economic conditions may cause a waste of economic resources. There are many examples that demonstrate the irrationality, inefficiency of premature implementation of specific activities related to innovation development. In particular, it is unacceptable to form concepts and innovative development program without exploring innovative opportunities and establishing priorities for innovation development of the territory. There are opinions to follow a rational sequence of the transition to the later steps and stages of change. Violation of this principle creates a high likelihood of destructive processes in the economic system. Peter Drucker's position in relation to consistent innovation activities is "a purposeful and organized search for changes, as well as in the sequential analysis of the opportunities that these changes bring for economic and social innovation" [15].

The process of evolution has also affected modern humans. According to G.V. Kleyner et al., differentiation of people on the basis of their psychological and intellectual nature, which arose in the course of evolution, manifested in distinguishing two types of people - thinking and acting (in the terminology of economists) or introverts and extroverts (in the terminology of psychologists), which caused a major obstacle to the transition of the Russian economy to innovative development [16]. An innovative mechanism, which is the driving force of the national innovation system, combines both the creators of new knowledge, which include intellectuals and enterprising participants in the

innovation process, introducing scientific and technological progress in the economic processes that are capable of active, decisive action and prepared to take risks. The state's task is to establish mechanisms to minimize the possibility of abuse by expansive entrepreneurs who are prone to seize power in commercial structures and unfair remuneration to representatives of scientific and technical intelligence for the results of their intellectual work. Insufficient financial incentives sharply reduce interest in tackling scientific activity that, according to many experts, is one of the barriers to innovation in the Russian economy.

Conclusions

The theory of global evolutionism determines two basic laws of the innovation process. First, in a targeted and efficient public administration on a national scale evolutionary progress arises with the need, which is reflected in the improvement of macroeconomic indicators. Second, the lack of an effective management system in the field of high-tech and scientific production inevitably leads to an evolutionary regression and causes inhibition in the development of innovation at all levels of the economy. Evolutionary nature of innovation processes allows us to apply the theory of global evolutionism as a methodological background to justify practical action aimed at the formation and development of the innovation system and innovation capacity. Principles of evolutionary dynamics and the global evolutionism justify the concept of consistent development system of innovative potential, based on the sequence of actions in targeted changing of the features of the economic system.

Corresponding Author:
Dr.Nikitskaya E.F.
Moscow State University of Economics, Statistics and Informatics (MESI)
Nezhinskaya str., 7, Moscow, 119501, Russia

References

1. Popov, V.P. and I.V. Krainuchenko, 2003. Global evolutionism and synergy of the noosphere.; Pyatigor. Inst. of Economics and Management. (InEM), Pyatigor. Branch of North Caucasus Acad. of civil service - Scientific. PH. Rostov n/D: Publishing house: APSN SKNC VSH, pp.: 333.
2. Nelson, R.R. and S.G. Winter. 1982. An Evolutionary Theory of Economic Change. Harvard University Press, pp.: 454.
3. North D. The contribution of the new institutionalism in the understanding of the problems of a transition economy. Date Views 01.01.2013 http://www.finansy.ru/publ/north.htm.
4. Sopin, V. S., 2009. Evolutionary theory of economic science: problems and prospects. Eurasian international research and analytical journal, #3 (31). Date Views 01.01.2013 www.m-economy.ru/art.php?nArtId=2687.
5. Alchian, A. A., 1950. Uncertainty, Evolution, and Economic Theory. The Journal of Political Economy, 58(3): 211—221.
6. Bondarev, V. Concepts of modern natural sciences. Date Views 01.12.2013 www.gumer.info/bibliotek_Buks/Science/bond/11.php.
7. Kaptyukhin, R.V., A.A. Romanov, O.N. Zhidkova and L.A. Danchenok, 2013. Features of online marketing communications and their classification. World Applied Sciences Journal, Issue 27 (Education, Law, Economics, Language and Communication), 13, www.idosi.org/wasj/wasj27(elelc)2013.htm
8. Oslo Manual. 2005. Guidelines for collecting and interpreting innovation data. 3rd edition. OECD, EUROSTAT. OECD Publishing, pp: 164.
9. Rostow, W.W., 1961. Stages of economic growth. Trans. Marchenko, V.P. New York: Preger, pp.: 236.
10. Rostow, W. W., 1971. Politics and the Stages of Growth. Cambridge University Press, pp.: 424.
11. Nikitskaya, E.F., 2012. The concept of management of innovative potential of the territorial subjects of the market. "Naukovedenie", #4(13). Date Views 01.01.2013 www.naukovedenie.ru/PDF/50evn412.pdf
12. Porter, M., 1998. Competitive Strategy: Techniques for Analyzing Industries and Competitors. New York: The Free Press, pp.: 397.
13. Schumpeter, J.A., 2007. Theory of economic development. Capitalism, socialism and democracy. Ed. Avtonomov, V.S., trans. Avtonomov, V.S. et al. Moscow: Eksmo, pp.: 861.
14. Nikitskaya, E. F., 2012. Innovation potential as a basis for sustainable economic growth. Scientific-practical interdisciplinary journal “Integral”, #3(65), pp.: 48—50.
15. Drucker, P., 1993. Innovation and Entrepreneurship. Practice and principles. Collins; 1st edition; pp.: 293.
16. Kleiner, G.V., 2011. Innovative development of region: potential, institutions, machinery. Collective monograph. Kleiner, G.V. et al; ed. Kleiner, G.V., S.S. Mishurov. Ivanovo: Ivanovo State University. Moscow, pp.: 198.

5/18/2014