Interaction between technological and economic transformations

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Keywords
Azerbaijan, technological transformation, economic transformation, innovation process, technological modernization, economic effects.

Abstract
The article discusses issues related to the paradigm of self-study technological and economical transformations. The author comes to the conclusion that in the present conditions, technological innovation process cannot be fully incorporated into economic activity. In this regard, special attention is paid to the combination of economic and non-economic regulation of technological innovation in the current period and in the upcoming period.

Introduction.

The role of technological progress in the development of the economy and in the society as a whole is further enhanced.On the one hand, an economic change brought about by technological developments and on the other hand, increases the importance of other economic changes resulting from the changes primarily institutional.

The President of the Azerbaijan Republic issued an instruction on the preparation of the Development Concept "Azerbaijan – 2020: Look into the Future". The need to prepare such a concept is due to the fact that our country has stepped into a new stage of development. The achievements that have been gained allow Azerbaijan to set even higher goals and determine the tasks that stem from these goals. The main strategic view of the concept is to take account of the current opportunities and resources and attain a stage characterized by sustainable economic growth and high social welfare, effective state management and supremacy of the law, the full ensuring of all human rights and freedoms and the active status of the civil society in the country's public life. In order to achieve the aforesaid goal, state regulation which ensures healthy competition in market economy conditions, transformation into an export-oriented economy that makes efficient use of energy and creates high added value and principles of a complex approach to the development of socio-economic spheres will be taken as a basis. Within the framework of the concept, it is planned to turn the country's economy into an economy based on efficiency as a result of a growth in general productivity and ensure transition to a stage characterized by the dominance of innovations(Development Concept, 2012)

From the perspective of the theory of the transformation of the actual use of technology is the result of mapping technology space on the economic field. At the same time, the vector of technological development inevitably formed under the influence of demand factors in the economic system. Investigation of the interaction of technological and economic transformational change is definitely a little known or at least not sufficiently studied, due to that reason author will pay special attention to its study.

Literature Review
On the theoretical interpretation of technological transformation.

The main feature of the process of technological transformation is the technological change, which is achieved through the result of the innovations. In most of the studies in technological innovation has been distinguish into routine innovation and fundamental innovations. The former innovations ensure the continuous improvement of technology and technical base of production within the consumption. In contrast, the fundamental innovations tend to mediate the discrete nature of the prevailing shift of equipment and technology.

It is impossible to ignore the strong difference in the degree of importance of technological change in different spheres of social activity, both in economic and in non-economic. Accordingly, structural, technological developments, which are the results of the transformation of the kind, are extremely diverse.

Thus, referring to the historical experience can distinguish at least three stages of the actual industrial technological modernization. First - pre-industrial modernization, in terms of content corresponding to the classical modernization during the Industrial Revolution, the second - early industrial modernization in the 19th century, and the third - late industrial upgrading in the beginning of the last century (HacizadeE.M.,2006). As the concrete historical research, the trajectory of technological transformations in many ways similar to the trajectory of intra-institutional transformations that have taken place in most countries.
At the same time, there is every reason to believe that the duration of the stages of modern technological transformation - post industrialization drastically reduced. With the internationalization of scientific and technical progress it applies to virtually all countries of the world.

Modern scholars are not of the traditional economics, it is fair to celebrate the independence of indigenous technological shifts from fundamental institutional change. This is supported by at least a very historical example of the industrial revolution in the 18th century, which occurred almost two centuries after the appearance of the first prototype of capitalism in the Netherlands in the late 16th century.

In general, the entire world historical experience demonstrates the autonomy of fundamental technological change of the fundamental changes of economic institutions. For this reason, the famous and still popular (in a non-professional environment, of course) the paradigm of technological and economic development, understood as an integrated process of technological and economic changes, which does not seem to be adequate to reality. Far more serious is the theoretical hypothesis of the endogenous nature of modern technological progress on economic development growth (Nelson R.,Uinter S, 2000), which is prevailing among the traditional economics. Their main argument is based directly on the well-known theory of human capital. In accordance with it in the modern era of human capital is the lead contributor to economic development, and knowledge is just an economic resource. Starting from this premise is a fundamental conclusion: technological changes that embody the new knowledge can be regarded as an internal endogenous factor in modern economic transformation.

