

# Breakthrough Innovations of Industry 4.0 as a Factor of Economic Growth

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**Abstract** — At present, the breakthrough innovations of Industry 4.0 in Russia are beginning to be actively introduced into socio-economic life. Breakthrough innovations Industries 4.0 have a dual nature: they carry a constructive and destructive force. The idea of intellectual entrepreneurship as a basic source for the development of a breakthrough economy, which has its own scientific and production culture, values, intellectual potential and knowledge, is formulated. The conditions for the development of a breakthrough economy are summarized. The disruptive innovations of Industry 4.0 are turning into a decisive factor in modernizing the economy, increasing the well-being of the community and the quality of life. At the present stage of development, an adequate and effective holistic system has not been formed that ensures the smooth functioning of the innovation process. The article discusses the conditions that create a favorable economic environment for the creation and widespread use of breakthrough innovations of Industry 4.0. Such innovations are able to unleash the potential of the socio-economic development of the country and transform its structure. Breakthrough innovations of Industry 4.0 are based on intellectual knowledge, which also covers artificial intelligence, allows you to create structures that serve the breakthrough economy.

**Keywords:** *breakthrough innovations, Industry 4.0, economic growth, intellectual entrepreneurship, intellectual knowledge*

## I. INTRODUCTION

Intellectual entrepreneurship allows the concentrated use of the energy of combined knowledge of the total employee and artificial intelligence beyond the limits of traditional trends, constitutes the innovative essence of the process of creating the value of an object-product, and gives rise to an appropriate space for fundamentally new opportunities for its qualitative transformation during design, production, distribution, exchange and consumption obtained results. Use of information products and services in the field of Intellectual entrepreneurship is a tool for organizing flexible forms of strategic partnership. Alliances in the field of intellectual entrepreneurship contribute to a more intensive generation of new knowledge.

States in which modern technologies are absent or do not turn into a decisive factor in the modernization of the

and quality of life from those societies where breakthrough technologies and high-tech goods operate successfully. To establish itself as a world leader, Russia needs a breakthrough not only in the economy, but also in technology, infrastructure, science, education, the social sphere, because judging by the value of such an index as the HDI, it is only in 49th place. In fairness, it is worth noting that in the top ten in the HDI, except Germany and Australia, not one country is included in the top ten world leaders in the economy, and this is the most important integral indicator for cross-country comparison of measuring living standards, education and longevity, developed for the program United Nations Development (UNDP) [19].

## II. RESEARCH RESULTS

Russia needs to focus on solving domestic problems and ensuring national security. Moreover, it is not necessary, of course, to ignore intercountry ratings. But you do not need to put them at the forefront. It seems that with all the variety and complexity of the socio-economic and political tasks facing Russia now, it is necessary to single out the main links in the chain of problems, pulling them which can extend the whole chain. These "links" are: production of the latest technologies, such as genomic, digital, nature-like, artificial intelligence, robotics. The main thing is to work ahead of schedule, as is being done in the military-industrial complex, and not to lag in the "tail" of the next technological wave. A breakthrough in technology will dramatically increase labor productivity, and most importantly, it will make it possible to "breakthrough" into higher levels of the technological pyramid [7].

Russia needs a breakthrough, or "jerk," - an expression that is closer in meaning to the Russian language. "Jerk" in the economy, which means many times increased labor productivity. It will allow our society not only to firmly gain a foothold in the five largest economies in the world, but also by the middle of the next decade to increase GDP per capita by one and a half times<sup>1</sup>.

To solve the problem, first of all, it is necessary to create a set of conditions in which culture, talent, knowledge, competencies and high technologies will become the basis

for the development of society, on which it is quite possible to prepare active and competent personnel who can creatively implement non-standard solutions.

