

## **Terminology is significant: "Re-industrialization" versus "Innovation development"**

**Iurii Bazhal\***

**Abstract.** This paper investigates the methodological background of modern attempts to establish the names for current and future type of our socio-economic system. Unexpectedly many experts came back to the old used terminology and have offered to define a new phenomena using category of "Industrialisation" in different combinations, without the contemporary core category of "Innovation". Why many economists shy off the category of "Innovation" when they describe the conceptual mode of existing and predicted future of economic systems? Why are we still using the name of "Industrial policy" instead adequate representation of this type of the state regulation under name of "Innovation policy"? This paper will try to explain this controversy as avoidance the recognition of Schumpeterian conceptual approaches in quality of new mainstream of economic theory. It is presented methodological basis for revealing the nature of the post-industrial economy using the Schumpeter's theory of economy development, which in many respects does not fall into the methodological frames of traditional neoclassic canon. The paper examines the Neo-Schumpeterian approach according which the economic wealth of the country depends first of all on the development of sectors with technological base belonging to current and next technological paradigms. Such conceptual vision sets new requirements to the state economic policy.

**Keywords:** Schumpeterian approach; Innovation development; Innovation policy; Technological paradigms; Economy of Ukraine.

**JEL Classification:** O14, O33, O38, O57

### **1. Introduction**

The famous ancient Chinese philosopher Confucius [Kongfuzi] said the first step to improve governance must be establishing of right names of things: "If names be not correct, language is not in accordance with the truth of things. If language be not in accordance with the truth of things, affairs cannot be carried on to success" [Confucian Analects, 2006]. Such task is easier for things that have been existing: more or less the majority of experts know the recognized meaning the names of existing things. More difficult situation is to give right definition for new things. How we can name unknown new emergent phenomena? What is that? In economics it is very important to give right name for new phenomena because such vision has direct influence on measures of economic policy and for elaboration the right strategy. Now we are considering this situation regarding to attempts to establish the names for current and future type of our socio-economic system. But unexpectedly many experts came back to the old used terminology and have offered to describe a new things using category of "Industrialisation" in different combinations, without the contemporary core category of "Innovation".

Such approach is surprising in light of realization The Strategy Europe 2020 that puts forward as main priority - "Smart growth: developing an economy based on knowledge and innovation", and

---

\*Dr., Prof. Iurii Bazhal, Head of Economics Department, National University of Kyiv-Mohyla Academy, 2 Skovoroda Str., Kyiv 04655, Ukraine ( [ibazhal@gmail.com](mailto:ibazhal@gmail.com); [bazhal@ukma.edu.kiev.ua](mailto:bazhal@ukma.edu.kiev.ua) )

as first flagship initiative to catalyse progress put a forming of “*Innovation Union*” to improve framework conditions and access to finance for research and innovation so as to ensure that innovative ideas can be turned into products and services that create growth and jobs” (Europe 2020, 2010). This strategy based on conceptual vision that the mentioned priorities will be to ensure the becoming of Europe as the world-leading competitive and dynamic knowledge economy, and this approach also is a fundamental principle of European integration in the 21st century. The Strategy Europe 2020 is conceptually related to the Schumpeterian methodological paradigm where knowledge and innovations are the central driving factor of economic growth.

Why many economists shy off the category of “Innovation” when they describe the conceptual mode of existing and predicted future of economic systems? Why are we still using the name of “Industrial policy” instead adequate representation of this type of the state regulation under name of “Innovation policy” (for example Aghion et al., 2011)? There are many influential concepts that characterize our present state on the axis of Human civilization development: post-industrial society, information society, innovation and knowledge economy, new economy, smart economy. Why we cling so tightly with the vision that is termed the “Industrial society”? This paper will try to explain the mentioned paradox as a fear the recognition of Schumpeterian conceptual approaches in quality of new mainstream of economic theory. We used a word “paradox” because everybody can see everywhere the ocean of innovation activities, the sea of relevant economic literature, but we have almost never seen the teaching of Schumpeterian conceptions at Universities (mainly only as history of thought). Slightly better this topic is presented in the MBA programs. The innovation model of economic development de facto engages implicitly in competition with the conception of “Industrial Modernization”.

