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## Technology as the phenomenon of human activity

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## Introduction

The creation of such educational sector as „Technology" in the State Standard for General Secondary Education caused controversial comprehension of the essence of technology. Strong stereotypes and the allure to the realities of industrial society do not allow considerable number of educators to turn away from the conception of technology as the transformation process of material object, energy or information. Actually, the notion „technology" in the period of development of modern society becomes more valuable, and technologization penetrates practically into all spheres of the mankind's life.

During the last decades, various journals of science have published many scientific articles that raise the issue as to value of technological progress. The result of „successful" implementation into the life of the idea of a man's domination over the nature, unlimited interference into the nature was that the mankind faced the problem of survival. The mutual relations between a man and the nature, which until recently were examined as the man's imperiousness over the nature, revealed dependence of the human existence on the nature. The following questions were raised: what human activity should be, what principles it must follow by, according which laws it must be developed, and so on.

Modern production of material objects exists in new conditions. Even such a new notion as „technological risk" has appeared. It characterizes quality changes in social and ecological environment that happened in industrialized countries close to the 70s of twenty century. This notion covers all types of destroying impact of production process on the human existence and natural environment.

## Main body

The philosophic literature created the conception that the technology is not only the tool, but also the process of active and motivated activity of the individual, in whom creative abilities as to transformation of the world (the nature, society, and culture) are realized. Certain consistency of processes in the structure of technological activity is stipulated not only and not so much by the law of the nature but by its practical goal. In the process of this transformation only human relations and conditions of the human activity are making and recreating. Moreover, technology is intellectual learning of reality, enlargement of knowledge about it.

However, technology is not only the process and the result, but also the tool of the human life. While functioning, the technology partly rejects from a man, it creates, so saying, technologized environment of the human life. Owing to technological transformation, there is creation of artificial world of human life, where the mankind's impact on the nature, society, and culture is becoming more and more technological, moreover, not only in such understanding that forms of technology as the tool of practical activity determine the direction of world transformation. Technological effectiveness means severe dependence of the human relation structure on the following objects of activity: the nature, the mankind, culture, strict consistency of processes of human activity.

The modern technologies' impact on all spheres of human life allows researchers to classify the current period as technological civilization, technological society, age of technological revolutions, century of technological culture, and so on [Бондаренко 1985: 167]. Determining the notion „technology", its place in human existence, based first of all on the analysis of technology functioning in such filed of practice as production, considerable number of authors directly or indirectly makes their subject of research on technological orientation of development of various spheres of human activity – *the process of technologization.*

The essence of technologization process is that results, which are planned by the subject, determine the order clearly, outline the activity, and regulate methods of its implementation. The guidelines and purposes of activity are proved functionally, that is, based on the possibilities of the subject functioning in the given technological system – production, scientific research, education, communication etc. The organizational and technological moment in realization of human activity is going into forefront. As the result of approaching science and practical experience almost all spheres of human life are becoming rationalized and technologized.

The process of technologization covers human communication, daily human life. The adaptation of a man to social environment is a specific learning of technology of daily life. Naturally, that under such conditions even inner world of an individual is affected by technologized environment, and is partly being transformed into the object of technologization.

The existence of the mankind in technologized environment stipulates considerable deprivation of individualization of activity that does not enable to realize entirely uniqueness, deepness, integrity of an individual. Owning to technologization, the life of a man is being transformed into the object, which is included to specific „technology of life". This phenomenon was fixed and classified by the existentialism as absolute power of engineering, technology above the mankind, in these conditions absoluteness of disposition engineering and technology from the mankind, inner world of a man from an individual himself „disposition itself". The following problem appeared: how in the context of technologization in human life specific system of „technology of life" correlate

to the need of realization of individuality, its inner world, in other words, how to leave the bounds of dominating technology.

In our opinion, the way of solving this problem lies in creating humanistic purport in technology functioning. Such forms of technological learning of the world that enable not to deform culture, but to save and develop it should be found. Therefore, human life in the context of technologization stipulates both learning „technology of life" (social technology) and designing such forms of technology of human activity, which enable to save and develop culture.