In Russia at the end of the last century, the Concept of the Information Society Formation was developed and approved. It indicates, in particular, that our country “must enter the family of technologically and economically developed countries as a full-fledged participant in world civilizational development while preserving political independence, national identity of cultural traditions, with a developed civil society and rule of law”. We single out several priority areas for the development of an exceptional breakthrough economy on a federal scale. Among them: IT - information and communication segments and electronics, manufacturing technologies, new materials and chemical products, fuel and energy [1]. Within the limits of the corresponding kind of activity one cannot but name: atomic and hydrogen energetics, catalysts, composites, laser components, multiprocessor electronic computers with parallel structure. The same status can be assigned to: unconventional processing of solid fuel and uranium, polymers, mathematical modeling and recognition systems, as well as speech (text) and image synthesis. Finally, we single out the deep processing of mining and technogenic raw materials using non-traditional methods, the study of mineral resources (forecasting, prospecting, exploration of mineral reserves and uranium), monitoring of the natural and technogenic sphere, regeneration of spent nuclear fuel (its disposal and disposal of radioactive waste), electronic ion-plasma components. All of them, of course, belong to an exceptional breakthrough economy.

The breakthrough economy of Industry 4.0 also arises from new scientific paradigms, new intellectual knowledge that extends not only to technological, but also socio-organizational, political and economic spheres. New intellectual knowledge, including artificial intelligence, allows you to create designs that serve a breakthrough economy, developing, as already noted, on the basis of breakthrough innovations of Industry 4.0. Let us clarify that we are talking, at least, about the economic, financial, political and managerial business areas. They make it possible to first form and then modernize the organizational and economic mechanism for the integration of efforts in this direction.

It should be noted that the breakthrough economy of Industry 4.0 makes the weighty scale of functioning traditional production unnecessary and obsolete. So, only a computer forced society to eliminate the industries that flourished in the past, related to the production of ordinary accounts slide rules and other similar products that were widely used previously in business practice. Such a breakthrough economy, which essentially closes (ceases) traditional approaches, is capable of making revolutionary changes in the national economy, which now, for example, is confirmed by the spread of artificial intelligence, information and communication and other innovative processes.

The determining factor in the formation of a breakthrough economy is breakthrough innovations that provide dynamic socio-economic development and transform its structure.

Breakthrough innovations of Industry 4.0 brings both creative and destructive power. The creative power is manifested in the fact that they are the basic factor of both social and economic growth. The destructive power is that new technologies at

The breakthrough innovations of Industry 4.0 are the result of new knowledge. Moreover, states in which modern technologies are absent or do not turn into a decisive factor in modernizing the economy are increasingly lagging behind in terms of welfare and quality of life from those societies where breakthrough innovations of Industry 4.0 and high-tech products are successfully operating [10]. They determine the updating of high-tech sectors of the economy, obtaining high incomes, including maximizing profits, and increasing the authority of Russia. We are talking, for example, about rocket engines, some types of nuclear energy and weapons, a number of agricultural and other goods.

The results obtained during the spread of breakthrough innovations of Industry 4.0 are felt quite clearly in economic practice. Each breakthrough innovation brings to life new directions of activity. In other words, under such conditions, the change of labor is even more active. The latter, as you know, paves its way in the form of an objective social law [5, p. 498-499]. Along with the change of labor, a change in production occurs and a change in the economy. Hence the need for appropriate personnel of the innovative type, namely: innovators with high professional qualifications. They are characterized by a purposeful concentration of efforts and intellectual thinking. The core of these properties is their creativity, free from stereotypes. Moreover, the highly effective innovative activity of such personnel, contributing to the formation and development of breakthrough innovations of Industry 4.0, is possible only with the manifestation of appropriate intuitive solutions on their part.

The facts indicate that knowledge formed the basis of practical activity and became a fundamental factor in modern economic growth. An enterprise (company) can improve its position by replacing any production resource with another, knowledge. Indeed, modern technologies are sets of executable instructions and recipes for how to manipulate nature, replacing labor with knowledge through robotization and informatization. The implementation of these instructions in practice, during which they turn from knowledge into actions, is the process of processing a natural substrate. The ultimate goal of this method of production is to obtain material benefits. In the indicated context, the use of new information releases, saves limited resources. In this quality, information is identical to the factor of production, although in its physical form it is not. Its influence is probably similar in its consequences to the reduction of production costs in the context of the permanent deepening of the division and change of labor.

