



THE EMERGENCE OF THE ENGINEERING AND TECHNICAL SPHERE AND ITS ROLE IN THE DEVELOPMENT OF SOCIETY

Кушаков Файзулла Абдуллаевич

ТГТУ стар. преп. кафедры “Социальные науки”

Электронный адрес: kushakovfayzullo@gmail.com

Телефон: +998977772583, +998900022583

Abstract

This article examines the development and progress of engineering activities. Specific professional and scientific aspects of engineering activities were socially analyzed. The economic, scientific, and social role and significance of the engineering profession in the life of society are highlighted. A comparative study of engineering and social spheres was conducted.

Keywords: Engineering, engineer, material production, engineering, engineering-technology, engineering-research.

Introduction

The concept of "engineer" comes from Latin - cunning, witty, inventive. Initially, engineers were called persons who operated military machines. With the appearance of the word "machine", which denoted a lifting device in the ancient Greek theater, an engineer began to be called the creator of all sorts of ingenious technical devices. In the XVI century, the concept of "civil engineer" appeared in Holland in relation to the builders of bridges and roads. Then this concept is used in England and other European countries. In the Russian army of the XVI century, engineers were called "rozmysl". In its modern meaning, the word "engineer" began to be used in the XVIII century in connection with the emergence of large-scale machine production. It was at this time that a whole system of special technical sciences was formed, which were designed to combine scientific knowledge with practice. An engineer is a person who professionally carries out technical creativity, this is a specialist with a higher technical education, who in his activity combines science with production, i.e. becomes a conductor of science in production.



Features of engineering activity

Engineering activity is a professional technical activity of a person (who has received a higher technical education), which is a means of his subsistence. With the complication of production processes, engineering activity was differentiated into engineering research, engineering and design and engineering and technological. actors, composers, etc.) By its role in social production, it is productive labour directly involved in the creation of national income. In this way, engineers perform one of the isolated functions of the aggregate worker. It was the practical orientation of engineering and all technical activities in general that gave the "intellectuals" a reason to look down on it.

In its modern essence, engineering activity is a technical application of science aimed at the production of technology and the satisfaction of social technical needs. In the process of the engineer's activity, the laws of science are transformed from their theoretical form into technical principles that find their practical application. This activity has a certain degree of risk, which is considered inevitable.

In order to ensure the necessary reliability of the created technical means and technology, methods and means of overcoming this risk are being created by establishing certain parameters, standards and using statistical accounting of cases of possible accidents. By its nature, engineering activity is mainly spiritual activity in the field of material production.

The Association of German Engineers has defined the main value criteria of engineering: ability to function and reliability, economy, welfare, health, safety, environmental friendliness, quality of society and personal development. The process of engineering activity includes: determination of needs, development and decision-making, preparation of production, regulation of production, satisfaction of needs.

Essential features of engineering activity:

- 1) it is an activity in the field of material production or an activity that is aimed at solving the problems of material production;
- 2) it is a practical activity, i.e. it deals with really existing objects, in contrast to theoretical or spiritual, where there are conceivable, ideal objects;
- 3) it resolves the contradictions between the object (nature) and the subject (society), is the process of transformation of the natural into the social, the natural into the artificial;



4) it occupies an intermediate position between theory and practice (the work of an engineer is mental work in the sphere of material production).

Thus, engineering activity is the materialization of a technical idea, which ends with the creation of an effectively operating industrial facility, the analysis of the functioning of which has an impact on engineering thought, as well as the development of technological knowledge and science as a whole.

Stages of development of engineering activity

The following stages of the development of engineering activity can be distinguished:

- 1) pre-engineering – the time of construction of large and complex structures of antiquity;
- 2) pre-engineering – the period of manufacture, the stage of the formation of engineering activity in the social plane (the end of the XVIII - the beginning of the XIX centuries);
- 3) the period of development of engineering activity on the basis of the system of machines and technical sciences;
- 4) the modern stage, which is associated with the transition to information technology.

Technical activity did not enjoy much fame even in ancient times. The criticism of technical activity turns out to be as ancient as this activity itself (the myth of God's destruction of the Tower of Babel; the myth of Prometheus chained to the Caucasian rocks; the myth of Icarus falling from heaven). Archimedes considered the construction of machines to be an occupation that did not deserve either labor or attention (most of them were born as if in passing, in the form of amusements). The attitude to technical activity did not fundamentally change in the Middle Ages, when this activity was often perceived as something magical.

The attitude to technical activity did not fundamentally change in the Middle Ages, when this activity was often perceived as something magical. Medieval craft was likened to a ritual that reproduced the corresponding myth. In medieval Europe, technical innovations, techniques, and methods were integrated into the class world of guilds. In the Renaissance, a different attitude to the engineer and his activities was formed. The engineer began to be treated not just as a craftsman, a technician, but as a creator, creating, like the divine creator, a new world, a world of second nature.

From the end of the 19th century, sharp criticism of technical dominance and idealization of the past began. Modern society also gives an extremely contradictory



assessment of engineering activity, seeing in it not only a source of vital benefits, but also social evil. However, it was only in the 20th century that technology, its development, its place in society and its significance for the future of human civilization became the subject of systematic study. Not only philosophers, but also engineers themselves began to pay more and more attention to the understanding of technology. This topic was discussed especially intensively on the pages of the journal of the Union of German Graduate Engineers "Technology and Culture" in the 30s. Often attempts of this kind of comprehension were reduced to an exclusively optimistic assessment of the achievements and prospects of modern technical development. At the same time, in the humanitarian environment, a critical attitude to the course of technological progress of modern society was growing, and attention was drawn, first of all, to its negative aspects. One way or another, in both cases, the technique became the subject of special analysis and research.