## **2. How terminology influences the economic policy**

Abovementioned terminological collision has a crucial influence on the actual economic policy. Even if we include into the old name the new meanings, many people and politicians remain in traditional understanding of meanings of these words. In Ukraine we have many examples of negative consequences due to usage of some economic categories into not adequate sense. For example, in many official economic programs the term “innovation policy” has been presented as “investment-innovation policy”. The authors of these documents have been afraid to embed into economic programs the notion of pure innovation policy. Why is it? Perhaps there is the same reason that many experts are afraid be using category of “Innovation policy” instead “Industrial policy”. It regards to the mainstream economic literature. In post-socialist countries the term “Industrial policy” mainly is understood as “Economy of industry”. In Ukrainian sample, concerning to the using term “investment-innovation policy” we have had such consequences when main focus was and remain on investments but not on innovations.

The similar result exists concerning to using term of “Industrialisation”. Many experts and politicians suggest that Ukrainian transitive economy with a former high industrial potential must mainly continue to develop their traditional industrial and agricultural sectors. In this case the main attention in the state policy intend for stimulation of innovations in order to modernize traditional enterprises. Especially for those that can occupy the market niches that have been left by developed countries to move resources toward the modern high-tech sectors. In fact it is policy to remain in previous technological paradigm. Then, in such context the terms of “new industrialisation” or “re-industrialisation” are used. But we cannot consider such vision as the methodological platform to elaborating of sustainable advanced strategy for economic growth. It is first of all because traditional markets are competitive and new enterprises do not have “market power” and consequently a high level of profitability. Also these markets are practically saturated that determines low added value of production. This paper discusses the mentioned problem and argues

conclusion that a catch-up economic development can be successful if a country will be able to have expansion of a new modern post-industrial branches and more innovative structure of production.

The same misrepresentation we have with understanding the new concept of “Knowledge economy”, which is more broadly development of the innovation economy concept (Bazhal, 2003). The modern paradigm outlining the essence and the factors of a country's global competitiveness in terms of methodology is directly linked to the new category introduced into scientific usage by an originally English term “Knowledge-based economy”. Only after a certain period of conceptualization of its contents, the term started to be used in its shortened form “knowledge economy.” This linguistic history manifests a conscious attempt to clearly define the conceptual meaning of the key core of emerging economic system. This term, as well as “Innovation economy”, pretends to be the name for new type of the current social and economic relations. The generalization level of this category is the same as notion “Industrialisation”. But as we can observe during recent time the notion of “Industrialisation” remains as a main vision of essence the modern processes.

The relevance and timeliness of such linguistic rigor have also found their proof in Ukraine, where most specialists translate this category into Ukrainian as “Economy of knowledge”. Such a translation prompts a common perception of this category as a branch phenomenon similar to the economy of industry, agriculture, transport, etc. Nonetheless, this translation is confusing, because the main conceptual meaning of this category is positioning the knowledge resource as the key major factor of the country economic growth. The methodological core of this category is presented not by the features of functioning of specific branches which deal with knowledge production in its various forms, but rather by the final synergetic result constituted by the application of knowledge to ensure stable economic development. For Ukraine, this “nuance” is critical, because we have a substantive gap between the achievements of individual branches of knowledge and the standard of well-being in the country on the whole. Thus it will be more accurate to translate the traditional term “knowledge-based economy” into Ukrainian as an attributive phrase, “knowledge economy”, and not as “economy of knowledge”. Further analysis will provide additional support to such using of terminology.

The paradigm of knowledge innovation economy has established itself at the turn of the millennium and today it has become a major theoretical platform for the policy of economic growth both for the developed and the developing countries. But this concept also is in contradiction to concept of “new industrialization” that initiates operation within old categories and old methodological visions. It is known that the concept of knowledge innovation economy served the basis for the European “Lisbon Strategy” and current Strategy Europe 2020. Relevant criteria are applied also to EU accession countries already as specific requirements to their current economic policy. This also applies to Ukraine as a potential candidate to join the united Europe and as a neighboring country. So, adequate understanding of the essence of the knowledge innovation economy concept and the relevant activities of the state economic policy concerning its practical implementation are timely for today's European countries and Ukraine.

