

THE MISSION AND ESSENCE OF THE THEORY OF TECHNOLOGICAL ORDERS



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ABSTRACT

The subject of the article is the mission and essence of the theory of technological orders; the object of the article is the process of technological development of the economy and society; the purpose of the work is to increase the efficiency of the processes of formation of the sixth technological structure in the economy and society; description of the methods of modernization of enterprises' products during the transition to the sixth technological mode; description of the scientific and practical significance of the general theory of technological modes; scientific methods in this article are the methodology and philosophy of science, logic, system analysis, synthesis, system approach, functional-decomposition representation of complex technological systems, forecasting, expert methods; scientific novelty of the work is associated with the development of the methodology of the general theory of technological modes and the description of the scientific and practical significance of this general theory

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1. INTRODUCTION

The relevance of this article is determined by the need to improve the effectiveness of scientific support for the processes of formation of a new technological order in the economy and society.

In 2008, the global systemic crisis began. At the initial stage, this crisis was considered a financial crisis. This crisis is connected with the process of formation of the sixth technological order. The reason for the crisis is the discrepancy between the new technological basis and the old socio-industrial institutions. Economists believe that a new (sixth) technological order began to form in 2010. It is expected that the formation of a new technological order can continue until 2040. The lack of a scientific theory of technological structures deepens the crisis. The lack of development



of the general theory of technological structures hinders the development of a new technological structure in the economy and society.

The hypothesis of the article is the statement that in order to accelerate the formation of the sixth technological order (mode) in society and the economy, it is of great importance: the formation of a general theory of technological order (modes); the socialization of knowledge, the understanding of the significance of this theory for the science and practice of socio-economic development of society.

The aim of the work is to increase the efficiency of the processes of formation of the sixth technological order in the economy and society.

In order to achieve this goal, the following tasks are solved in the article:

- description of the functions and roles of the technological order (structure) in the economy and society;
- development of methodological provisions of the general theory of technological order;
- descriptions of the methods of modernization of enterprises' products during the transition to the sixth technological order;
- description of the scientific and practical significance of the general theory of technological orders.

The object of the article is the process of technological development of the economy and society.

The subject of the article is the development of the general theory of technological orders and the description of the scientific and practical significance of this theory.

Scientists recognize the term "technological order (way of life)" as a scientific category [Vdovina (2019), p. 605-618]. However, the essence of this category should be recognized as not yet sufficiently studied. In the process of forming the sixth technological order, it is expected that the economic potential of our country will develop [S. S. Yu et al. (2021), p. 107-112]. The technological order is considered as a set of technologies [Qosakyan (2021), p. 4-8]. They develop the science of technological order (structures) [V. Glushchenko (2020), p. 488-504]. The essence of the sixth technological order is investigated [V. V. Glushchenko (2021b), p. 16]. They study the impact of the new technological order on the legal institutions of the state [Pashentsev et al. (2021), p. 2]. They develop models of the technological development of the world economy [Aivazov (2015); 8, p.3-29]. They express the view that the impact of technology on the development of the organization has not yet been sufficiently studied [Mescon et al. (1993), p. 131]. In the process of research, it is important: to describe the tasks of the scientific theory of technological order [V. V. Glushchenko (n.d.-d), p. 60-74]; to conduct a systematic analysis of the technological order [V. V. Glushchenko (2021d), p.22-34]; to form a methodology for strategic planning of the formation of the sixth technological order [V. V. Glushchenko (2021c), p. 30-46]. There is a well-known point of view that the change of one technological order (mode) by another technological order (mode) is accompanied by a

global crisis [V. Glushchenko \(2020\)](#), p. 488-504; 13, p. 2]. In the process of developing a new technological order, technological platforms are formed [Sindetsky \(2009\)](#), p. 3-9]. Knowledge of functions and roles reveals the socio-economic essence of technological order [V. V. Glushchenko \(n.d.-a\)](#), p. 80-93]. Studies show the existence of a relationship between the level of technological development and:

- the form of the state, the specifics of the legal system [V. V. Glushchenko \(n.d.-c\)](#), p. 2];
- types of money and the monetary system of the country [V. V. Glushchenko \(2009\)](#), p. 7-16];
- the level of human rights development [V. V. Glushchenko \(2018\)](#), p. 303-339];
- organizational forms of scientific activity [V. V. Glushchenko et al. \(2015\)](#), p. 2].

Innovation is a tool for the development of a new technological order (way of life). These innovations create an innovative monetary multiplier in the economy. This innovative money multiplier is opposed to the bank money multiplier. The ratio of the innovation money multiplier and the bank money multiplier affects inflation and the degree of hardness of the national currency of the state [V. V. Glushchenko and Glushchenko \(2016\)](#), p. 104-117].

The technological order (structure) can be considered as a large system. Therefore, for the study of technological order, their functional-decomposition representation can be used "[GlushchenkoVV 1990 Functional decomposition representation of complex technical systems](#)" (n.d.), p. 184-186].

The process of development of the sixth technological order can take the form of the development of a number of technological platforms [V. V. Glushchenko \(n.d.-e\)](#), p. 44-63].