The features of the process of technologization appear significantly in modern scientific perception – in appealing to practical needs of society, expansion of methods of engineering sciences as to fields of natural and humanitarian investigations, and so on. Technological effectiveness in realization of social functions of the science is that by means of the science the society secures from unexpected consequences. Knowledge is becoming necessary basis of organization of people, their cooperation in activity. It releases people from emotional and psychological involvement for regulated forms of social life and behavior. Therefore, any given events of human activity are perceived by the subject as given clearly, as necessary events to be submitted.

Essential peculiarities of the science technologization reveals in the following things: [Винокуров, Митин 1985: 55–556], firstly, in the need of broader research of technological approaches that are based on drafting and designing procedures as production tools of new knowledge. Also distinctive feature is application of knowledge and methods that are connected with them in various fields of the science, engineering production. Computerization of modern science is implementing. Thereby, the number of mathematicians and software engineering specialists, who serve these processes, is increasing. Computerization results in further intellectualization of the work. Separation of scientists' work is delving, at the same time importance of integrated research is enlarging.

*Secondly*, the scientific activity is getting more and more algorithms. Dominating ideal of scientific and research activity is becoming practical learning of algorithm of creative work and its application in production of new knowledge.

*Thirdly*, technologization of the science is revealed in target orientation of scientific research in manufacturing and practical needs, embodiment of scientific knowledge into manufacturing practice – up-to-date engineering and technology. Besides, realization of possibilities of the science as productive force stipulates the change of ideals of organization and structure of implementation of scientific investigations. Nowadays, realization of possibilities of the science need advanced material and technical infrastructure. The structure of the science is changing in the following way: engineering tools are becoming more complicated, number of scientific employees, who are employed in material and technical spheres, is increasing, the connection with manufacturing process is strengthening, and so on. All this predetermines „industrialization of the science",

„technicalization of the scientific work". In this context, on the one hand, development of technology becomes the scientific problem, on the other hand, possibilities and number of science increase considerably, which results implement into manufacturing practice.

One more demonstration of technologization of science is the implementation of technological approach in the scientific perception. On this basis in the natural science fields of scientific and technical nature are created (for example, biotechnology, genetic engineering).

The realization of heuristic possibilities of technological approach in scientific perception enables not only to get new original results in the natural science but also to work out new opinion on technology in general, to create new concept of technology. The heuristic potential of technological approach was used by A. Ugolev, who created the concept of „natural technologies", proved technological unity of biological and technical worlds, new wider conception about technology [Философия гуманизма 1987: 208]. The application of technological approach enables to integrate the cognitive possibilities of technology and the natural sciences, to open new general laws of functioning of natural (biological structures) and manufacturing technologies. Hence, A. Uglev investigated such living systems of various levels as technology, biosphere as technological process in the planetary scope [Философия гуманизма 1987: 228].

The research of general regularities of natural and scientific technologies results to new understanding of technology, in other words, general conception about technology transforms into the science about principles, structure and dynamics of organized processes. Thus, technology is the most general concept that fulfils methodological and integrated function as to all sciences. This conclusion is entitled to exist. Firstly, manufacturing technologies itself become the part of a wide complex that includes both artificial and natural technologies, and so-called synthetically technologies. Secondly, nowadays, much regularity of natural technologies is used in manufacturing technologies. The sense is in attracting attention to fruitfulness of learning general laws that are difficult according to organization of the processes of natural and artificial systems, the application of its laws for controlling such processes that have great theoretical and applied meaning.

The process of technologization with the scientific perception also includes culture. In the context of up-to-date technology the alternative of technological existence and cultural work is restoring. There is no doubt that natural, cultural and practical features combine in the essence of technology itself. On the one hand, it is functioning embodiment of the laws of the nature; on the other hand, it is result of human activity as to transformation of the word. The technology operates as the tool of the word formation, the world of culture that is opposite to the nature.

Though, the unity of cultural and natural features is realized in the essence of technology, relation of technology to the nature and culture is problematic. Technology in its functioning generates „the world of technology", that has its logic of development, and avoid a man that impact on it. The result of technological transformation of nature by the mankind is breach of many natural systems, degradation of the nature. Under the influence of „the world of technology" technologization of culture, in other words, domination of technological approaches in its manufacturing and understating takes place. Besides that, the technology's affect on culture can be also destructive, ruining.