### **3. Genesis category of “Post-industrial society”**

The modern notions of “Re-industrialization” (Tregenna, 2012, Peneder and Streicher, 2016), “New industrialization” (For a European Industrial Renaissance, 2014), and “Industry 4.0” (Recommendations ..., 2013) have come after elaboration and broadly dissemination theoretical conception of “Post-industrial society” (Galbraith, 1967; Bell, 1973; Toffler, 1980) that have been recognized in status of new step in understanding the substance of contemporary evolutionary process. Such turn of economic thinking requests the special explanations. In our opinion, the basic

vision that caused this transformation regards to recognizing of new key resources for economic growth. In order to give the evidences we will present the historical logic of occurrence of the post-industrial economy as the institutionalizing of a new social and economic form to develop of new key resource for economic growth, i.e. for increasing the added value. Such key resources have been different in different historical periods. Its changing drastically influenced the economic organization of society as well as prevalent theoretical concepts.

The economic science always tried to outline certain stages of the economy development of human civilization, but such methodological approaches mainly had and have political nature. It is clearly attested by the most common names of corresponding historical periods: slaveholding system, feudalism, capitalism, which reflect derivative political systems where the ruling elite (class, strata, caste) were slave-owners, feudals, capitalists. But they were successful magnates as they owned those key resources (production factors) which mainly produced the national income of the countries. The system-forming function of the key economic resource for the institutional type of the state in fact was not changed even by revolutions (antifeudal, anticapitalist): in case of victory revolutionists became the same feudals, capitalists or state capitalists.

One may bring correspondence between these systems and the prevalent key production factor ensuring the economic growth: military force for seizure of assets of other countries, land for agricultural production, and capital for industrial production. But, for example, physiocrats cared for agriculture and denied the ability of industry to produce added value, and the classic political economy refused to include service sector as factor of economic development, considering it as a non-productive branch. Today ideas of a “new industrialization” or “re-industrialization” are also frequently are proclaimed as the readjustment of the service sector dominance; and many experts, especially in post-socialist countries, consider this dominance as unjustified and harmful for economic development.

Such reaction is conditioned by the fact that services sector has recently become the key resource of the countries' economy development. Taking this into account it seemed logical that the first definitions of the post-industrial society were related to the extension of the ‘production sector’ for the account of services (today 70% of GDP in developed countries is created by this sector). However, soon it became clear that these are not just traditional services, but fundamentally new ones related to the prevalence of a new key production factor – scientific and technological progress. Therefore, the classical definition of the post-industrial society is considered to be the one given by the ‘father’ of this concept, D. Bell: *“a society the economy of which the priority has moved from the pre-emptive commodity production to services, research, organization of education and quality of life, in which the class of technical specialists has become the main group of professionals and, most importantly, in which innovations are increasingly dependent on the achievement of theoretical knowledge. Post-industrial society suggests the emergence of the intellectual class, whose representatives at the policy level act as consultants, experts or technocrats”* (Bell, 1967). According to the mentioned tradition, D. Bell refers the ‘intellectual class’ singled out by him to new political elite, which should come to power in the post-industrial society. But this prediction did not happen.

The ‘intellectual class’ did not come to political power. One may search the reasons and consequences of such a course of events into a very large palette of scientific conceptions and in new social and economic conditions. Yet the understanding of fundamental changes which happened and are taking place in the post-industrial society (in comparison with industrial one) - in economic relations at the level of enterprise as an organizational and production structure, region as a territorial and production system, in forms and functions the state institutions, still remains at the initial stage. This is also may give us explanations why the abovementioned proposed fundamental

classifications of the current social and economic state remain in the paradigm framework of "industrialization". Our hypothesis of explanation of this situation is that main factor which has been imprinting all mentioned historical change was "innovation" as separate self-reliant phenomenon. Many scholars distinguish a diverse forms of innovation (technology, product, services, institutions etc.), but they have not been paying attention on existence of "innovation" as the peculiar economic object that demanded to be manageable. Only one methodological conception did it - the Schumpeterian theory.

