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## Science and Its Role in Modern Society: Epistemological and Social Aspects

We live in an age of information and high technology, it seems that a person has already answered all the questions, but the world around us is asking more and more, and we are trying to find answers to them. But nature cannot be forced to say what we would like to hear. Scientific research is not a monologue. Asking a question to nature, a researcher runs the risk of failing, but it is the risk that makes this game so exciting. Science is a risk game, and a game always is exciting, unpredictable and interesting. Science is one of the defining features of modern culture and perhaps its most dynamic component. Today it is impossible to discuss social, cultural, anthropological problems without considering the development of scientific thought. Modern society is entering the informational stage of development, the rationalization of all social life is becoming not only possible, but also vital. On the other hand, the limits of the development of a civilization of a one-sided technological type were revealed: both in connection with the global environmental crisis, and as a result of the impossibility of total control of social processes revealed. Modern science in many respects is essentially, radically different from the science that existed a century or even half a century ago. Its whole appearance and the nature of its relationships with society have changed.

It should be noted that there are still three basic concepts of science: science as knowledge, science as activity, science as a social institution. Modern science is an organic unity of these three points. Here, activity is its basis, a kind of “substance”, knowledge is a system-forming factor, and a social institution is a way of combining scientists and organizing their joint activities. And these three points make up the full definition of modern science.

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The first concept, science as knowledge, with a centuries-old tradition, is considered as a special form of social consciousness and represents a certain system of knowledge. This is how science was understood by Aristotle and Kant. For a long time, such an understanding of the sciences was almost the only one.

The logical and epistemological interpretation of science is determined by both socio-historical conditions and the level of development of science itself. In fact, those aspects of science that were revealed in the past at the early stages of its existence were absolutized, when scientific knowledge was presented as the result of purely spiritual efforts of the thinking individual, and the social determination of scientific activity could not yet be detected with sufficient completeness.

This concept cannot alone reveal the full definition of modern science. If science is considered only as a system of knowledge, then some shortcomings arise. And the thing is that such a direction in science (relying only on reliable, verified facts, knowledge) is pretty monotonous and limited. The researchers are eluded by its social nature, creators, material and technical base, limited possibilities for a deeper and more comprehensive study of the specifics, structure, place, social role and functions of science. All this led to the need to develop another concept of science, to strengthen the study of the activity and social aspects of this social phenomenon.

If we consider science as an activity, then today its functions seem to us not only the most obvious, but also the first and the first. And this is understandable, given the unprecedented scale and pace of modern scientific and technological progress, the results of which are noticeably manifested in all sectors of life and in all spheres of human activity. For example, recently, foreign scientists have put forward one rather strong and sharp hypothesis about the reason people believe in deity. After many studies, they concluded that in the structure of human DNA there is such a gene that gives various commands to the brain about the existence of a deity.

An important aspect of the transformation of science into a direct productive force is the creation and strengthening of permanent channels for the practical use of scientific knowledge, the emergence of industries such as applied research and development, the creation of networks of scientific and technical information, etc. Moreover, after the industry, such channels even beyond. All this entails significant consequences for both science and practice.

Science as a social institution is a social way of organizing joint activities of scientists who are a special social and professional group defined by a community.

The institutionalization of science is achieved through well-known forms of organization, specific institutions, traditions, norms, values, ideals, etc.

The purpose and purpose of science as a social institution is the production and dissemination of scientific knowledge, the development of research tools and methods, the reproduction of scientists and ensuring their fulfillment of their social functions.

Today, in the conditions of the scientific and technological revolution, one more concept is more clearly revealed in science, it acts as a social force. This is most clearly manifested in those numerous situations today, when the data and methods of science are used to develop large-scale plans and programs of social economic development. In compiling each such program, which defines, as a rule, the goals of the activities of many enterprises, institutions and organizations, the direct participation of scientists as carriers of special knowledge and methods from different fields is fundamentally necessary. It is also significant that, due to the complex nature of such plans and programs, their development and implementation involve the interaction of social, natural and technical sciences.