The impact of technological development on economic transformation.

Problem of the influence of technological innovation in economic development is the subject of research, both on the micro and the macro levels. Let's start with micro research, where most of which are purely applied research. Based on their results, there is no doubt the variety of effects of technological innovation in a modern market economy.

At least three fundamentally different types of technological innovation should be taken into account. First, innovations that provides the relative cost savings, particularly in the case of the effect of increasing returns. Second, innovation aimed at improving the quality of goods subject to relatively minor variations in the demand for it, and thirdly, the so-called "green" innovation, coupled with the improvement of the environment. Fundamental importance is the difference between the institutional mechanisms operating in the sector of small business venture in the sector of large-scale firmer (Kempbel K., 2008).

Small innovative firms also play a huge role in technological progress. Thus, extensive case studies on Third World countries clearly show a decline in the existing deep technological gap with advanced countries in a number of developing countries, thanks to the rapidly emerging in these small innovative firms. (Global Economic Prospects, 2008). On the economic field is taken into account mainly the effect of market innovation on the part of the recipient firms. Following a convincing argument Douglass North, technologies rightfully judged by their indirect influence on the efficiency of firm's recipients of these technologies (North D., 1997) that is mediated by the effect on the production and the relative costs of economic agents.

In recognition of the technological transformation as an integrated process should take into account special externality effects on economic activity induced by the creative scientific and technological activities, or, in other words, the initial research on new technologies and new technical and design solutions. Objectively significant risk of failure of these studies regardless of the actions of market agents, including venture capital firms. In particular, despite the extreme specialization and the experimental nature of modern scientific research, there remains a huge role and importance in the success of gifted individuals - geniuses. Their deficiency is often an insurmountable obstacle to the achievement of the desired outcomes of innovation.

It follows from the arguments made; particularly important field of activity is self-contained, before actual economic projections, forecasting technological progress on its specific areas. In turn, in this field, as is well known, the most widely adopted on the basis of expert forecasting methodology Forsyth. It focuses on the search for the opportunities and the risks specified exactly scientific and technological development - both global and national. The use of expert method Forsythe, as evidenced by the foreign and domestic experience, allows us to see new innovative solutions to anticipate and evaluate new risks to predict new path of development, including those that currently do not exist at all. At the same time is achieved by positioning technology (science and technology) in the overall forecast prediction of community development as one of the main components.

Considering the problem of the impact of technological change on the economic transformation dynamics, one cannot ignore the numerous case studies in the mainstream of modern macroeconomic theory. Most of these are in turn based on an econometric model of the

famous Robert Solow (Solow R., 1956).

As follows from the results of econometric studies based on firm, industry and macro statistics, during the period of 1970-1980 years in countries with developed market economies, about 80% of the increase were due to the influence of technological performance factor in the future, this share has declined slightly. However, according to experts, is largely driven by productivity gains appeared innovations in business as usual, mainly related to the improvement of government.

Most of the trials based on the assumption of endogenous of technological progress taking place on the basis of the reproduction of human capital in economic development. However, according to recognized theoretical results, the endogenous technological progress is accompanied by significant external side effects and is manifested through increase (loss) public benefit that is not covered on market value parameters (Romer P., 1986).Moreover; it is believed that increasing marginal returns of human capital that is manifested through positive side effects. A certain part of the positive side effects created by the companies own investment in research has a direct impact on the scope of its activities.

However, the hypothesis of the "flexible" endogenous of technological progress is not supported empirically. As recognized by the Paul Romer, author of the best-known econometric model of endogenous growth, in fact the impact of technological innovation on economic growth seen as an implicit function of time ["Technological advance comes, from things that people do. No economist, so far as I know, has ever been willing to make a serious defense of the proposition that technological change is literally a function of elapsed calendar time. Being explicit about the issues here is important nevertheless, because it can help untangle a link that is sometimes made between exogeneity and randomness" (Romer P., 1994)].