#### **4. Innovation factor of economic development: Schumpeter's concept**

In our opinion, a methodological basis for revealing the nature of the post-industrial economy may be the theory of economy development by J. Schumpeter (Schumpeter, 1911:1934, 1939), which in many respects does not fall into the methodological frames of traditional neoclassic canon. The central controversial gnoseological vision consist of the understanding the category of "development" as special economic phenomenon. Neoclassical concept bases on assumption the increasing of the production factors amounts (labor, capital, and productivity) ensures economic growth. Schumpeterian approach suggests that only innovation activities can influence the long-run economic growth. Therefore Schumpeter has singled out the economic development that is conditional on innovations as 'Dynamics' or the real development. Correspondingly, the economic system that is functioning without innovations was named as 'Statics' or that don't has development, but only "circular flows". In this methodological frame, the economic growth based on innovations acts as a fundamental specific phenomenon of business activity.

Such a methodological separation seems as a common notion about condition of the existence of any phenomena, but, according to Schumpeter, in economic theory and practice the demonstration of specific features of these two states requires different categorical mechanism. The conceptual separation and demonstration of the different essence of the 'Statics' and 'Dynamics' stages of economy has been puzzling for the traditional views on the nature of economic processes. That is why the Schumpeter paradigm was relatively less popular in academic circles during the last century and has been undergoing the long way of its forming and recognition.

The convincing evidence in favour of such a conclusion may be the content of the basic textbooks in Universities for courses of macroeconomics, microeconomics, and economic growth (Bazhal, Pisotska, 2012). Basically, such modern handbooks do not contain detailed chapters about the theory of economic development by J. Schumpeter as well as Neo-Schumpeterian theories, knowledge economy, smart economy, etc. Generally, there are historical references and mentions about them, but these theories are still absent in the basic conceptual 'body' of textbooks. The factor of 'technological changes' for the most part is regarded in terms of neoclassic equilibrium models modified into the models with endogenous variables, which reflect different phenomena of the innovation process, but they do not significantly affect the existing production functions derived for previous periods. The mentioned new endogenous variables are considered only as reasons to increasing productivity of existing factors of production, not as special additional phenomena that cause the new value added.

The complexity of understanding the mentioned ideas of Schumpeter in many respects is conditioned by believe in a neoclassic canon according to which the achieving of the equilibrium state of Pareto efficiency by the economy is the final goal and objective function of successful economy. Keynes only improved this canon for short-term periods when market mechanism fails in effective self-regulation, but the innovation factor was not regarded as a factor of sustainable development. If one considers more modern neoclassic theories of economic growth – for instance of basic model of Solow-Swan, different endogenous theories of economic growth, – then it is possible to make a conclusion that they seem to convincingly prove the importance of the factor of

innovative technological changes. But their methodological conceptual point remains the format of analysis of the 'economic Statics', i.e. the development of economy on the basis of the traditional structure of production, which is described by empirical (that is by data from previous periods) production functions. Such a methodology of analysis of economic processes is not able to foresee (and explain) the state of economy which appears on the basis of innovational technologies that change the production function.

The central production factor which represents the innovative activity in these models is the increasing of the productivity of given labor and capital resources (TFP – total factor of productivity, 'Solow residual'). In endogenous theories the increasing of productivity is specified in new variables of human capital, patent activity, financing of researches and development, etc. However, the tempo of growth of productivity of traditional resources is defined concerning to the old production, i.e. to the formerly existing one, not regarding to product innovations. Thus, it is about the economic 'Statics'. But in this case remains the "black box" – existing the unexplained residue of the tempo of economic growth. Such puzzle belongs to neoclassical concept. It is Schumpeter's theory that explains this matter.

#### **4. Neo-Schumpeterian concept of economic development**

Schumpeter showed the crucial influence of technological revolutions on the economic development. He established a tight connection between technological innovations and long-term cyclical fluctuations of economic development. In this context, it is important to make a clear distinction of "old" and "new" branches in the analysis and during the formation of the economic policy, as well as the problem of "leading sectors" and methods of their state support.

