Torun International Studies

2015, No. 1 (8), pp. 5-12
DOI: http://dx.doi.org/10.12775/TIS.2015.001

Olena Cherniavska*

THEORETICAL APPROACHES TO THE DETERMINATION OF THE PHENOMENON OF «TECHNOGLOBALISM»

Abstract. This article examines the main factors and pre-conditions which caused the emergence of technoglobalism in the 20th century. The author identified the role of the research activity of transnational corporations in making this process more intensive, and also the main attention is concentrated on national and foreign approaches to understanding of such a new phenomenon as "technoglobalism".

Keywords: scientific and technological progress; information revolution; postindustrial economy; techno-economic structure; research and development (R&D); transnational corporations; scientific and technological globalization; technoglobalism.

1. INTRODUCTION

In the second half of the 20th century the new stage of scientific and technological revolution has begun, in the epicenter of which there were the USA, Japan, USSR, France, Italy and some other countries of Western Europe, and also Canada. If previous scientific and technological revolution, the scientific base of which was created in the beginning of the 20th century as a result of revolution in natural history and theoretical physics by such countries as Germany, France, Great Britain and the USA, caused essential changes mainly in industry, the modern one carried out revolution practically in all spheres of not only industrial production and services but also in the sphere of intellectual labor.

Thus, in 1950th in most capitalist countries formation of favorable conditions for the economic growth took place, which was carried out mainly due to the extensive use

* Kyiv National Economic University named after Vadym Hetman, elena-kneu@mail.ru

of natural and intellectual resources, but by the end of 1950th the rate of economic growth had slowed down considerably and the intensification of production by means of introduction in all spheres of economy of the last achievements of scientific and technological progress, in particular new resource, labor and energy saving, environmentally clean and waste-free technologies has come into question.

Researching the modern features of formation of technoglobalism, it is necessary to pay special attention to interpretation of this phenomenon by foreign and domestic scientists who study the problems concerning the development of global technological civilization. The term «technoglobalism» itself hasn't become widespread so far. And there is no unanimity among researchers about the meaning of this concept and its relation to the number of other correlated categories, such as «technological progress», «global problems», «technological globalization», and «internationalization of R&D».

Taking into account the above mentioned, it is necessary to analyze different approaches to determination of «technoglobalism» and discover the essence of this concept. First of all let's pay attention to the basic driving forces which caused the emergence of technoglobalism.

2. MATERIAL AND METHODS

We analyze the driving forces of formation of the technoglobalism as factors or the obstacles to development the sphere of technologies which influence this development indirectly. By their nature they are distinctive catalysts which contribute to the formation of this phenomenon, or or else the factors that slow it down. In our opinion, at the current stage of economic development such forces are as follows.

First, the revolution in information and communication technologies, which promoted the appearance of new organizational forms and production processes. As a result, the transition from industrial to «information» economy and society, where financial capital gives a way to new intellectual and information technologies, and also an important aspect that there is a rapid spread of worldwide Internet network.

The well-known Ukrainian scientist Filipenko A.S. adheres to the similar point of view, and states, that «formation of the postindustrial information and technological mode of civilization development» (Filipenko, Rogach & Shnyrkov, 2001, p. 184) had assisted the development of technoglobalism; at the same time there are «such its elements as: an overwhelming dynamics of «fundamentalization» of technological processes in scientific and technical progress, influence on the microstructure of substance, perfection of immaterial elements of productive forces, that requires joining the efforts at a global level (genetic engineering, biotechnology, new composites, thermonuclear synthesis, artificial intelligence etc.); all-embracing informatization of public life on the basis of the swiftly progressing computer engineering, planetary computer networks, electronic, fiber optic and space telecommunications» (Filipenko, Rogach & Shnyrkov, 2001, p. 184).

Secondly, increasing number of TNCs and considerable increase of their activity in the R&D sphere and in global distribution of new technologies. The experts of UNCTAD pointed out that the number of TNCs today is about 80 000 against 35 000 in 1990 year, in addition nowadays they have about 900 000 foreign branches against 150 000 in 1990 year (UNO, 1992 & 2008).

Thirdly, intensification of international competition in technology-intensive industrial sectors and growth of volumes of foreign direct investments, in particular investments in capital- and technology-intensive industrial sectors grew more quickly than investments in resources- and labor-intensive production.

Fourthly, increased capacity of hi-tech production, especially in industrial countries, and «intraindustrial trade», that is trade within one industrial sector or product group. Such trade model represented growing specialization of oligopolistic companies and the increase of the foreign investments in such companies. «Intraindustrial trade» usually took place inside TNCs, between parent companies and subsidiaries, between its branches, and mainly in high-paid, technology-intensive sectors such as machinery, electric and transport equipment. At the same time the intensity of R&D became the most essential determinant of the intercompany export and import, also the highest level of concentration of this type of trade was observed rather in Japan than in the USA.