The 20<sup>th</sup> century was the century of the triumphant scientific revolution. NTP accelerated in all developed countries. Gradually, there was an increasing increase in the high technology intensity of products. Technology has changed production methods. By the end of the 20<sup>th</sup> century, high technologies developed, the transition to the information economy continued. All this happened thanks to the development of science and technology. This had several consequences. Firstly, increased requirements for employees. They began to require great knowledge, as well as an understanding of new technological processes. Secondly, the share of brainworkers, scientists, that is, people whose work requires deep scientific knowledge, has increased. Thirdly, the growth of well-being caused by scientific and technological progress and the solution of many pressing problems of society have generated the faith of the masses in the ability of science to solve the problems of mankind and improve the quality of life. This new faith is reflected in many areas of culture and social thought. Achievements such as space exploration, the creation of nuclear energy, the first successes in the field of robotics gave rise to a belief in the inevitability of scientific, technical and social progress, aroused the hope of an immediate solution to such problems as hunger, disease, etc.

And today we can say that science in modern society plays an important role in many sectors and spheres of human life. Undoubtedly, the level of development of science can serve as one of the main indicators of the development of society, and it is also, of course, an indicator of the economic, cultural, civilized, educated, modern development of the state.

The functions of science as a social force in solving the global problems of our time are very important. An example here is environmental issues. As you know, rapid scientific and technological progress is one of the main causes of such dangerous phenomena for society and man as the depletion of the planet's natural resources, air, water, and soil pollution. Therefore, science is one of the factors of those radical and far from harmless changes that occur today in the human environment. Scientists themselves do not hide this. Scientific data play a leading role in determining the extent and parameters of environmental hazards.

The increasing role of science in public life has generated its special status in modern culture and new features of its interaction with various layers of social consciousness. In this connection, the problem of the features of scientific knowledge and its relationship with other forms of cognitive activity (art, ordinary consciousness, etc.) is acute.

This problem, being philosophical in nature, at the same time has great practical significance. Understanding the specifics of science is a prerequisite for the implementation of scientific methods in the management of cultural processes. It is also necessary for constructing a theory of control of science itself in the conditions of scientific and technological progress, since elucidation of the laws of scientific knowledge requires an analysis of its social conditioning and its interaction with various phenomena of spiritual and material culture.

The concept of "knowledge-based society" appeared in the late 1990s in the scientific and economic circles of the European Union (EU). It first appeared at the level of discussions, discussions about the post-industrial and information society, about further ways of developing the economy and culture of the West. Historically, the foreboding of a knowledge-based society appeared in the 1970s with the classic post-industrialist Bell<sup>2</sup>. Similar ideas appeared in other authors. For example, Porat wrote about the possibility of an "information economy"<sup>3</sup>. Initially, a knowledge-based society meant:

- Massive, fast, cheap and secure Internet. The vast majority of the population had to regularly contact the world-wide network – for communication, shopping, searching and receiving news, satisfying any personal needs – in education, health, social activities, hobbies, etc.

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<sup>2</sup> Yu.Yu. Belova, N.Z. Alieva, Yu.S. Shevchenko, *The role of science in the modern society of knowledge: epistemological and social aspects*, "Modern problems of Science and Education" 2012, No. 5.

<sup>3</sup> B.G. Kuznetsov, *The value of science and the problem of its impact on civilization*, pp. 18–19.

- Investing in people and knowledge (primarily applied, profitable), involving young people in information technology, working in the economy and even political activities based on knowledge.
- Finally, this is a knowledge-based economy – e-commerce, Internet logistics, traffic automation, online government: electronic government representation and even online health.

Over the following years, the widespread use of the Internet and mobile devices has changed not only the economy, but also social connections, cultural life, lifestyle and even the way of thinking of the population in many countries of the world. The concepts and images associated with information, technology, and science gained great importance. As a result, the concept of knowledge-based society began to play an important role in the social and technical sciences.

Today, the main meaning of a knowledge-based society means that the further development of the Western (consumer) society is mainly due to the increase of knowledge – fundamental (scientific) and applied (techno-economic and economic knowledge). The latter, being involved in the material life of society, become the main economic force – the force for the development of production, consumption, management, defense, etc.

Science as a leading element of a knowledge-based society. The most active element of a knowledge-based society is science. It sets the vector and the rhythm of the development of society, introduces new, previously unprecedented ideas into culture, opens up new private ontologies (“worlds”), new types of energy and resources, offers whole classes of new needs and even types of activity and creativity. Usually, science is understood as: true knowledge of reality (knowledge of a certain type), a social institution that opens up this true knowledge (universities, academies of sciences, institutes, groups of scientists). In the system of a knowledge-based society, science is necessary as a social institution, included in a system that operates according to the second formula. In turn, the core of a knowledge-based society is the national innovation system. Thanks to her, the second formula appears in the following more expanded form: knowledge → technology → technology → goods → money → knowledge 1 → ...