Neo-Schumpeterian approaches have developed these ideas within category of technological paradigm (Dosi, 1982; 1984). Such approaches have been elaborating the economic theory of technological dynamics (Dosi G., Freeman C., Nelson R., Silverberg G., Soete L., 1988; Nelson, 1995; Perez, 2002;; Malerba *at al.*, 2003; Elgar Companion to Neo-Schumpeterian Economics, 2007; Dosi, 2012). Technological changes are regarded here as the main material object - the species that dynamically develops by itself and determines the ways of evolution of the modern civilization system. Waviness of this process is described by Kondratyev's theory of "long waves" (Kondratiev, 1925; Tylecote, 1992; Freeman, Clark, and Soete, 1982; Freeman and Louka, 2001; Rumjantzeva S., 2003). We consider more productive the approach which concentrates less on the fixation of precise time phases of this wave, studying the essence of the process and its reasons. In this sense it is more important to recognize the technological changes which condition structural reconstruction of the economy as a main factor that have been causing the "long wave" of economic development. The cyclical periodicity depends on the frequency of appearance and putting into operation of basic innovations, leading to the creation of branches-locomotives of the general development and their further spreading in the economy (Mensch, 1979). Today among such "locomotives" we see the branches that are connected with information technologies (Castells, 1996-1998; 2000-2004; Freeman and Louca, 2001).

The development of Neo-Schumpeterian conception created a theoretical basis for a new vision of the basic principles to ensure a countries' economic development and set new requirements to the state economic policy (European Commission, 2010; Smits, Kuhlmann, Shapira, 2010; Carayannis, 2013). This new vision is connected with perception of the national economy's structure as a phenomenon occurring from the different waves of new technological complexes. But in many cases of policy analyses we can meet domination of more traditional vision under consideration the characteristics of structural change. As a rule it is structure of enterprises according a form of property, dynamics in the context of interrelations of various economic indicators and sectors: commodity or service production, creation of added value, investments, such

kinds of activity as the capital flows, final consumption, export, import, etc. Such analysis reveals connections between different parameters of the economic system, establishes certain regularities suitable for international comparisons, etc., but it is limited for the tasks of strategic planning of the state economic policy as it does not give a clear vision of the influence of established structural processes on the future state of the economy. So a more modern instrument of analysis is the vision of structural dynamics of production through regularities of technological systems development.

The concept of technological paradigms singles out the key factor that ensured mass demand for technological changes, and which determined such paradigm. The leaders of the global community master these technologies in advance. The branches that actively use the key factor and adapt its most successfully to the requirements of the corresponding production organization, are the main investors in advanced technologies and form the technological paradigm of the society. In this context, these branches play the role of priority branches. Understanding of the main peculiarities of development and change in technical and economic paradigms and their connection with institutional structure of the society is an important factor of economic policy formation. Specific features of the new technological paradigm, having been determined, show the way of looking for goals and ways of strategic support of its development in the country (Bazhal ed., 2002).

In light of mentioned it is clear why Neo-Schumpeterian theories pay so many attention to the innovative structural reorganization of the national economy, and they consider this as a central direction of economic policy aimed at economic development. Taking this into account, the state management of economic processes concerning structural changes connected with employing of different types of technologies, especially with focus on the development of high technologies, is exceptionally important for the current stage of economic systems development.

## **5. Policy implications: evolutionary economy**

The Schumpeter theory of economic development belongs to the theory of evolutionary economics. Moreover, the term ‘evolutionary’ in this case means the fundamental change of the existing order of things, breakthrough to a new quality (new combination) which is mainly unpredictable. It is such a methodological content that is disclosed by the famous Schumpeter’s alogism in the form of the question: “How long will it take to improve the production of diligences to make a steam engine?” It is clear that it is impossible to provide the occurrence of a steam engine by constantly improving cart transport. Therefore, according to the Schumpeter’s economic development theory it is important to focus economic policy of the country in order to ensuring the long-run economic growth less on modernization its traditional enterprises (new industrialization), but more on the way the creation of new ones which appear upon the innovation technological base. Traditional productions are important for preserving of the existing volumes of national product and ensuring the functioning in the mode of economic ‘Statics’, but the ‘Dynamics’ of economic system is directly connected with the innovative development.