The following questing is raised: whether the system of technology, not being in conflict with the nature and culture, not influencing destructively on them, is not possible? The positive answer expects formation of a certain quality of culture technology. The point is about correspondence, adequacy of technology system to the essence of the nature and culture. The problem becomes complicated because with improvement of the system of technology its deforming influence on culture does not decrease but, vice versa, increases. A paradox situation appears: practical understating of the nature by a man, rationalization of technology turns to be a conflict in the systems „technology-nature" and „technology-culture". On the one hand, human mind in the form of science enables to master superior configuration of material motion, recreate it technologically. On the other hand, these new technologies, in a determinate sense, become more ruining as to the nature and culture.

The search of human activity technology, that is adequate to a man and culture, has brought to the newest biotechnology, to transform it to the basic one. Biotechnology can act as technological basis not only to technology system of human activity but also as a new model as to the past periods of correlations between technology and culture.

Engineering and technology of new generation (according to H. Toffler, engineering of „the third wave" of engineering ) put into the first place the following universal human values: ecological, moral and humanistic imperatives [Философия техники в ФРГ 1989: 399]. The change of paradigms is matured: machinery paradigms, paradigms of domination above the nature should reach back. Innovation will be successful if they combine technological and social aspects. The security of new technologies is no longer defined only by technical expertise. It can be added by social expertise.

Majority of authors agree that technology may be considered as the aspect of human activity. Somebody examines technology in the context of any activity category (more often with the industry). There are many variants of interpretation of the notion „technology" as complex of methods of processing, manufacturing and transformation etc. For example, V. Dortfman affirms that technology is receptor activity (in practical aspect) or chain of separate adopted theoretical regularities. Other authors estimate modern technology, firstly, as methodology

of modern manufacture, in other words, complex of rules, skills, manufacture processes. Secondly, they estimate modern technology as scientific discipline, in other words, complex of specific knowledge and rules, technological processes.

More general definition of technology is offered by T. Burdina [Бурдина 1988: 120]. She classifies engineering and technology as general attributes of human activity that restricts its objective and procedural aspects. V. Krasikov turns away from limited specialized definition of technology [Красиков 1985: 101]. Firstly, he thinks that technology is the instrument of analyzes of the nature of human activity, and secondly, it is a „bridge" between manufacturing and scientific activity.

A. Bondarenko [Бондаренко 1985: 63] expresses his view that practical (objective) technology is complex of processes and operation mediated by the experience that creates certain use values. He developed the system of precise gradation of types of technology.

Gradation according to the range of modern technology can be 1) practical, 2) scientific, 3) theoretical. *Practical technology* is material production (material technology), service sector, science, medicine and medical service (social technology), arts, culture, literature, etc (spiritual technology). *The scientific technology* examines and summarizes experience of creation of use values. Its subject is the processes of interactions of tools of work, subjects of work and environment in the process of formation of diversity of use values. *Theoretical technology* studies dialectics of technology and possibility of application of the laws of development of the nature and society for transformation of material and spiritual world of a man. The subject of its investigation is processes of development of cognitive and creative activity of a man, its different spheres. Theoretical and scientific technology, likewise practical, may be divided into similar spheres according generalized types of use values that are connected with specialization (nanotechnology, social technology, and so on).

Gradation according to objects of application of technological process is 1) the nature as sphere of material production (material, manufacturing technology), 2) a man and human society (social technology), 3) thinking, social consciousness, spiritual life of society (spiritual technology).

In practical sphere as to the object of application of technological process the scientist distinguishes the following fields: material and practical (production of manufacturing tools and objects of consumption); social and practical (economical, legal and class relations); spiritual and practical (ethical and aesthetic relations). In scientific sphere the scientist distinguishes the following fields: material and scientific (natural science, material science, technical science, and so on); social and scientific (the economics, production procedures, legal science, and so on); spiritual and scientific (arts, education science, psychology, literature, and so on). Finally, in theoretical plan the scientist distinguishes the following fields: material and theoretic (theory of engineering, technological,

natural and scientific development, theory of different processes); social and theoretical (economic, political and other social theories); spiritual and theoretical (ideology and ideological studies).

The basis of technology includes objective laws. It develops adequately to the nature and depends on level of its application. The objective laws of the nature are the laws of forms of material motion.

The work of A. Bondarenko plays systematized role in the ocean of empirical data.