Fifthly, considerable changes in the sector of the international trade (from low tech to hi-tech commodities), especially in the developed economies. Thus, the part of low tech commodities in industrial export was constantly diminishing from 45% in the middle of 1960th to 35% at the end of 1980th, at the same time the part of hi-tech types of commodities rose from 16 to 24% during the indicated period (Ostry, Nelson, 1995). And in 2005 the part of high- and middle-tech commodities' export made up about 65% of the general export in OECD (OECD, 2007).

We should notice that the USA gradually lost its competitive positions because the hi-tech trade got out of its control. In the second half of 1980th the same tendency was observed in the countries of Western Europe, and also in Japan, where a decline of hi-tech export volumes took place. Unlike the «Triad countries» only in the new industrial Asian countries there was a positive tendency of growing technological competitive advantages. As a result, in many developed economies steps towards modernization of the national trade and revision of the domestic trade policy were carried out.

Sixthly, aggravating the global problems of technological development, that is a contradiction between society and nature represented a contradiction of scientific and technological progress, which was the reason for emergence of such problems. That is why at the end of the 20th century sharp necessity to minimize the technogenic impact of human civilization on environment appeared, above all, applying resource saving, ecologically clean and waste-free technologies in industry; introduction the new types of alternative energy; usage of hybrid transport and technologies of clean car etc.

Thus, considering the causal factors of technological development nowadays, it is also necessary to identify such basic factors which contributed into formation of technoglobalism as contradiction between old and new technical ideas, permanent change of techno-economic structures, shaking off its old elements and formation of new ones, contradiction between scarcity of natural resources that remained, and growing human wants and needs. Shukhardin S.V. adheres to the similar point of view. He notes that the «main motive force of technological development is a necessity of society in material and cultural welfares, that it's shown in contradiction between the constantly growing material and cultural needs of people and economic feasibility to satisfy these needs» (Shukhardin, 1965, p. 42).

In professors L.Rotsios and V.D. Sikora's opinion, the history of technoglobalism began in 1977 when R. Ronstadt (Ronstadt, 1997) made attempts to estimate the importance of R&D, which are conducted by multinational corporations (Rotsios, Sikora, 1995).

He analyzed the research activity of 7 most influential American TNCs, which conducted considerable part of the corporate R&D abroad. On the initial stage of the research Ronstadt noted that, for example, the company IBM spent $200 million (and it is about 30% of its budget) in 1974 on overseas R&D (Douglas W., Douglas N., 1998). Thus, the other 6 TNCs such as Otis Elevator, CPC International, Exxon (energy sector), Exxon Chemical, Union Carbide (industry of chemical preparations and plastic) and Corning Glass Works also spent 45, 39, 25, 23, 12 and 9% of the budget respectively on R&D abroad during the same period (Wiley Company, 1978).

These companies created or purchased 55 R&D centers in the following regions in the world: in Canada and Europe, in India (2 centers), in Japan (2 centers), and in Australia. For analysis the researchers chose 42 centers, which had been founded by American TNCs, and classified them into 4 categories: Centers of Technological Transfer (31), of Local Technologies (2), of Global Commodities (5) and Centers of Corporate Technologies (4). Creation of R&D centers was directed to help transfering technologies from parent companies to daughter ones, and also it was very important to provide technical help for foreign daughter companies concerning the usage of technologies brought from the parent company, gaining higher local market share, developing new and improved commodities for foreign markets, production of innovative technologies for parent corporations in the USA, gathering information in the field of new technologies with the purpose of their use in the home country, and so on.

Thus, R. Ronstadt came to the conclusion that in all cases the decision concerning placing and conducting of R&D in a foreign country was based mainly on the closeness to the production facilities, presence of favorable market conditions and foreign scientific and technological competence.

So, Ronstadt's research was the proof of that. The research activity of American TNCs in foreign countries was successful enough in the field of R&D in the second half of the 20th century. The importance of R&D that was conducted by the foreign branches of TNCs constantly grew in most countries-recipients in 1990 although this proceeded differenly in different countries: for example, it had the most importance in Ireland, Great Britain, Spain, Hungary and Canada, and the least – in Japan, France, and Sweden. It is also necessary to note that TNCs conducting the activity in the field of R&D in a foreign country gave rise to a subsequent development of technoglobalism. That is why the process of internationalization of R&D can be considered to be the first stage of formation the technoglobalism.