Discussions and conclusions

What conclusions can be drawn from a consideration of the results of micro-and macro research?

First, the technological transformation is not isomorphic to the economics. Full incorporation of technological innovation process in economic activity and, especially, in market activity does not occur.

Secondly, in the framework of the established markets and sectors of the economy experienced limited endogenous technological progress. Actually still exist and endogenous and exogenous growth. Non-market side effects induced by the research innovation, technological autonomy reflect the objective of the fieldwork on specific economic systems.
Third, to a large extent technological progress acts as a free public good, though global use. The classical theory of value, coming from the postulate of limited economic resources, is not applicable in the evaluation of the performance of innovators.

Of the findings of that technological transformation, has a tremendous impact on the development of off-market economic system, requires public regulation. It is primarily a flexible regulatory policy innovation markets, taking into account the inherent significant side effects. This kind of policy is designed to be different directions. On the one hand, it involves the stimulation of the entrance to the innovative markets by exempting from taxation of the initial

investment, on the other hand, the rejection of the tax benefits in the event of excessive entry into the market, resulting in a significant reduction in the effectiveness of innovation.

Furthermore, in the present conditions very significantly increased the need for non-market incentives creative scientific, inventive, and design activities. In particular, the moral stimulation of innovators through public recognition of their achievements in a variety of forms. Extensive empirical evidence shows that the favorable economic developments definitely correlated with positive transformational technology shifts.

Thus, we can draw the following conclusion: the dominance of the global and national economic arenas of financial actors and the closely related resource corporations entails the restriction of capital flows in the innovation sector and the high-tech sector. This phenomenon reflects the deep structural contradiction between the institutions of venture capital and high-tech sectors and institutions of the capital market - the global financial market. It should be allowed in the near, or at least in the medium term.

The coming technological transformation and its economic effects.

Without any exaggeration, the modern society lives waiting for the grand technological shifts. Thus, in the very near future (2020-2030 years.) Come as a predominant approval of the new technological order, which will determine the formation of new businesses and industries (RANDCorporation, 2006). Along with the rapidly improving information technology in the short term it is anticipated widespread application of new nanotechnology and biotechnology.

At the macro level - the level of national economies, multi regional economies and the global economy - the degree of imperfection of information used and introduced the real technology is definitely increasing. And unambiguous structural correspondence between the demand for technology in macro systems and the actual supply of technology - of innovation in these systems will not be achieved. Thus, for the foreseeable future technological transformation to a large extent will occur independently of the economic transformation and will not be fully incorporated into the economic transformation as its internal component.

Of course, in the long term and complex problem involves the development of technological advances permit the system level, that is, by adequate "tuning" of existing institutional arrangements within the economic system. First and foremost, in a particular space-time dimension is required to answer the question, what are the main economic institutions and actors will ensure the implementation of future technological breakthroughs. The main role in the dissemination of technological advances, according to most forecasts, will continue to belong to the largest high-tech corporations. Of course, this assumes the maintenance of the existing institutions of a market economy enterprise, allowing obtaining high profits from sales of products based on new technologies.

In turn, no one questions the dominant role in the practical development of technologies that trigger the creation of new technological methods, new techniques and new products for small and medium-sized innovative businesses. A venture institutional mechanism should ensure that corporate interests do not innovators in the results of their marketing activities.

Finally, the usual corporate mission lies on replication of technological advances in specific markets. Successful financial and other results of these activities will testify about the adequacy of future market mechanisms to the needs of economic development.

In addition, along with the expected dramatic technological change is expected deployment of a global green transformation, which is expressed in the transition of the world economy on a low carbon and energy efficient "rails"(Report UN, 2012).And, in turn, is a rational resource use will be achievable primarily on the basis of fundamentally new technologies using renewable resources.

As a result, the role of the state, whose interests are diverse organization, can only intensify. First and foremost, it is likely manifest itself in conducting an active policy to stimulate economic innovation. It involves a variety of forms of social regulation: government programs, public-private partnerships, and tax incentives, preferential loans for innovative firms in the stage of their initial capital.

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