A. Rakitov thinks that there are two notions of technology – traditional and modern [Ракитов 1991: 262]. Traditional technology is the collection and sequence of operations that are determined by character of engineering tools, intermediate and final targets. Modern technology includes all operational structure and systems that ensure realization of relevant activity and achievement of its goals, system of controlling, resourcing, intellectual and informational support, and also integrated system of social, economic, cultural and sometimes even political effects of its activity.

V. Kashyrin analyses development of views on technological motion [Каширин 1988: 157]. He is confident that philosophical generalization of technology is practically lacked now. General technological theory that are released from terminological peculiarity to create communicative barriers between technologists will be able to become an effective tool of support of correlation between natural, technical and social sciences and relevant formation of daily conciseness. According to V. Kashyrym, there are two ways of formation of general technological theory: development of fields of technological sciences; 2) investigation of general problems of engineering sciences. But optimum alternative is interconnection of these ways. Also, the scientist attempts to explain what theoretical technology from his point of view is. It studies and describes regularities of technological action, establishes parameters and conditions of processes of transformation of material object, energy and information; sets necessary parameters that can turn the process into specified channel and optimize it by changing these parameters.

V. Kashyryn thinks that natural technology is a complex of biological processes of direct change of subject of environment by means of functioning parts and organism in general; in other words, natural technology is diverse actions that are connected with material and energetically exchange. The social technology is created in anthroposociogenesis along with appearance of collective interaction of subjects and conscious reflection of the environment. The scientist introduces the notion technological form of motion as natural and social complex of material processes of purposive change of various material object, energy and information (mechanical, physical and chemical, and so on) that take place in engineering systems in accordance with their specific laws of structure and functioning.

Generalizing views that exist in modern national literature, it is to be noted that at the beginning technology was considered as simple receptor activity. Later on, more general view on technology as the element of human activity was broadening. Generally, material, social and spiritual technologies were separated. Certainly, it is already great level of investigation of the technology as philosophic notion.

M. Tarasenko determines technology as productive force of a social man that implements integral productivity of collective labour [Тарасенко 1985: 165]. It expresses socially manufacturing tool of application of material object of the nature through human labour in general – labour as real existence of collectiveness. Modern technology designs collective capability to activity, essentially, additional society productive force that is raised from social division of labour. Technology is objective, material embodiment of the essence of a man. It may be neither productive force nor phenomenon of culture beyond social and historical practice. It is the same human activity, but is defined and transformed though the substance of natural entirety in the form of spontaneous interaction of natural processes. Therefore, functioning in accordance with the laws of the nature, it is subordinated to regularities of social activity. Technology always becomes material unity of natural and social in the sphere of practice, specific form of social practice.

Manufacturing industry is historically specific form of technology existence. From the first labour actions, casual sporadically application of natural subjects till its systematically application as instruments, and then to manufacturing instruments – that is general direction of the genesis of technology and engineering tools. Historically, technology appeared earlier then manufacturing industry, which was originated from machine production. Firstly, is existed in the form of manual, instrumental, handicraft labour.

In his turn, V. Knyazev is interested in the problem of technology in the context of objective dialectics of the essence and existence of a man [Князев 1990: 116]. He thinks that the problem of technology can be solved, firstly, through identification of the content of cognitive attitude a human to the world, secondly, if to consider the main issue of philosophy in theoretical and practical form under social and practical matter, in other words, the issue of interrelation of the essence and existence of a man.

In such a case, technology becomes the form of identification and development of social essence of a man. V. Knyazev indicates that empirical analysis enables to define such main forms of technology existence: as natural process as the status and form of activity, as the party of social relations, as the science; as a moment of any human activity. He considers that solving the assigned task stipulates revelation of the essence and determination of connection of notions „the essence – human – the essence of force – activity tool – manufacturing and labour function – operation". This chain of notions allows not only to implement

transition from philosophic level of analysis of the problem to particular and social but also to explain the logic of technological progress as definite form of social progress. Every type of society creates ideologically and practically its own concept of engineering and technological process that is originated from its social nature and social and economic essence. The criterion of definition of the essence of certain technological degree of development of the society must own integrated character. This criterion demands to take into consideration what exactly is the essence of force or manufacturing and labour function is implemented. It also demands analysis of degree of adequacy of technology to historically defining character of manufacturing relations, and, as the result, to needs of development of social essence and creative abilities of a human.

