

Technological Innovation

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Abstract. The spectacular development of technology within the field of informatics and telecommunication for the last decade, associated with a postindustrial revolution, has solidly contributed to the globalization of the contemporary international economic life. A very important factor in promoting the globalization of production and the financial globalization is the recent progress from the technology of information and communication which has a strong impact on the economic, social and cultural life. The postindustrial revolution marks the transfer from an industrial based culture to a culture based on information, communication and experience.

Keywords: Globalization, revolution, industrial, postindustrial

The technological innovation comprises the technology of information and communication, having a strong impact upon mobility and communication. The technological revolution involves a “social revolution” and the advancement from the industrial capitalism towards a postindustrial conception of the economic relationships.

In order to understand the economic and social transformations from the nowadays society, the historical stages of the technological transition shall be concisely presented – from the first to the third technological revolution.

The first technological revolution, triggered at the end of the 18th century, was marked by great technical performances which led to remarkable progress in industry and transports and the prevalence of these performances has lasted for more than 100 years. The arrival of the steam machine has revolutionized the existent technology of that time, the products modeling the economic and technological structures being coal, iron and garment. These industries were based on simple electromagnetic principles, using high quantities of energy and disposing huge quantities of waste and pollutants. There were characterized by long production cycles, elusive quality of the craft labour, repetitive work, standardized products and a strongly centralized leadership.

Besides important mutations within the field of economics, mainly determined by the use of modern manufacturing techniques, the industrial revolution has triggered changes within the entire social context. The structural changes induced by industrialization were eventually felt in all articulations of the society: from the qualification of the work force to the institutionalized reforms adopted all along the years by the present developed countries; from the general infrastructure, functionally adapted to be able to face the technical progress already present in all the other branches of the national economy to the specialization of consumption; from the differentiation of economic activities and the deepening of the social division of work up to their vertical and horizontal integration.¹ The British experience of the industrialization was taken by a part of the countries of the European continent on the one hand but also by the USA, Canada and Japan, on the other hand, the second half of the 19th century being marked by an entire series of new industrial methods indicating the beginning of the second industrial revolution.

¹ Postelnicu, C., & Postelnicu, G. (2000). *Globalizarea economiei*. Ed. Economică. București, p.19

The second technological revolution (the end of the 19th century) has recorded the triumph of electricity and of electro-mechanical-chemical systems, a process following the track of electricity - steel - mechanics - automobiles - aeronautics - petrol - chemistry. The early period was recorded during 1870 – 1914, while the assertion, maturity and extension period extended up to about 1950-1960.

The third technological revolution practically started in 1950 after the transistor had been discovered in 1948, followed by the microprocessor at the beginning of the '70s and by its introduction in the working of information, telecommunications and satellite communication. The products which mark this period are: the multipurpose computers and the personal computers, the robots, the compact and video disks, the laser, the fax, the radiotelephone, the Internet, the biomass etc.²

Alvin Toffler's "The Third Wave" is suggestive within the study of the dynamics of the society in general and especially within the study of the industry. Setting out the process of the economic and social transformation of the society in three moments: the First, the Second and the Third Wave, Toffler magisterially describes the path of the industrial development during the last two moments. The Second Wave, identified with the Industrial Revolution, triggered a new economic and social reality, as we have mentioned above. Nevertheless, beginning with the mid '50s, it became clearer the fact that the classical industries of the second wave were behindhand and on the way to extinction in the industrial countries. In the United States, for example, during 1965 and 1974, the work force grew increased with 21 per cent, while the work places from the textile industry increased with only 6 per cent and those from the iron and steel industry decreased with 10 per cent. A similar situation was registered in Sweden, Czechoslovakia, Japan and other countries belonging to the Second Wave. As these decayed industries were transferred to the "developing" countries where the work force was cheaper and the technique was less advanced, their social influence started to decrease and a series of new dynamic industries developed replacing them.

The new industries differ considerably from their predecessors from different point of view: they no longer were especially electro-mechanic and based on classic sciences from the era of the Second Wave. They were born from the rapid progress within a series of scientific fields found in a rudimentary stage, or even inexistent 25 years before: the electronics quantum, the theory of information, the molecular biology, oceanology, nucleonics, ecology and space sciences. Due to these, we were able to exceed the blunter time and space limits from the industry of the Second Wave, succeeding to manage, according to the remarks of the Soviet physician B. G. Kuznetov, „very little spaces (similar to the compass of an atomic nucleus, respectively 10^{-13} centimeters) and time intervals of 10^{-23} seconds".³

The economic regions or sectors, based on the industries of the Third Wave (associated with the Informational Revolution) have bloomed while those based on the industries of the Second Wave have stagnated but the transition has just only started. For the time being, many governments are looking to accelerate this structural change but at the same time attenuating the difficulties of the transition.