In our times many empirical researches show that economy oriented on reproducing and developing of traditional structure of production (‘Statics’ development type) is not able to substantially increase its wealth and social prosperity in the long-run perspective because the development of traditional competitive markets with time restricts the creation of a new added value. The microeconomic neoclassic theory also confirms such a conclusion concerning markets of traditional products – the margin profit at such markets should move towards a zero mark. Therefore, the sustainable growth of the national added value may be provided only by the innovative growth that stipulates the ‘Dynamics’ type of economic development. The simple increasing of the production volumes of traditional productions, even in the mode of the labor productivity increasing (including

when it will happen because the robotizing and 3-D printers dissemination) will not give a powerful long-term resource for dynamic development of the country or its regions.

The Schumpeter's conceptual paradigm is based on the fact that 'Statics' economy will be steadily moving to the relative overproduction and will come to crisis state. Contrary, the rescue and development for economic system may be given only by evolutionary innovative 'breakthroughs' in the form of an innovation technological change. In neoclassic models such scenario is not specified and, therefore, this approach does not posit the availability of critical necessity of the creation and development of fundamentally new innovative productions. These models only demonstrate the actuality of resources productivity increase, but in terms of a given function, that is in terms of existing technological structure of production.

The last quarter of the 20th century has shown that the Schumpeter's theories may adequately explain the character and driving forces of modern post-industrial economic development. In this regard, one may pay attention to rather paradoxical fact: as we mentioned, the Schumpeter's conceptual approach has had a little representation in Universities' courses, but in fact this theory has been in the basis of economic strategy and current policy of the developed countries and countries having achievements in the dynamic development. The innovation model of economic development lay as main theoretical basement. The innovation model of economic development is embedded as theoretical basement of the current economic strategy of the European Union where the central driving factor of economic development is a new knowledge and innovations. The strategy Europe 2020 emphasises that along with the realization of traditional goals of macroeconomic policy – the achievement of macroeconomic stability, increase of the efficiency of available resources and support of employment, – the tasks of building the innovative knowledge economy are shifting to the first place (Europe 2020, 2010).

The above-mentioned reflects the main qualitative difference between the post-industrial economy (as the Schumpeter's type economy) and the industrial economy (as the economy of neoclassic concept). This difference is connected with recognising the stepwise quality change of many economic processes (Schumpeterian vision). Neoclassical tradition is staying in conceptual framework of a linear long trend of natural development without crucial change, and without understanding the development under uncertainty future condition. In this sense conception of "Industrial 4.0" also remain like neoclassical, because it clearly defines future technologies. In Schumpeterian vision we don't know exactly what kind of technologies will be invented and broadly commercialized. For instance many experts predict growth with biotechnologies. But only innovation process will be defining future (who did know in XIX century about modern economic role of aviation, ICT etc?).

The necessity of representing new economic phenomena in actual economic policy may be generally characterized as follows: neoclassic economic theory describes processes and economic policy in relation to markets and phenomena which already exist, but the post-industrial Schumpeter's theory tries to form visions and instruments for managing processes and phenomena which do not exist today, but will be appeared tomorrow and will define the economic development both at macro- and micro-levels. Thus, traditional programs of economic development outline the competitive advantages of available resource base of the country or region as well as the ways and means of their further modernization. Modern Schumpeterian programs must be created to elaborate the innovation model of economic growth focusing on the creation of new knowledge resources for gaining new competitive advantages in order to ensure the permanent growth of innovation products (endless transition). Today the creation and supporting of effective functioning of knowledge resources generating innovations become priority and gains decisive value for the strategy of economic development.



## 6. Conclusion

The modern innovative theories justify a new conceptual vision of the nature of successful social and economic development. This new view related to the vision of perspectives of national economy through the evaluation of the potential of productions with the foremost innovation technological decisions. The innovation technological changes are regarded as a main factor that defines the ways of the evolutionary dynamics of modern civilization system. These technologies generate the periodical structural reorganizations of economy through extended implementation into the production of basic innovations that form new industries – locomotives of general development. Today this function is performed by informational technologies that have found wide application in all spheres of life. But tomorrow the new technology will come to our economy and we don't know for sure what it will be. We know exactly it will be "the innovation" created by innovators-entrepreneurs. Thus, the strategy of development of innovation technologies must be a central focus of the economic system building, and be embedded into the long-run social and economic strategy.

