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**ENGINEERING VALUES UNDER GLOBAL CHANGES**

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*Abstract*

The article is devoted to the topical issue of modern philosophy of science and technology - value aspects of engineering at the stage of high-tech modernization of society. The dominance of innovative technologies in the system of social relations, accelerated growth of integration processes requires new value meanings and tasks in the engineering sphere. The basis of the study is engineering which is an area of increased responsibility and an essential tool for transformation of the relationship between man and society, man and technology. The latter determines the interest in scientific achievements and improvement of the quality of engineering developments in conditions of fundamental changes in social systems. Efficiency of reformation of public relations depends on engineering whose special significance is due to its unlimited technological potential in the field of interaction of man and the social environment. The article discusses a number of value trends inherent in the current stage of social development, and their impact on the nature of engineering. The purpose is to analyze engineering values, identify factors affecting the dynamics and structure of values attitudes of engineers. Factors affecting the structure and dynamics of value orientations of engineering subjects are investigated. The need for "reformatting" of engineering values considering new requirements for management systems of the latest technologies and their social security is substantiated. Attention is paid to the significance of the humanistic orientation as an axiological basis for the engineering value system that performs one of the key tasks in changing social processes.

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**Keywords:** Engineering, value orientations, moral, humanistic values.



## **1. Introduction**

The present stage of social development is characterized by the increasing dynamics of global transformations in many areas. Significant changes are taking place in the scientific and technical sphere which is the most important for solving problems of high-tech modernization of modern society. At this stage of development, attention is paid to technological achievements applied for changing the environment. There is a constant reform of physical and social reality. Radical transformations in the social sphere determine the interest in the practical use of scientific achievements and improvement of the quality of engineering developments. The effectiveness of modernization of the entire system of social relations depends on the engineering whose special significance is due to its unlimited technological potential in the field of interaction of man and nature, man and society.

The relevance of the article is due to the fact that rapid expansion of the technosphere, nanotechnology, research on new types of weapons, and artificial intelligence threaten to the human civilization. “The world can be destroyed by human activities” (Jonas, 2004, p. 279). Issues of value foundations of engineering are of particular importance.

In addition, modern transformations of the global order, technological order, generate interest in engineering activities as the most important tool for transformations. If in earlier periods of scientific and technological revolution the most important engineering tasks were related to the efficiency and quality of developments, currently attention is paid to the axiological aspects, the dynamics of value orientations in the structure of engineering activities, transformations of value systems to solve the problem of relationship between technology and morality.

## **2. Problem Statement**

The modern world is on the verge of global changes. Geopolitical, economic, political and other crisis situations indicate the onset of a new stage of development. Under aggravated global contradictions, all spheres are being transformed. Interaction of man and technology is changing. In the last decade, under general technologization, the engineering problems, their influence on social processes and issues of social responsibility have become priority. Engineering values are possible ways of solving ethical problems in the field of science and technology.

## **3. Research Questions**

The article studies engineering values determined by various factors, including socio-technological and axiological transformations.

## **4. Purpose of the Study**

In the context of these problems, the purpose is to analyze engineering values, identify factors affecting the dynamics and structure of values attitudes of engineers.

## 5. Research Methods

The research is based on the use of general philosophical and general scientific methods: activity and system approaches, analysis and synthesis.

## 6. Findings

### **Moral Horizons as Survival Conditions**

At the present stage, engineering activities are determined by social, axiological, and anthropological determinants. The starting point of this study is the current state of social space within which engineering value systems are formed.

The current stage of development of the post-industrial society is informational or “knowledge society”. These terms are identical, since qualitative social transformations are determined by special significance of information and knowledge. According to Bell (2004), the new stage of social development should have led mankind to progress at the expense of enormous achievements in science and technology. The scientist believed that this stage has already begun, because characteristics of the society are obvious: “research and development are becoming a source of innovation (moreover, new relations between science and technology are formed); social development measured by the increasing share of GNP and workforce is determined by the success of knowledge” (Bell, 2004, p. 802).

However, the study of modern social reality allows us to identify specific patterns that are different from those described before. On the one hand, social predictions of the scientist were justified, and indeed, the society based on scientific and information technologies has been formed. On the other hand, at the beginning of the new millennium, one can observe a different reality which is characterized by fundamental changes in human communication, social connections and relationships, and an increased human impact on the biosphere. This situation contributes to a new reality, the technosphere, as a holistic formation where gradual integration of social, technological and natural processes takes place (Demidenko & Dergacheva, 2010).

Humanity has faced previously unknown circumstances and uncertainty of future social development strategies. That is why the issue of social development is open. The reality of today high-tech world is as follows: “it continues to show that it was and remains unpredictable for our logic and for our scenarios” (Kiselev, 2015, p. 25).

Analysis of the social situation identified fundamental changes in the nature of relationship between man and technology, science and society, “science and society interfere with each other” (Bauman, 2008). When technologies become a powerful transforming force that changes a person and his ways of life, the center of gravity is transferred to engineering activities which can assess consequences and risks both at the stage of creation and application of the latest technologies.

However, transformation of social relations does not depend on the level of development of scientific technologies. It depends on moral values. Disappointing consequences of the total crisis, destruction of basic values force us to elaborate humanistic development strategies. That is why engineering, whose value system is based on humanism, morality, social responsibility, should be considered as one of the most important factors determining the vector of development of modern society.