To our opinion, technology is transformation of forms of materials motion on productive forces of a man. As far as we distinguish five man forms of material motion, so we can distinguish as well five forms of technologies: mechanical, physical, chemical, biological and social. First three forms are combined into the block of inorganic technologies. Mechanical form, as the simplest one, includes more complicated forms of technologies and is improved with them. Not any complicated form can exist without mechanical form. In pure form the mechanical form does not exist and, respectively, does not develop. Only in abstraction it differentiates as a separate object. Both mechanical technology and physical technology include chemical technology but not as mechanical sum. It is new, higher quality. Of course, chemical technology is complicated creation but the issue is not only in complication but also that it not development yet. The essence is new quality level.

Chemical technology does not exist without physical and mechanical technologies, as well as biological form does not exist without inorganic forms.

Transformation of technologies and its development is taking place by virtue of human activity. Moreover, inner contradictions of forms of technologies are solved so much faster and more intensive then higher level of technology. In other words, development of complicated forms of technologies is carrying on faster. To understand development of forms of technologies is necessary to solve the essence of forms of material motion that comply main forms of technology, to research its inner regularities and interconnections.

The sound investigation of the most complicated and higher quality technology, social technology, has just started. V.M. Knyazev thinks that social technology is not restricted to the methods of exploitation of working force since it includes conscientious manufacturing procedures and social life and also practical application of social and other types of knowledge [Князев 1990: 92]. As a matter of fact, social motion did not become the subject of social investigation. Therefore, to our mind, there are numerous problems that people face with: ecological crisis, deficit of natural resources, various demographical problems, instability of industrial and economic development of certain countries, father development of defence technology that create the threat to life in the Earth,

technocratic thinking as the paradigm of industrial society, and, finally, interrelationship between the mankind and space, that a man has just started domesticating. The matter is that social form of material motion removes all previous forms creating preconditions for harmonic interrelations between a human and nature. If the development of technology goes on according to the principle of one and several forms of material motion, it results inevitably, for example, to ecological crises of other problems. It also concerns peculiarity of interrelations in society.

Social characteristics, assessment of technology are connected with the status of society that consumes this technology. For example. A. Rakitov writes that character of application of information technology depends radically on economic status, social structure and political structure of the society, its general culture and level of legal awareness, predominant moral standards and values attitudes [Ракитов 1991: 77]. Technological basis of society of epoch of scientific and engineering progress will be developed only under the terms of certain intensive social and cultural transformation. This point of view is shared by circle of western philosophers of engineering.

Conclusion. Actually, it is possible to solve all mentioned global problems (stabilization of industry state, prevention of ecological crisis etc) as soon as applying new methods of controlling economics, structure and regulation of production, global designing (Rome club demonstrated this example). There is thinking that people won't be able to take responsibility for engineering till they can't perceive themselves and control themselves using the measure that technical progress claims. Father progress of engineering and technology, development of our society depend on solving these philosophical problems.

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**Abstract**

The article deals with analysis of modern scientists' views on the problem of the essence of technology from interpretation of technology as receptor activity as to certain its types till definition of technology as the element of human activity in general, productive force of a social man in the context of the objective dialectics of its essence and existence. The connection of technology with the forms of material motion is shown.

**Key words:** technology, technological progress, technological activity, process of technologization, technologized environment.

**Аннотация**

В статье анализируются взгляды современных ученых на проблему сущности технологии: от трактовки технологии как рецептурной деятельности определенных ее видов до определения технологии как элемента человеческой деятельности, в общем, продуктивной силы общественного человека в контексте объективной диалектики ее сущности. Показана связь технологии с формами материального движения

**Technologia jako fenomen ludzkiej aktywności**

**Streszczenie**

W artykule przeanalizowano poglądy współczesnych uczonych na naturę problemu technologii: od traktowania technologii jako reaktywnej działalności po określenie jej jako uświadomionego elementu działalności człowieka, w ogólności zaś jako siły wytwórczej człowieka wchodzącego w relacje z obiektywną naturą. Pokazano związek technologii z formami przetwarzania materiałów.

**Słowa kluczowe:** technologia, postęp technologiczny, aktywność techniczna, proces technologiczny, środowisko techniczne.