A distinctive feature of a post-industrial innovation economy is the production of new products and services that had not been produced in the industrial age. The theory of economic development by Schumpeter, Neo-Schumpeterian concepts as well as actual economic practice of the last decades proves that a dynamic economic development of the country is possible only in an innovation model of economic growth. Preservation and conservation of traditional production structure, i.e. reproduction and development only of pre-existing companies, even of the very successful ones, may have only a short-term positive effect. In the long run, such policy shall lead to economic crisis and stagnation.

The progress of the advanced countries is primarily caused by development of innovative production structures. In a broader sense, the history of human civilization shows that those countries which tried to maintain their competitiveness only due to expansion and improvement of the existing production structures, even if they were highly competitive at a particular time, became outsiders of the world economic system. In contrast to this, the focusing policy actions on generating and mastering of innovation technologies, which create condition for production of new products and services, allowed ensure the dynamic economic development.

The development of post-industrial production structures requires the growth of potential of new knowledge generation and effective institutions for knowledge commercialization and its transformation into innovative technologies and products that are to belong to current and future technological paradigms. Thus, today the main emphasis in economic policy of the ambitious country, including Ukraine, must be to develop sectors of post-industrial economy, building the resource base of creative innovation activity and institutions for the new knowledge commercialization. This policy primarily develops local Universities, advanced organizational forms of their interrelations with business, creating infrastructure for transfer of innovative technologies as well as a network of cross-industry systems (clusters).

It is necessary to strengthen the development strategy for new industries of economy and firms belonging to the post-industrial economy. Major attention in this strategy shall be paid to the formation of resource potential for generation of innovations that cause the formation of new companies, to create and develop new jobs and new markets in domestic and international context, rather than to recover traditional production structures. For this purpose the first role shall be assigned to measures aimed at developing innovation potential, strengthening of education and science, formation of infrastructure for transferring innovative technologies, support of innovative activity in all the areas as well as its wide international integration in education, research and innovative activities.

This approach gives theoretical tools to recognize technological innovations as main factor of the contemporary economic development. The policy makers have to admit the objective nature of these processes. It can help create more effective economic policy. The practical realization of this task will require considerable management efforts and first of all we need an objective economic assessment of the technological structure of national economy according to belonging to different technological paradigms. It can allow elaborating the needed institutional, regulatory and economic motivational measures to ensure an accelerated development of the branches of 5th and 6th technological paradigms.

## References

- Aghion, P., Boulanger, J. and E. Cohen (2011), Rethinking Industrial Policy, Bruegel Policy Brief 2011/04, Brüssel.
- Bazhal, I. (2003). Economy of knowledge: Theory and state policy (in Ukrainian). *Economics and Forecasting*, (3), 71-86.
- Bazhal, I. (ed) (2002). Economic evaluation of state priorities for the technological development. *Institute for economic forecasting of NAS of Ukraine, Kyiv* (in Ukrainian).
- Bazhal, I., Pisotska I. (2012). The necessity of studying J. Schumpeter's theory of economic development in Ukrainian Universities // *Scientific notes of NaUKMA. Pedagogical, psychological science and social work*, Issue 136. – P. 14-18.
- Bell D. (1967). Notes on the Postindustrial Society // *The Public Interest*, – 1967. No. 7. – 102–118.
- Bell, D. (1973). *The Coming of Post-Industrial Society: A Venture in Social Forecasting*. New York: Basic Books.
- Carayannis E.G. (Ed.) (2013). *The Innovation Union in Europe: a socio-economic perspective on EU integration*. Edward Elgar Publishing.
- Castells, M. (1996-1998). *The information age: Economy, society and culture*. Malden, MA: Blackwell.
- Confucian Analects, the Great Learning, and the Doctrine of the Mean. *The Chinese Classics I*. Translated by James Legge. - London: Trübner. Revised second edition (1893), Oxford: Clarendon Press, reprinted by Cosimo in 2006. – Chapter 13.
- Dosi G., Freeman C., Nelson R., Silverberg G., Soete L. (Eds) (1988) *Technical Change and Economic Theory*. Sant'Anna School of Advanced Studies, Pisa, Italy.
- Dosi, G. (1982). Technological paradigms and technological trajectories: A suggested interpretation of the determinants of technical change. *Research Policy*, 11, 147-162.
- Dosi, G. (1984). *Technological change and industrial transformation*. Palgrave Macmillan.
- Dosi, G. (2012). *Economic organization, industrial dynamics and development: Selected essays*. Sant'Anna School of Advanced Studies, Pisa, Italy.
- Europe 2020: A strategy for smart, sustainable and inclusive growth. (2010). - Brussels. – European Commission, 3.3.2010 COM(2010) 2020 final.
- European Commission. (2010). *Europe 2020: A strategy for smart, sustainable and inclusive growth*. COM (2010) 2020, Brussels.
- For a European Industrial Renaissance. – European Commission, Brussels, 22.1.2014 COM(2014) 14 final.
- Freeman, C. (1982). *The economics of industrial innovation*. Cambridge (Massachusetts): The MIT Press.

