Informational and Technological Progress in the Knowledge Based Society

by
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Abstract. Technological and informational progress is among the leading factors that allow the increasing degree of economical liberalization and the shaping of a society that is based, first of all, an knowledge. From the first industrial revolution, the progress has manifested increasingly strong, it has changed lifestyles, it has significantly improved the people living standards and it has became the desire of all countries regardless of their level of development. The knowledge, in quantitative and qualitative form, reached its peak now, and we are witnessing at increasingly rapid and revolutionary changes. We have to accept these changes and adapt to them. Between knowledge and technological and informational progress is an interconditionality relation. Both factors are present and vital for the economy and for each individual life. As every good thing that marks our activities, decisions and behavior have theirs less lighting side, in this paper we make a brief analysis about the technologic and informational role and place in today`s society.

Key words: economic liberalization, knowledge, knowledge based society, technological and informational progress.
JEL classification: O1, O3

1 Introduction

A factor with a positive impact on development, on economic growth and on the construction of the knowledge-based society is *technological and informational progress*, which is particularly recognizable in the development of science, of technics and modern technologies. This imposes deep structural transformations and the adoption of adequate solutions for the maximization of effectiveness at a macro-, mezzo- and world-economic level.

The technological and informational progress results in the rise of the efficiency of the human, financial, scientific potential of each country and generates, according to the case:

- the widening of the area of productive activity beyond frontiers;
- the development of trade exchanges;
- the transfer of the results of scientific research, of persons and capitals at the sub-regional or regional level, as an inseparable part of the economic interdependencies at a global level;
- the reduction of poverty and of illiteracy;
- durable development, etc.

The unprecedented rise of the speed with which information is transmitted and the diversification and multiplication of the means of dissemination allow an event that takes place in one country to have an impact on other countries and regions, even if situated in the opposite side of the world; but the dissemination of the technological information brings forward, besides the approaches and relations that are thus made, besides the fresh impetus to the processes of economic development and growth, new gaps or it deepens the old ones.

Economic and technological expansion interconnects all the world's regions into a network that we call global economy, allows access to knowledge to all the world states and populations, radically modifying, in some of the cases, the economic and social reality.

2 Material and method

In order to write this paper, I dealt with the concepts of technological and informational progress and of knowledge-based society, as well as with the relation between them, by methods of direct theoretical analysis and by researches in the specialized literature, with a view to identifying and analysing the stage of knowledge in the field.

3 The concept of knowledge based society

The concept of *knowledge-based society* started to be defined at the end of the 20th century and the beginning of the 21st one, as a result of the increasingly important technical and economic progress, opening ways to new challenges in all the fields of human activity. Humanity obviously joined an ascendant trend of evolution, a context in which each country tries to capitalize all the opportunities that knowledge offers (Haller A.P., 2010, p. 54).

The concept of *knowledge society* established itself at the end of the 20th century, in USA, as a result of the papers and studies of several theoreticians, among whom *Peter Drucker*[1].

Initially, the *knowledge based society* was called *information society*, outlining one of the main characteristics of the *knowledge economy*, that is the knowledge-based economy, a characteristic that "implies the utilization and management of the existing knowledge under the form of the technological and organizational one, the production of new technological knowledge through innovation, a new economy in which the process of innovation is decisive, in which the tangible goods become more important than the intangible ones" (Drăgănescu M., pp. 1-2).

In *Cultura şi sociatatea cunoaşterii* (*Culture and Knowledge Society*), *Mihai Drăgănescu* defined the *knowledge society* as an intermediary stage between the *information society* and the *society of consciousness… the knowledge society* should be thought and developed in the beginning with a view to this future society (of consciousness, our note).

Knowledge carries most of the influence in human activity, so that the specific economic, cultural or social activities grow more and more dependent upon a necessarily increasing volume of information, outlining a new era in the process of economic and social development based upon *knowledge* (Haller A.P., 2010, p. 54).

In *Alvin Toffler*'s view, humankind passed through two phases (waves) and presently it is prepared to enter the third one, the knowledge one (Toffler A., 1983, p. 22).

The way from the first to the current (third) wave was long and difficult, marked by deep changes in all domains as well as at a mental level. From an agrarian society, whose primary objective was subsistence, characterizing the first wave, we have now reached the stage of a society where knowledge comes to the forefront, the third wave, after having transited the industrial one, which has characterized the second wave.