What is science in epistemological and social aspects? In epistemological, epistemological, cognitive aspects, modern science is both a dynamic process and a static system, i.e. the unity of “Yang and Yin”, expressed in Taoist language: both the process of discovering new knowledge and its result is knowledge itself. Science as discovery. As a process of discovering new true knowledge, science is creativity in the highest sense of the word. An extensive

literature on the philosophy and psychology of scientific creativity is devoted to this difficult problem. The essence of the process of discovering a new concept (construct) is such a combination of old images, principles, concepts that solves the problem, question, task. The choice from an immense number of combinations is carried out using intuition, or rather a philosophical (aesthetic) principle or “sensation, taste”, i.e. feelings of beauty<sup>4</sup>. From a formal point of view, the subject of cognition (scientist), formulating a fundamentally new concept that solves a difficult problem, leaves the epistemological space of dimension N in the space of larger dimension (N + M)<sup>5</sup>.

Science in the social aspect. An analysis of the role of science in modern society leads to a difficultly visible, chaotic set of problems in which science, technology, business, society, politics, economics, ethics, religion, and most important anthropos are tied into such a complex knot that only the future Alexander the Great can cut as a thinker, as a philosopher. These are problems such as globalization, the “technicalization” of man and society, the “over complexity” of modern society, the end of the old and the emergence of a new civilization, the risks and dangers posed by scientific and technological progress, the anthropic crisis and the anthropic turn, the problem of immortality, posthuman, superintelligence.

Thus, scientific knowledge – mathematics, physics, biology, linguistics, mechanical engineering – are understood equally and serve as the main condition for true globalization and the emergence of a single humanity. Therefore, the dissemination of scientific knowledge brings together and unites people of all races, nationalities, cultures.

The problem of rationalization and technicalization of society and man. “Mountains” of literature are written on this topic, but from a philosophical point of view, only the dilemma is significant: does scientific and technological progress develop or destroy the human Anthropos as a generic creature? Does human existence develop or disappear? Scientists (many scientists, businessmen, politicians) are in favor of the unlimited development of science and technology, anti-scientists (many theologians, existentialists, even ecologists) are against it. Between these extremes is still a lot of intermediate positions.

Therefore, the rationalization and technicalization of society is a problem, but a solvable problem. Critics of scientization emphasize the substitution of the human in man. For example, M. Heidegger back in the 30s of the XX cen-

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<sup>4</sup> Yu.Yu. Belova, N.Z. Alieva, Yu. S.Shevchenko, *The role of science...*, op.cit.

<sup>5</sup> V.G. Gorokhov, *Fundamentals of the philosophy of engineering and technical sciences*, 2007, p. 77.

tury. He wrote that since the Renaissance, technology has gradually and imperceptibly replaced the essence of man with something “inhuman,” ultimately, with nothing. In connection with this, he introduced the concept of “stave”<sup>6</sup>. Today, it is supported by thousands of philosophers, scientists, public figures.

Who is right? From our point of view, it is possible to “judge” the opposite sides, if human criteria are highlighted. It was they who gave a constructive measure – the main criterion for evaluating complex processes and phenomena. This was written by Confucius, Aristotle, Hegel and other great minds of mankind. The most profound philosophers and anthropologists, such as Pico della Mirandola, Kant, Hegel, Feuerbach, Soloviev, Berdyaev, singled out freedom, creativity, love as the highest attributes of a person. Therefore, we can propose such a principle for assessing scientific and technological progress from the standpoint of the preservation and development of anthropos: the development of science, technology, technology must be carried out in such a way that in the foreseeable (predicted) future, man is preserved and deepened, his freedom, creativity, love as attributes of homo sapiens.

These concepts should be interpreted in a philosophical rather than ordinary sense. Freedom is understood as the possibility of the maximum development of man, as the maximum of actualization of potencies (Hegel, Marx). Creativity as the ability to create something that did not exist, as going beyond the boundaries of the old culture, as going beyond the limits of a priori forms of cognition, as “continuing the Divine act of creating being” (Mirandola, Kant, Solovyov, Berdyaev). Love as a desire for the identity of subjects (Hegel).