It is not by chance that in the era of scientific technologies, issues of ethics and social responsibility of an engineer are crucial (Gorokhov, 2007; Dombmnska, 2009; Lenk, 1996; Allie, 2009).

Globalization and social transformation are signs of the era of deep transformations and shifts of civilizations (macroshift). According to Laszlo (2004), the modern period is a critical phase characterized by randomness and unevenness. Technological innovations are at the heart of the stage. Former engineering tasks are not relevant in modern conditions of uncertainty and instability. In other words, the era of global transformations requires an immediate and urgent review of attitudes towards the research and technology management in the context of human awareness of the future.

A well-known scientist F. Fukuyama expressed a similar point of view arguing that implementation of modern technological ideas in biotechnology and genetic engineering creates a real threat to the humanity (Fukuyama, 2004). That is why the issues of application of nanotechnology in medicine, critical analysis of the use of advances in neuroscience are currently in the focus of scientific discourses (Marcus, 2002).

These problems require immediate solutions due to radical changes in the geopolitical, economic, socio-cultural environment. There is a serious threat to the mankind. We are talking about the use of nanotechnology in genetic engineering, biomedicine, development of multifunctional technological systems that enhance technological capabilities of man. The accumulated destructive technological potential makes it necessary to focus on fundamental value principles that constitute the core of professional ethics”: morality, humanism, responsibility. The moral horizon in engineering activities is related to solving the problem of effective and safe use of new technologies for future generations. It is necessary to choose strategies and models of technological and social development.

### **Dynamics of engineering value orientations**

The study of the dynamics of engineering values requires analysis of the influence of external social value trends. A modern specialist, an engineer, is under the influence of social conditions which do not contribute to creativity, responsibility and other value systems. This is justified by the deepest decline of traditional values and dismantling of the axiosphere of society. “The crisis of the value system can be caused by both ambiguity of the attitude towards the past and uncertainty of the future. Tomorrow should be understandable, predictable and manageable; it is necessary to look further, focus on goals that are far behind us, understand remote consequences of our actions” (Lektorsky et al., 2015, p. 26).

The quality of transformations does not contribute to practical recommendations and ways to overcome social challenges. A person as a subject of engineering activities becomes a hostage of those values. He is in a sociocultural space where it is necessary to make decisions outside narrow professional boundaries, choose between material and moral, individual and collective. In this context, personal qualities of an engineer become important.

The modern socio-cultural situation offers the engineer to choose conditions that ensure the development of abilities. However, he has to be more active, improve his professional skills, and master new knowledge that goes beyond his basic training. This modifies his activities. The presence of a wide range of value meanings and goals, the absence of any restrictions presuppose diverse possibilities, means and methods of human existence. By expanding usual boundaries of professional activities, the engineer has to be prepared for moral responsibility for making decisions. Only a moral person can solve this task.

In the conditions of commercialization of the entire sociocultural space, implementation of these tasks becomes complicated.

However, at the current stage, given the enormous influence of technology and the scale of their social consequences, social responsibility of engineers acquires is crucial. It is filled with new meanings and is expressed in efforts to foresee undesirable and negative consequences embedded in the results of engineering research, and ensure quality management and control at all stages.

Nevertheless, this is only the first step towards modernization of engineering activities. The next stage is analysis of engineering values. The most important value principles are correlated with reorganization of society. The technological component of engineering activities is being improved, but the nature of their value orientations will be dominated by the value system that will dominate the integrated system of social relations. When the basis of “social matter” is made up of moral principles and ideals of humanism which stand guard over a person, the use of scientific, technical, economic achievements will ensure stability and security of the world. If the economy and politics are not human, moral principles are ignored, the risk of negative social consequences will be much higher (Stepniyats, 2016).

It is necessary to build a society based on humanistic values that are different from material and consumer ones. One of the solutions is formation of new value approaches to engineering as an essential component of modern transformation processes. It is obvious that the hierarchical system of engineering values is undergoing significant changes. The study of its dynamics suggests that material, utilitarian values and goals are dominant. The engineering sphere included in the integral system of social activities is under pressure of negative tendencies characteristic of modern consumer society which is the reverse side of the new stage of social development (Baudrillard, 2006; Bauman, 2008).

The consumer society as one of unforeseen consequences of the rapid technological breakthrough radically changes the vector of development of social processes. Modern engineering activities are under the influence of socio-economic conditions. They reform goals and objectives of scientific and technical activities destabilizing the initial stage of formation of humanistic foundations of the “knowledge society”. Under these conditions, it is probable that scientific and engineering projects will not be implemented as inconsistent with the demands of modern consumer society.

The source for solving these problems is to rethink basic values, eliminate causes that have changed the vector of development of value orientations.

## **7. Conclusion**

The study on engineering values is relevant. Issues of permissible boundaries of scientific knowledge, the need to manage possible risks when using the latest technologies are crucial. The study of the modern stage of social development shows that between man and technology, science and ethics, man and social environment, there is a deep gap which requires an intensified search for the most effective strategies for getting out of the crisis. One of the directions in solving these problems can be development of new axiological approaches in the engineering field, rethinking of attitudes towards technical advances. It is necessary to focus on the role of engineering as a sphere of increased responsibility, a factor regulating the relationship between man and technology. Due to the specific nature of engineering activities, the basis for the value system should be a humanistic orientation which recognizes a person as a supreme value.

It is obvious that implementation of these requests is a key point in managing high-tech systems and their social security. Humanistic principles should become a basis for new strategies of the scientific and technical model of development.

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