Currently, humanity faces a turning point, that *Toffler* regards as a "quantum leap" towards a totally different civilization. The changes of the third wave will be deep and will eventually open the way to a consciousness society, as *Mihai Drăgănescu* calls it in his dissertation *Culture and the knowledge society*, a much subtler and maybe anti-economic one.

The risks associated to the second wave (the wave of industrialization) are certain causes of the shift of paradigm and of the more and more important emphasis on knowledge. If in the industrial society technology dominated both the economic and the social levels, in the knowledge society man will dominate technology and will have the control of the major directions of progress.

In the knowledge based society, technology, especially the informational one, continue to have an important role even if the paradigm is changing in favour of awareness and consciousness, marking the economy and society transition to a higher level of evolution.

4 Informational and technological progress in the knowledge based society

Technological development led to the modification of the economic and social

[1] **Peter Fredinand Drucker** (1909-2005), was a management consultant, with a rich editorial activity in the economic field, one of the most appreciated American personalities in this domain. In his reference books, he made correct predictions and assessments regarding the important economic tendencies of the end of the 20th century (privatization, decentralization, Japan's economic expansion, the importance of marketing and management, the development of the information society). In *The Effective Executive?* Drucker analysed the knowledge-based role and manner of action of the employee and of the manager, regarded as a primary factor of productivity, which, in its turn, is relying on knowledge in a more and more significant way.

advantages that some countries (especially the developed ones) have acquired over time, and which had placed this category of countries on a position that the developing states have long aspired to. Modern technologies bring on the markets new products at lower and lower costs, offering the populations from both the developed and the developing countries a higher and higher standard of life. The development of high technologies has changed even the basic rules of the international financial world, the speed with which capitals move being now so high that, quite often, the financial authorities cannot comprehend or control them, as the current economic world crisis demonstrates us.

Technological development has as a consequence among others a significant decrease of costs, the rise of productivity, and as a final point the economic growth and development, and this phenomenon of technological progress will continue to characterize the world economy in the future as well, but on a different direction, dictated by its negative externalities, especially on the ecosystem and, lately, on the life style.

Simon Ramo asserted that the *surest way to improve the standard of life of the nation is to excel from a technological point of view. …Technology and particularly high technology is the one that can be used to increase the nation's resources, to produce wealth that would not exist if we did not use it; it is an instrument capable to multiply the efficiency and therefore the value of time and of labour; technology is the one that facilitate the production of more and more competitive goods and services to satisfy our needs with less efforts and by saving so valuable natural resources* (Ramo S., 1996).

If, for some people, the high technology means huge gains in several seconds, by means of stock market speculations, for instance, for the poor, technology does not have any effect, not even an informational one; it is rather a threat. Yet, technological development and the emergence of competitive informatics systems will lead to the increasing of the efficiency of all activities and implicitly to economic growth and development, even in the emergent states. Economic liberalization is one of the processes that allow even the developing economies to have access to knowledge and its results in the easiest way, and with positive effects (Haller A.P., 2010).

The pressure exerted by competition on each company forces it to a continuous search of solutions so it could resist and become stronger on the market, in order to make cheap products of high quality, and the solution for that is to adopt the newest and the most effective technologies by developing the sphere of knowledge and by generalizing the already existing technologies.

As we have already stated, technologies are the grounds for the cost reduction, for the improvement of quality, for obtaining new products and raising production. The effect of the introduction of high-tech in the system of production is a revolutionary one. Technology is not only the quantity and quality of the fixed assets, but also the conception of the processes of fabrication, the art to use everything that the machine can offer you, the capacity to disseminate the information, in one word – knowledge. The fixed assets we have, together with knowledge, form the technological potential. The introduction of competitive equipment in a technological process, together with its adequate administration will lead in a direct way to the reduction of the expenses on raw materials and equipment, on power and salaries and on increases of productivity.

Any newly created technology is oriented not only towards the reduction of costs, but also towards the improvement of the product quality. The same fixed asset, with a different know-how, leads to obtaining similar but clearly different products when it comes to the consumer's choice.

The projection, accuracy and facilities offered by the high-tech make possible products that were impossible for the old technologies.