- Freeman, C., & Louca, F. (2001). *As time goes by: From the industrial revolution to the information revolution*. Oxford: Oxford University Press.
- Freeman, C., Clark, J., & Soete, L. (1982). *Unemployment and technical innovation: A study of long waves and economic development*. London: Frances Pinter.
- Galbraith, J. K. (1967). *The New Industrial State*. Princeton University Press.
- Hanusch, H., & Pyka, A. (Eds.). (2007). *Elgar companion to Neo-Schumpeterian economics (Elgar original reference)*. Edward Elgar Publishing.
- Kondratiev, N. (1925). The static and dynamic view of economics. *Quarterly Journal of Economics*, 39, 575-583.
- Malerba, F., Nelson, R., Orsenigo, L., & Winter, S. (2003). Demand, innovation and the dynamics of market structure: The role of experimental users and diverse preferences (CESPRI WP No. 135).
- Mensch, G. (1979). *Stalemate in technology: Innovations overcome the depression*. Cambridge (Massachusetts): Ballinger.
- Nelson, R. (1995). Recent evolutionary theorizing about economic change. *Journal of Economic Literature*, 32(1), 48-90.
- Peneder, M., & Streicher, G. (2016). De- versus Re-industrialisation: Is Structural Change Reversible? - WIFO Working Papers, No. 506, January 2016.
- Perez, C. (2002). *Technological revolutions and financial capital: The dynamics of bubbles and golden ages*. Edward Elgar Publishing.
- Recommendations for implementing the strategic initiative INDUSTRIE 4.0. Final report of the Industrie 4.0 Working Group. (2013). - National Academy of Science and Engineering, the Platform Industrie 4.0.
- Rumjantzeva, S. I. (2003). The long waves in economy: Multivariate analysis (in Russian). S.-Peterburg University. Sankt-Peterburg.
- Schumpeter, J. (1934). *Theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Cambridge, MA: Harvard University Press.
- Schumpeter, J. (1939). *Business cycles: A theoretical, historical and statistical analysis of the capitalist process*. New York: MacGraw Hill.
- Shumpeter, J.A. (2011). *The Theory of Economic Development: an inquiry into profits, capital, credit, interest, and the business cycle* / translation from English by V. Starko. – K.: Publ. Hous of National University of “Kyiv-Mohyla Academy” (in Ukrainian).
- Smits R.E., Kuhlmann S., Shapira P. (Eds.) (2010). *The theory and practice of innovation policy: An international research handbook*. Edward Elgar Publishing.
- Toffler, A. (1980). *The third wave*. – New York: William Morrow Company, Inc.
- Tregenna, Fiona. (2012). Manufacturing Productivity, Deindustrialization, and Reindustrialization. United Nations University. Retrieved February 2, 2012.
- Tylecote, A. (1992). *The long wave in the world economy: The present crisis in historical perspective*. London: Routledge.