The valorization of the microprocessor which made possible the explosive growth of the compilation and conditioning of information at low costs, may have been the most important innovation associated to this last moment. For the last 30 years, global communications have been revolutionized by the appearance of the satellites, the optic fiber and the wireless technology, of the Internet and the global network (the World Wide Web). These technologies are based on microprocessors to encode, transmit and decode a great volume of information which circulates through the electronic networks. The costs of the microprocessors are decreasing while their power is increasing (phenomenon known as Moore's Law who has foreseen that the power of the microprocessors would double while the production costs would halve every 18 months). Thus, the costs of the global communications are decreasing which leads to the decrease of the coordination and control costs of a global organization.⁴

² Bari, I. (2005). *Globalizarea economiei*. Ed. Economică, p.37

³ Toffler, A. (2002). *Al Treilea Val*. Ed. Antet, p.92

⁴ Rotariu, I. (2004). *Tendențele mondializării și mondializarea tendințelor*. Ed. Mirton. Timișoara, p.29

A decade ago, the majority of the national telecommunication markets was dominated by the monopole of the state and at the same time isolated ones from the others by means of commercial and investing barriers. This is now a thing of the past. There has already appeared a global market of telecommunication. Inside this new market prices decrease because the bidders compete among themselves in order to keep or increase the number of the clients. But the gainers are more the consumers who will ascertain that the prices for telecommunications abate vertiginously.

In the beginning of the present century, *the electronic trade* is the most dynamic process of world economy and its ascent is compared with the ascent of the automobile, the plane or of the electronics during the 20th century.⁵

The electronic trade has a more growing percentage in international transactions. The global network appears as an import element of unification. It discards some of the constraints related to location, dimension and temporal zone. The global network (the Web) allows the cycle progress of both small and big businesses at a global level to costs which have never been more decreased.

The electronic trade (the E-com) facilitates the globalization of world economy by eliminating the distances among trade partners and by reducing the communication time for business closing. On the other hand, the globalization of world economy is the main factor which propels the development of the electronic trade. The rapid ascent of the E-com was also favored by the Multilateral Agreement negotiated within the "Uruguay Round" finalized in 1994 by means of which the signing countries agreed with the liberalization of the trade with products of the information technology and communication (ITC). The electronic trade is present in different proportions in almost all the countries of the world and it definitely contributes to the gradual transformation of the classic economies into informational economies based on the sector of the technological industry.

The technical progress has led to the continuous decrease of the costs for the international transports of the goods and persons and of the international communications, the technological progress in production making possible the decomposition of the production processes. The comedowns of the costs for international communications and the recent progress from the informational technology have also opened vast possibilities for the international financial fluxes.

At a world level, the electronic trade is no longer a simple activity or a form of trade which concentrates the efforts of the competing countries and companies to win new markets and to better possible respond to their exigencies. Presently, the electronic trade has become an essential component of the economic development policies especially promoted by the industrialized countries. By means of the adopted policies at governmental level by the strong developed countries, with the aim to establish some unique regulations regarding the accomplishment of commercial transactions on electronic support, the electronic trade has become a fundamental component of the international trade. But at the same time, the accessibility of the informational technologies related to the Internet, their low cost as well as the relative independence from the classic technologies allow the economies of the developing countries a possible rapid integration in this field.

Taking into account the evolution and the dynamic of electronic trade at global level, a series of actions towards the development of digital economy is necessary, such as: liberalization of monopolist providers who keep the high costs, specific ITC legislation and the Internet (digital signature and others), access to the communication networks, avoiding the supra-regulations, laws of the intellectual ownership and copy rights, a solid capital market, infrastructure according to the international standards, freedom of access to information, interactions among the economic agents, govern, industry and citizens and finally competition.

Within the universe of the information technology and communications, the *multinational societies* play a very important role. The growing speed of transmitting technology and of the know-

⁵ Laudon, K., & Traver, C. (2001). *E-commerce. Business. Technology..* Society. USA, p.15

how among the participant countries to the world circuit represents an important phenomenon of the present globalization. The multinational societies are the most important vehicle of the international transfer of technology and knowledge.