The value of information is determined precisely by the possibility of the release of resources, the scale of their expected savings.

The decisive role is played by the ability not only to produce information, but also the ability to consume it. There is a problem of perceiving the knowledge gained, awareness of its importance, understanding the prospects for use. That is why human potential and interaction between people are of particular importance. Indeed, the copying of information and knowledge is followed by their materialization, objectification, and this is not a simple process that requires a high level of education and qualification of employees. In this case, we are dealing with a limitation not in the availability of knowledge, but in its consumption. Ultimately, the field of production and exchange of things is narrowing, while the service sector, aimed primarily at the growth of knowledge, is expanding. Knowledge begins to be produced in order to gain even more knowledge.

The services provided to business make a decisive contribution to the formation of the value of the manufactured product, improving the position of companies in the market. Now, not physical, but mental labor is applied to the subject.

Creating conditions for the development of a breakthrough economy is a special type of activity of the state, business and public organizations. It is focused on meeting the needs and interests of not only the real sector of the national economy, but also of the whole society. Successful establishment and development of a breakthrough economy is quite possible provided that this task is the basis of both state policy and important targeted national programs of the country. Moreover, this archi is necessary if it provides large-scale support for all participants in this process, for the whole people. Without a targeted state influence, it is virtually impossible to achieve a reasonable breakthrough, to achieve the necessary breakthrough in introducing the latest achievements of science and technology throughout the country.

The state, business, public organizations, with the help of not only domestic education, are called upon to develop a mutually beneficial policy, to implement the strategic and tactical measures emanating from it in this field of activity.

Their important function is also the regulation of the development of a breakthrough economy at all stages: from the formation of demand to its comprehensive satisfaction. Through various institutions, the state, for example, is called upon to monitor emerging trends in science, which, by the totality of their initial properties, are identified as breakthrough and create special conditions for their development.

Under such conditions, it is quite obvious that a further search is to be done, and not only research, but also applied in order to achieve breakthrough results of the domestic economy. This is especially important taking into account the sanctions policy both in relation to our country and Russian anti-sanctions.

A breakthrough economy, among other things, also involves elements of market self-regulation, combined with state regulation of social reproduction. The state directly targets business entities on the formation of market structures that meet the interests of society. It regulates reproductive processes. Performing the functions of regulating breakthrough reproduction, the state is guided by its ideals and goals, relies on the tools at its disposal, the developed policy, means and apparatus, as well as methods for its implementation.

It is stated about intellectual entrepreneurship here, to take into account the understanding of the economy in general as a system of relations that develops between market entities in the process of their production activities aimed at design, production, distribution, exchange and consumption.

Intellectual entrepreneurship allows the concentrated use of the energy of combined knowledge of the total employee and artificial intelligence beyond the limits of traditional trends, constitutes the innovative essence of the process of creating the value of an object-product, and gives rise to an appropriate space for fundamentally new opportunities for its qualitative transformation during design, production, distribution, exchange and consumption the results obtained.

The use of information products and services in the field of intellectual entrepreneurship is a tool for organizing flexible forms of strategic partnership [9, p. 452]. Alliances in the field of intellectual entrepreneurship contribute to a more intensive generation of new knowledge. The knowledge applied to the processing of material increases its value. "Work with knowledge is considered as a new way of creating goods and added value" [3, p. 83]. At the same time, the knowledge potential can be realized only if the qualifications and competencies of employees complement each other. This circumstance drives the principle of increasing returns. Skilled workers, as a rule, are concentrated in those places where their qualifications correspond to many other workers [12, p. 93-96; 8, p. 109-112].

### III. CONCLUSION

It is stated that intellectual entrepreneurship plays significant role in the economy in general as a system of relations that develops links between market entities in the process of their production activities aimed at design, production, distribution, exchange and consumption.

Intellectual entrepreneurship allows the concentrated use of the energy of combined knowledge of the total employee and artificial intelligence beyond the limits of traditional trends, constitutes the innovative essence of the process of creating the value of an object-product, and gives rise to an appropriate space for fundamentally new opportunities for its qualitative transformation during design, production, distribution, exchange and consumption the results obtained.

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