In order to underline the production increases that technology brings forward, we can just mention that in 1864 the invention of the mechanical loom replaced the labour of 20 people.

These qualities of the technology make the companies try to improve their position on the market, try to diversify production and to make efforts for costs reduction.

Technology represents nowadays the basis of the comparative advantage, both at the level of the company and at the level of each country apart. The difference of technological potential is the quantification of this comparative advantage, a reason why the informational and technological progress is transposed into a factor of maximal importance for the reduction of the gaps of economic growth and development.

At present, technology had become an important factor of production together with labour, so that the technological and informational progress often unbalances the labour market by reducing the number of employment opportunities and increasing the unemployment rate, imposing further efforts for the requalification of the population and for the application of effective measures of economic policy on this market, under the circumstances of demographic increase as well.

Making an investment that could be characterized as highly technologized and productive, represents an important ground for economic growth and development. The acquisition of technology represents a rise of the stock of real capital existing in the national economy, but due to its advanced scientific nature, the new technology manages to transmit an effect of improvement of efficiency to all processes of production involved.

Investment in technology as a factor of production, once it becomes productive, leads to a strong effect of rise of the economic development rates, identifiable as both national income and per capita income. We must say that the relationship investment in technology/economic development is a two-way relationship: an important leap of development transmits an effect of rise at the level of technologies in the economic system. If the economy functions in the proximity of a GDP level in potential rise, the economic agents who do not consider strategic decisions of increasing investments in technologies, will become non-competitive and will be eliminated from the market. This is the reason why all the developed and developing economies aim at getting access to technology and implicitly to knowledge.

The technology of information, the most modern component of technology, exists under different forms, from the most rudimentary to the most complex ones, in any economic system and with spectacular beneficial effects on people, businesses, institutions, government and countries in general.

The networks of communication and the IT components make possible the interconnection of economic agents, so that their activities could take place in real time, with low costs and maximal benefits. In the economic and technological evolution, the permanent development of new solutions is needed, of adaptation to the evolution of the market and of the society.

Considering all of these aspects, we are facing the problem of the application of a certain type of technology according to the stage of economic development.

Generally, the developing and the weakly developed countries use an intensive technology in labour, and the developed countries an intensive technology in capital that favours the rise of productivity, reduces the number of fabrication errors, reduces the time needed for technological processes and simplify them as well. Through the liberalization of the markets, the developing countries got an easier access to the knowledge and technology produced by the developed states.

Technological changes in the developing countries presuppose, first of all, the borrowing of the technologies already existing in the developed countries, a thing that is so more possible as the degree of economic liberalization increases, because the emerging economies have a very low capacity to develop their own technological capacities. Generally, the production of the developing countries is sustained with rudimentary equipment and technologies, due to a precarious infrastructure and to the lack of access to financial services. Most of the developing countries maintain their specialization in producing non-competitive

goods on the external markets and they manage only to a small extent to incorporate technology in the productive processes (King Al. et al., 1993), most of the times in proportion to the effectiveness of the measures of economic policy by which the acquisition of the results of knowledge is encouraged.

The decisions related to the introduction of new technologies have in view the fields of the IT, biotechnology and automation. The developing countries in particular should make significant efforts to adapt the new technologies to the local conditions. Furthermore, for these countries, a hindrance in the way of the acquisition of competitive technologies is their relatively high cost. Under these circumstances, an important part is played by the multinational corporations, who owe technologies that allow the developing countries to achieve effective activities, with a positive impact upon their development and economic growth.

Watson, Crawford and *Farley* (Watson R., et al., 2003) underline the major importance of information as a factor of production for the phenomenon of development. The information brings forth an effect of stimulation and of reduction of the necessary time to make an economic leap, due to its low costs of multiplication. Furthermore, information is what makes the difference of development between countries, especially in the case of the developing ones, because here a role is played by each economy's capacity to administrate and utilize the new information.

Information is what creates the business opportunities, and the decision to invest with a direct impact on the rise of the capital stock at the national level is a function that depends directly on its quality and quantity.

In the classical models of economic development, the companies are affected by the phenomenon of the scale economies through information and creativity (Stiglitz, 2003). In the new theory of growth, the paradigms of the economies of scale and the frontier of the production possibilities are resized. Through informational restructuring at the company level, which does not necessarily need further costs, the existing technologies and the quantity of resources are given higher limits, and the place and role of knowledge are redefined.