The international transfer of technology represents a dynamic component of the international economic relations with special attributions in *promoting technological progress at planetary level*. The technology transfer, component of the invisible trade, takes place in a rhythm superior to the international trade of goods, although prevalently it represents a reduce value in contract with the value of the international trade of goods.

By means of the transfer of science and technology, the multinational societies favor the informational capital concentration in the receptive countries in order to be able to face competence or from financial reasons, thus offering generally prosper economic climate to the foreign investors. The foreign capital has the advantage to possess superior technology, developed marketing and management abilities, and when they are transferred to branches (that means they are brought on the market of the host country), the companies from the local market observe the actions, the abilities and the superior technologies of the foreign companies and make effort to imitate or acquire them with the aim to maintain competition.⁶

The technological revolution is a post-industrial revolution comprising three waves: the wave of informational technology, of communication technology and of cognition. Presently these are manifesting very intensely and determine drastic changes in economy by means of the globalization of the markets, the automation of industries, an exponential growth in the total of the generated information. In this culture based on information, communication and knowledge, services represents a substantial part of all activities. Technology and culture have a great impact on economy, they generate significant new challenges to the way that people and organisations think, operate and are managed, and in the same time, they are responsible for remarkable demographic and social changes. The post-industrial economy is characterized by quick and facile communication, high speed information delivery, very low costs of transfer, storage and processing large databases, and also by the ability to make machines that design and build other machines. These features are not limited to the business or manufacturing environments. They have already strong effects on homes, cars, our entertainment and health. And they have a great impact on society and how society views itself and the world.⁷

Third Technological Revolution, like the first two, it is followed by many changes and provoke millions of people to make important adjustments. It is an "information revolution" that greatly expands the scope of tradable services and tends to move many service jobs offshore to emerging economies, like India, China, and other industrial newcomers where labor is much cheaper. Defined by its consequences, it may also be called the "offshoring revolution."⁸

In some views, the "*globalization era*" is already gone and we are living a "*post-global era*". Globalization has been a project of a world-integrate economy regulated by the trade rules, to follow the mutual profit of all the participants with positive advantages for the society. Today, globalization can be seen like one of the causes of violence discrepancy and injustice⁹

The new wave of globalization is expected to create new patterns of the *inequality* among countries. The inequality has been an old issue for the developed and developing countries, but this wave of globalization will favor this process by means of the new patterns of outsourcing, off-shoring

⁶ Pecican, L. (2007). Modele privind studiul impactului investițiilor directe străine și naționale asupra pieței muncii și evoluțiilor macroeconomice din România -Sinteză documentară- *Modelarea și evaluarea impactului investițiilor directe naționale și internaționale asupra pieții muncii și evoluțiilor macroeconomice din Romania*. Contract MEC 91- 052/ 10 sept 2007, p.10

⁷ Kahane, Y. (2006). *Technological Changes, the Reversal of Age Pyramids and the Future of Retirement Systems* . European Papers on The New Welfare. Paper No. 4

⁸ Sennholz, H., F., *The Third Industrial Revolution*, <http://www.mises.org>

⁹ Pollifroni, M. (2006). *Globalization and Glocalization: an Epistemological Analysis from Business Economics*. ABH Conference 2006. Queen Mary University of London

and by the diffusion of technology. So far, the greatest of the GDP from the rich countries is not considered global. The global arbitration will only equalize the salaries of the identical workers with identical tasks. Thus a positive strategy to counteract the growing inequality has three directions in view which need new forms of the cooperation among business, work and govern. This directions are:

- ✓ The increase in the pace of innovation. This is likely due to the recent technological developments and a much larger pool of brain power driven by globalization, and the average growth rates in the 21st century could be higher than in the past;
- ✓ To realize potential income gains, a transition from an industrial to a post-industrial society is necessary, where manufacturing employment shrinks and wealth is increasingly created in the creative/intellectual services, some of which are internationally tradable;
- ✓ A post-industrial society needs a restructuring of work organization away from narrow functional tasks towards multi-tasking and job rotation, such that the division of labor between countries and firms will increase, whereas the division of labor within firms is likely to decrease.¹⁰

In general, the technological systems attached to the three industrial revolutions coexist, they interpenetrate, but they substitute and eliminate reciprocally in an inter-technological struggle which is transferred in the economic, social and cultural – educational domains of each country.

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¹⁰ *Inequality: Tackling Poverty and Social Fragmentation, Inequality and Globalization*, Global Economic Symposium <http://www.global-economic-symposium.org>