Levels and forms of engineering and technical activity

Engineering activity is based on technical activity - this is a set of actions that ensure the implementation of scientific, industrial and social tasks. These tasks can be both theoretical (as technical creativity) and practical, which begin with engineering research and design, pass the design stage, and end with the creation of industrial designs.

The theoretical level of engineering and technical activity is carried out in the process of technical creativity. Technical creativity is the process of creating a new technical and technological object. This process includes a system of interrelated stages: 1) formulation of a specific technical and technological idea (problem) and identification of the direction of its solution, when the human (subjective) factor materializes in the process of creating a new idea; 2) the creation of an effective model of the corresponding object or progress, when the idea acquires more distinct technical and technological forms of expression.

Historically, technical creativity is realized in two forms – inventions and discoveries. 1) Invention is the process of creating new principles of operation and ways of their implementation in specific technical and engineering devices. At the same time, we are talking about the creation of an object that did not exist before in reality (the invention of the wheel, gunpowder, internal combustion engine, etc.), where the materialization ("objectification") of the idea takes place; An invention ~ is a new



solution that ensures the satisfaction of a new actual realized need or the improvement of any criteria of efficiency and other indicators of existing objects without deterioration or insignificant deterioration of other indicators.

Inventions are usually associated with the improvement of technical systems (devices), technologies (methods), structural materials and substances, or with the creation of material products, technologies, materials, substances, strains, microorganisms. The main features of an invention are significant novelty and usefulness. In order to recognize a new solution for an invention, an application for a patent is filed in accordance with the established procedure, on the basis of which, after confirmation of novelty and usefulness, it is submitted. A patent or other similar document is issued to the invention. Invention appears when the development of science and technology lags behind the needs of society, which needs to implement new goals. Invention precedes specific engineering developments. At the same time, the inventor can be self-taught (the inventor of the steam engine I. Polzunov), or come to the invention on the basis of the analysis of the previous experience of the development of science and technology (the inventor of the telephone A. Bell). Invention is a system of actions: from a certain guess (insight) to a prototype model (in 1765, I. Polzunov was the first to build a steam power plant, but the creator of a universal steam engine is considered to be J. Watt, who in 1784 created a working system and received an author's patent). Often an invention follows a discovery (T. Edison left more than 1000 inventions in various technical fields, but his inventions followed the corresponding discoveries in the scientific and technical field), so an invention is a way to implement a discovery.

2) Discovery is the identification of natural things, phenomena, regularities, etc., which actually exist in nature, but are not known before (the discovery of America, the periodicity of elements, mineral deposits, etc.), which is based on the internal needs of the individual (inventor) in comparison with the influence of external conditions and circumstances.

Discovery is the identification of natural things, phenomena, patterns that actually exist in nature, but are not known before (the discovery of America, the periodicity of elements, mineral deposits, etc.). The discovery is based on the internal needs of the inventor, and not on external conditions and circumstances. There is no clear watershed between the uplifts of invention and discovery, for example, the discovery of X-rays required the invention of appropriate technical equipment (an X-ray



machine). Historically, the relationship between discovery and invention also changes. If at the first stages of the development of scientific and technical knowledge (when its theoretical level was not high enough), the cognitive process began with an empirical search in the form of discovery and invention, then from the 20th century the theoretical level of discovery began to prevail. If initially the increment of technical knowledge was associated with the experimenter, today the process of technical knowledge is associated with the theoretical research of scientists.

The practical level of technical and engineering activities is carried out in two forms: 1) as engineering research and design; 2) as construction.

Engineering Research and Design: Engineering research and design involves scientific research and calculations, engineering and economic justifications, as well as the design process of the facility, with each type of engineering activity based on a corresponding basic technical science or system of sciences, and complex technical problems require the interaction of technical, natural and socio-cultural sciences.

Design is a type of engineering work that is carried out in various fields of human activity: in the design of technical systems, design, modeling of clothing, etc. The development of design options is usually associated with the formulation and solution of problems of technical creativity. At the design level, the implementation of a technical idea takes place within the framework of experimental development, which is associated with the formulation and solution of problems of technical creativity. In the process of design, a drawing of a technical product or system is created, specific technical characteristics are calculated and specific conditions of implementation (nature of the material, productivity, degree of environmental friendliness, economic efficiency, etc.) are fixed.

The result of the design development is a technical product, a finished structure. Design is combined with the development of appropriate technological conditions, i.e. methods and technical conditions for the implementation of a specific model. Therefore, design is associated with technology, which reveals the mechanism of organizing the process for the production of a particular product.

References

1. Leont'ev A.A. *Psikholingvistika [Psycholinguistics]*. – Moscow: Smysl, 2003. – 287 p.
2. Zimnyaya I.A. *Psikhologiya obucheniya inostrannym yazykam v shkole [Psychology of teaching foreign languages at school]*. – Moscow: Prosveshchenie, 1991. – 222 p.



3. Luria A.R. Yazyk i soznanie [Language and consciousness]. – Moscow: Moscow University Press, 1998. – 320 p.
4. Shcherba L.V. Yazykovaya sistema i rechevaya deyatel'nost' [Language system and speech activity]. – Moscow: Nauka, 1974. – 428 p.
5. Kubryakova E.S. Language and Knowledge: On the Way of Obtaining Knowledge about the Language. – Moscow: Languages of Slavic Culture, 2004. – 560 p.
6. Galperin P.Y. Introduction to Psychology. – Moscow: Moscow State University Publishing House, 1976. – 150 p.
7. Levelt W.J.M. Speaking: From Intention to Articulation. – Cambridge: MIT Press, 1989. – 566 p.
8. Nation I.S.P. Learning Vocabulary in Another Language. – Cambridge: Cambridge University Press, 2001. – 477 p.