The generalization of the effective technologies that are directly related to computerization and knowledge will draw a new outline of the economy. The success of each country at the international level will be determined by the way in which it will manage to encourage technological innovation, as this would lead to new economic opportunities and to a higher standard of life for the population.

If, in the past, economic growth was made by increasing the supply of capital, of labour and of the quantity of capitalized natural resources, now it is more and more based upon the increase of the amount of knowledge and of the number of innovations, upon their quick adoption of wide-scale dissemination. The high-tech industries are the ones that dictate the trend of the economic growth and development. Just like the industries intensive in capital (automotive, chemical, steal) marked the economic growth of the '50s and the '60s, now the companies producing high technology (computers, telecommunications, biotechnology) represent the engine of economic growth for the early 21st century.

At present, considering the strong tendencies of globalization, most of the countries must cope with the challenges of this process. Under these circumstances, the best example is that of Japan, who owes limited natural resources and faces population ageing, so it is fully motivated to make great efforts to place itself in the top of the innovating states of the world. The Japanese became famous for their capacity to improve and re-trade what they imported, and innovation is one of the main factors of Japan's economic development, even if not at the level of the USA (Doyukai K., 2009).

In the rise of Japan's GDP an important part was played by high technology, and especially by the investments in computers, telecommunications and software equipment. The technical progress in the IT industries and the innovation process led to price reduction, product quality improvement and the conception of new products, which brought forth the rise of the internal and external

competitiveness, robotics representing an important element in Japan's long term development (Doyukai K., 2009). Even if the robot technology is at a primary stage of development, the Japanese companies are permanently broadening the sphere of applications.

Although this country, the third economic power of the world until recently, is now crossing a difficult period from an economic and social standpoint, as a result of the economic world crisis and of the losses following the natural disasters in the spring of 2011, with consequences at the regional and the international levels, it remains an example of progress through technological, informational and knowledge development. Saying nothing of the negative aspects of progress, we bet on a relatively fast recovery of the Nipponese economy, starting from the same reasons as we have by now, based on knowledge and its capitalization: technological development, innovation, automation, foreign trade under conditions of liberalization and protectionism.

5 Conclusions

Economic progress is conditioned by technological and information progress, which is vital in sustaining competitiveness and dynamism on the internal and external market.

At the beginning of the 21st century, society has passed over the informational stage and is characterized by knowledge, which, in its turn, offers access to a plurality of technical, technological, innovative and informational elements, of quantitative and qualitative nature, whose practical applicability sometimes radically transforms life, objectives, processes, paradigms, concepts and environment, requiring adaptation to a new economic and social reality where technological and informational progress is an integral part.

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References

Doyukai K., *Japan's Innovation Strategy,* Committee on Japan's Innovation Strategy, http://oas.ftbusiness.com; http://www.doyukai.or.jp/policyproposals/articles/2006/pdf/060608c.pdf Accessed 4/06/2011

Drăgănescu M. (2002), *Cultura şi societatea cunoaşterii*, http://www.racai.ro/~dragam/CULTURA&SC.pdf, Accessed 10/05/2011

Haller A.P., (2010), Economic Liberalization and Protectionism – Basic Processes in the Knowledge Society. Methodological Concepts, *Proceedings of the 2rd International Conference on Business and Economy – Constantza*, Ridley Heather, Farber Michael, Hull Susan (eds.), New York, Addleton Academic Publishers, I: 209-218;

Haller, A.P., (2010), An Epistemological Approach of the Knowledge-Based Society from an Economic Perspective, *KSI Transactions on Knowledge Society,* Bulgaria: The Knowledge Society Institute, III(1): 54-57;

King Al.and Schneider B., (1993), *Prima revoluţie globală*, Bucureşti, Editura Tehnică;

Ramo S., (1996), *Oeconomia*, Manila Press;

Stiglitz J., (2003), *Globalizarea. Speranţe şi deziluzii*, Bucureşti, Editura Economica;

Toffler Alvin, (1983), *Al Treilea,* Bucureşti: Editura Politică;

Watson R., Cramford Michael, Farley Sara, (2003), *Strategic approaches to science and tehnology in development*, World Bank Working Paper 3026, http://econ.worldbank.org.

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