As opposed to L. Rotsios and V.D. Sikora, professors J.A. Peck and H. Wai-Chung Yeung claim that at first the term «technoglobalism» was used by S. Ostry and R. Nelson in 1980th. Like Ronstadt's research (Ronstadt, 1997) S.Ostry and R.Nelson also tried to explain the research activity of multinational corporations, which conducted it in key R&D centers in many industrial countries with the developed network of university research centers. Moreover, they stated that distribution of information technologies and global telecommunication networks had provided the firms with material and technical possibilities and potential for organization and coordination of R&D, and also the possibility to obtain technical knowledge at global level (Peck Jamie, Wai-Chung, 2003).

Later a lot of research works were published by S. Ostry and R. Nelson, D.Archibugi and J. Michie, E. Mensfild and J. Howell, who studied the formation and development of technoglobalism. That is why, it is possible to assert that majority of technoglobalist researchers came to the conclusion that technoglobalism appeared and started to develop

in 1980, simultaneously with the development of the new stage of scientific and technological progress, which is characterized as information (postindustrial) revolution, when information technologies, «intellectual» computers, electronic automatization and robotization of all spheres and sectors of the economy gradually took place.

3. RESULTS AND DISCUSSION

We should mention that the concept of technoglobalism is usually interpreted by domestic and foreign scientists as an element of globalization process of the economy, also as the research, innovative or informational globalization (Tab. 1). However, it is mostly understood as the technological globalization or globalization of technologies. In our opinion, such equation is not quite clear and needs a comprehensive discussion. In fact, in common understanding we determine technological globalization as one of the basic directions of the process of globalization, which spreads on science and technological sphere and is characterized by the global influence of the newest results and achievements of scientific and technological progress in all spheres of the mankind's activity. However, we characterize the phenomenon of technoglobalism not as a process, but as a result of technological globalization, consequence of information communications (postindustrial) revolution, when undoubtedly the most active impulse in its formation and development belongs to TNCs, which conduct their activity in high-tech industrial sectors of the economy (aerospace equipment, bio-, nanotechnologies, ICT, genetic engineering, pharmaceutics, and so on).

In our opinion, interpretation of the technoglobalism essence by the well-known Ukrainian scientist O. G. Bilorus is the most complete and all-embracing. In fact, studying the problems of scientific and technical globalization and international technological safety of Ukraine, he came to the conclusion about active development of the world processes of technoglobalism, and connected it with telecommunication revolution and pointed out at the same time, that in the center of those technological changes concerning the development, exploitation and transfer of the newest technologies, undoubtedly there are TNCs for which a question of correlation of their internal and external activity in the sphere of technoglobalism is the most valid at the modern stage (Bilorus, Lukjanenko, 2001).

Taking into account the above stated, it should be mentioned that modern industrialization, which began to operate in the society, have accelerated the progress of replaying human labour force with automated processed. Technologies and forces of nature which worked on society, have accelerated this progress, thus improving the conditions of population's life. However, almost all technical equipment which was used by people began to violate the ecological equilibrium and balance between nature and mankind gradually, at the same time creating the threat for stability of biosphere. That is why it is possible to claim that determination of technoglobalism essence is inextricably intertwined with ecologization of human activity, i.e. creation of the new range of ecologically clean, energy saving and waste-free technologies, facilities for an environmental monitoring etc.

Tab. 1. The definition of "technoglobalism" in different scientific researches

The Definitions	Authors, their researches
Technoglobalism in a broad sense – is the process of globalization, which extends its influence on the sphere of inventions and innovations; in a narrow – is the process of production, transfer and diffusion of technology that is becoming more international.	Rotsios L. and Sikora V.D. (1995). Globalization of technology and national globalization innovation systems. Kyiv.
Technoglobalism means a strong interaction between the process of technological internationalization and globalization of the economy.	Dr R. A. Mashelkar. Technology: Opportunity and challenge. The Tribune (online edition). Indian Science Congress. January, 2004.
Technoglobalism is a comprehensive international cooperation in R&D and a global partnership in the field of technological innovation.	Richard P. Shuttmeier. Strategic Asia 2004-05: Confronting Terrorism in the Pursuit of Power // Ashley J. Tellis, Michael Wills, 2004, the National Bureau of Asian Research. Washington, p. 548
Technoglobalism is an ideology that improves globalism on technological grounds, meanwhile Internet and e-commerce are essential parts of modern tehnoglobal vector of economic development.	Alan Tonelson. „The Perils of Techno-Globalism". National Academy of Sciences. Issues in Science and Technology. Summer 1995, Volume: v11 Issue: n4 – pp. 31-38
Technoglobalism is a phenomenon when TNCs use their technology globally and at the same time get the access to new technologies through the diffusion of global R&D and technology cooperation.	S. Ostry, R. Nelson. Techno-Nationalism and Techno-Globalism: Conflict and Cooperation (Washington, DC: Brookings Institution, 1995), p. 132
Technoglobalism is a world process of internationalization, invention and development, industrial and commercial usage, transfer and diffusion of technologies.	Filipenko A.S., Rogach O.I., Shnirkov O.I. World economy. 2nd ed., Kyiv.: Lybid , 2001, p. 582
Technoglobalism is a merger of innovation and new technologies in a single system of technical knowledge, the emergance of "technological macrosystems" in communications and transport areas, the effects of telecommunication revolution, spreading the Internet.	Bilorus O.G., Lukyanenko D.G. Globalization and Security Development. Monography. Kyiv: KNEU, 2001, p. 733
Technoglobalism is a modern wave of implementation the new technologies, especially ICT.	Patricia A. Glenn. Information technology in a global economy// «Computational Economics». – Springer Netherlands: Volume 6, Number 2, 1993, p. 107-114
Technoglobalism is a process of displacement the national innovation systems and unreasonable & ineffective efforts of national governments to stimulate technological development within countries.	Archibugi D. and Michie J. // The globalisation of technology: a new taxonomy // Cambridge Journal of Economics, 1995, Vol. 19 (1), p. 121-140