The problem of risks and dangers. In connection with scientific and technological progress, with the social changes caused by it (especially in the XX-XXI centuries), thinkers and the public raise the problem of danger and even the possibility of death of mankind. The same problem is clearly manifested in post-non-classical science (virtualistics).

From a philosophical and anthropological point of view, there are two main classes of risks and dangers: external and internal. External risks are caused by the discoveries of science, the development of technology, the appearance of goods and services that quickly and even suddenly invade the outside of society: they threaten human health, violation of traditions and ethics in society, habitual lifestyles, etc. Here, conservatives and “progressives” immediately clash, old and young people, women and men, East and West. One way or another, these contradictions are resolved during discussions in scientific

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<sup>6</sup> A.A. Huseynov, *Great prophets and thinkers*, 2009, p. 25.

journals, business forums, and in parliaments. And in different countries in different ways.

However, internal risks are much more dangerous than external ones. They are caused by such a development of science and technology, which at the beginning of the innovation process is perceived by the majority positively, but which gradually transforms society, culture, traditions negatively, i.e. so that, entrenched in culture, it destroys man and society from the inside. This is alcoholism, drugs, the dangers of virtual "being", genetic engineering, nano-technology, 3D printers and other achievements, remote forecasting of social consequences, which is difficult to carry out. Philosophers and scientists urge to develop forecasting of the social consequences of scientific and technological progress and, moreover, forecasting the future development of science and technology, because only scientists (even before the stage of funding research) can foresee the dangers of possible future discoveries, and in the event of such a danger, do not finance their own research. Wait for the society to ripen ethically to obtain dangerous knowledge (it may take hundreds of years to wait!). Einstein, Grothendieck, Sakharov and other prominent scientists called for this.

As K. Yu. Dobrin notes, "in the post-industrial information society, the situation with the utility of norms, justice and legitimacy is becoming even more complicated: instead of social norms based on the principles of culture and humanism, regulation based on financial and regional interests is observed"<sup>7</sup>. The problem of substituting the reality of illusions (often suggested) is clearly manifested not only in the problem of alcoholism and drug addiction, but also in the democratic processes in Russia, when the electorate is not instilled with the help of the media of what is, but what seems.

Thus, science in a knowledge-based society is the leading, most active element that sets the tone and rhythm for other elements of a "science-intensive" society – technology science, business, financial system, art, etc. In an epistemological respect, modern science is a post-non-classical science, the science of complex human systems. Its basis is: synergetics, anthropics, virtualistics, theory of complexity. In social terms, science is the leading side of the evolution of society, which develops it and creates many difficulties, anomalies, contradictions.

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<sup>7</sup> T. Kun, *Nominality and the emergence of scientific discoveries*, [in:] idem, *The structure of scientific revolutions*, Chicago 2001.

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## Science and Its Role in Modern Society: Epistemological and Social Aspects

### Summary

The main form of human cognition – science – today has an increasingly significant and significant impact on the real conditions of our life, in which we must somehow navigate and act. A philosophical vision of the world presupposes fairly definite ideas about what science is, how it is structured and how it develops, what it can do and what gives hope, and what is inaccessible to it. Talking about modern science in its interaction with various spheres of society and the individual, we can distinguish three groups of social functions that it performs. These are, first, cultural-worldview functions, second, the functions of science as a direct productive force and, third, its functions as a social force, due to the fact that scientific knowledge and methods are now being used more and more widely to solve a variety of problems arising in the life of society.

**Keywords:** society, knowledge, science, epistemological, social aspects

## **Наука и ее роль в современном обществе: гносеологические и социальные аспекты**

### **Резюме**

Основная форма человеческого познания – наука – сегодня оказывает все более существенное влияние на реальные условия нашей жизни, в которых мы должны как-то ориентироваться и действовать. Философское видение мира предполагает довольно определенные представления о том, что такое наука, как она структурирована, как она развивается, что она может, на что дает надежду и что недоступно для нее. Говоря о современной науке в ее взаимодействии с различными сферами общества и индивида, можно выделить три группы выполняемых ею социальных функций. Это, во-первых, культурно-мировоззренческие функции, во-вторых, функции науки как непосредственной производительной силы и, в-третьих, ее функции как социальной силы в связи с тем, что научные знания и методы в настоящее время все шире используются, чтобы решить множество проблем, возникающих в жизни общества.

**Ключевые слова:** общество, знания, наука, гносеологические и социальные аспекты