Source: structured by the author.

Thus, the development of technoglobalism is useful for most countries as revolutionary technologies cause less harm for environment than technologies which were resource-intensive and contaminated the ecology. At the same time a lot of countries, especially de-

veloping ones, are often deceived and place its production facilities that are dangerous for environment on their territories. As we know, technoglobalism changed not only scales and pattern of production in the developed industrial countries but also had a huge global influence on the quality of life, interpersonal relations and their attitude towards environment. Simultaneously a powerful potential of the new scientific and technical achievements is not always used to the benefit of mankind. However, in spite of that today the mankind doesn't have other alternative except for a subsequent intensification of the process of global technological development because of the gradual exhaustion of present natural resources, population growth and various ecological problems.

4. CONCLUSIONS

Summing up, it is necessary to conclude that application of the newest achievements and results of modern scientific and technological progress became key to economic development and contributed to accelerating globalization processes, especially in scientific and technological spheres. Changes to the new technological method of production, to high science-intensive technologies, rapid and wide distribution of information and communication technologies, which eliminates barriers on the way to the transfer of commodities, services, capitals are basic motive forces, which stimulate the process of globalization, both economic and technological in particular. From the initial stage of technoglobalism origin the powerful technical and technological changes took place in different industries of national economy. Its structure and principles of placing the productive forces of society (the rates of their development were considerably accelerated) changed and resulted in a substantial economic revival in the developed industrial countries. In world economic development a transition took place gradually from the capitalism of «free competition» to the monopolistic one. The process of concentration of capital in sectors of heavy industry resulted in the creation of large industrial objects. This period was connected with the formation of world currency and credit markets, increasing the international division of labor, the importance and intensity of the international trade that grew sharply, especially in technology-intensive industries. Thus, revolutionary transformations in the sphere of science and technology gradually gained a global character. More and more often the key role of technological factor is noticed in the process of the economy growth for most countries in the world.

REFERENCES

Bilorus. O.G., Lukjanenko D.G. (2001). Globalization and safe development. Kyiv.

Douglas P. Woodward, Douglas W. Nigh. (1998). Foreign Ownership and the Consequences of Direct Investment in the United States: Beyond Us and Them. USA.

Filipenko A.C., Rogach O.I., Shnyrkov O.I. (2001). World Economy. Kyiv.

OECD Science, Technology and Industry Scoreboard 2007: Innovation and Performance in the Global Economy. (2007). Paris. www.oecd.org/sti/scoreboard

Ostry S. and Nelson R.. (1995). Techno-Nationalism and Techno-Globalism: Conflict and Cooperation. Washington.

Peck Jamie A., Wai-Chung Yeung Henry. Remaking the Global Economy: Economic-Geographical Perspectives. (2003). London.

Ronstadt R. (1977). Research and Development. Abroad by US Multinationals. Praeger. New York.

Rotsios L. and Sikora V.D. (1995). Globalization of technology and national globalization innovation systems. Kyiv.

Shukhardin S.V. (1965). Question of moving foces of technology development. Questions of history of natural science and technology. Moscow.

The International Executive. (1978). Volume 20 Issue 1, Wiley Periodicals, Inc., A Wiley Company, Winter. – p. 1-62. http://www3.interscience.wiley.com/cgi-bin/full-text/114116276/PDFSTART

World Investment Report 1992: Transnational corporations as engines of growth // United Nations, NewYork, 1992, p. 367.

World Investment Report 2008: Transnational Corporations and the Infrastructure Challenge// United Nations, 2008, p. 411.