In the process of developing the sixth technological order, the importance of the: project approach in the activities of organizations may increase [V. V. Glushchenko \(n.d.-b\)](#), p. 63-75]; scientific and pedagogical schools [V. V. Glushchenko and The \(2020\)](#), p.44-63].

In the process of the formation of the sixth technological order, there will be an institutional restructuring of universities and other organizations [V. V. Glushchenko \(2020\)](#), p. 56-71]. The effectiveness of the mechanism of integration of science, practice and education will be increased [V. V. Glushchenko \(2019\)](#), p. 25-40]. Further development of the project method of higher education is predicted [V. V. Glushchenko \(2021a\)](#), p. 29-37].

2. METHOD

Researchers believe that the technological order can act as a kind of "unit of measurement" in the periodization of global economic development [Aivazov \(2015\)](#); [G. S. Yu \(2016\)](#), p.2-29].

At the same time, researchers have not yet formed a consensus on what should be understood by the term «technological order». Here are some points of view regarding the concept of «technological order»:

1. In [G. S. Yu \(2016\)](#), p. 3-29], it is proposed to understand the technological order as a system of key global institutions that ensure the expanded reproduction of capital. With this approach, the analysis shows that such a definition may not reflect the primary influence of production technologies on the socio-economic superstructure of society (business forms, innovative institutions, the monetary system, the political system, the form of the state, the world order);
2. in some works, the technological order is understood as a set of production technologies that are at the same level, used in a certain period of time in the organization. However, it should be noted that this definition of the concept of «technological order» actually duplicates the well-known term «technological basis of the organization».

In this situation, such a definition of the concept under consideration can be proposed: "The technological order is a harmonious (systemic) combination of: a set of technologies of economic and financial work; customs of business behavior (turnover); ways of organizing business processes; methods and tools of management at all levels (international, national, organizations); the nature of the functioning of technological, industrial and socio-economic institutions (relations). All this set of factors and relations is considered at a specific stage of their historical (temporary), economic, social, technological, ecological, and cultural development [V. Glushchenko \(2020\)](#), p. 488-504].

However, it should be borne in mind that the "technological order (way)" belongs to the category of large technological systems. Therefore, it is impossible to give an exhaustive definition of this concept. This conclusion was reached by scientists who for many years and times tried to give their definition of a complex system. This conclusion is explained by: a large number of different aspects of such systems; a variety of possible goals for their study.

A change in the technological order can be accompanied by a change in the entire paradigm of socio-economic development of society. In 2021, there is a transition from territorial production complexes to a cluster-type economy. At the same time, technological platforms are also developing [Sindetsky \(2009\)](#), p. 3-9]. This allows us to predict a systemic change in all aspects of human activity in the process of forming a new sixth technological order.

At the same time, research in the framework of individual sciences (economics, technology, sociology, etc.) may not be fully adequate. This is due to the fact that in the process of research within a single scientific discipline, it is impossible to adequately describe: the systemic effects of combining different parts into a single whole; the synergy of interaction of various structural elements of the technological structure; the interaction of different levels of hierarchy; knowledge of an implicit

nature, and others.

At the same time, at present, there is no scientific tools adequate to the scale of such a phenomenon as the technological order (way of life). However, such scientific tools are necessary for solving practical problems of the global transformation management system: the technological basis; the architecture of the economy; socio-economic relations (institutions) in society. This further confirms the relevance of this article.

The technological order (as a large and complex system) can be characterized by such properties [V. Glushchenko \(2020\)](#), p. 488-504]:

1. the property of being effective is determined by the fact that the development of a new technological order leads to the achievement of the set social and economic goals for a specific period of time. For the sixth technological order, this is the period 2010-2040;
2. a large number of structural elements of the technological order (technologies; monetary relations; business forms; social and industrial relations-institutions; management methods, etc.) and their physical heterogeneity;
3. the connections between the elements of the internal environment of the technological order should be stronger than the connections between the elements of the internal environment and the elements of the external environment of the order;
4. the emergence property of the technological order: the properties of the technological order (as a large system) are not equal to the properties of the parts of this technological order;
5. the presence of several levels of hierarchy in the technological order: each level has its own goals and ways to achieve them; these levels are connected by relations of subordination;
6. the multifunctionality of the technological order is its ability to perform a certain set of functions on its existing structure (development of technologies; improvement of industrial relations; improvement of the level of comfort of life, etc.);
7. the flexibility of the technological order lies in its ability to change the purpose, mode of operation, depending on: the conditions of the external environment(adaptation); the state of the elements of the internal environment (survivability);
8. the reliability of the technological order is its ability to perform its economic, technological, and social functions with certain quality indicators over a certain period of time;
9. the safety of the technological order is its ability not to cause unacceptable damage to its external and internal environment;
10. the durability of the technological order is its ability to work in a situation where external conditions go beyond certain limits;

11. the vulnerability of the technological order is its ability to receive (or not receive) damage from external and / or internal damaging (harmful) factors;
12. the stability of the technological order is its ability to come to an initial and / or equilibrium state after the end of harmful effects, and so on.

Each technological order can be considered as a five-level technological "pyramid". Within this pyramid, all subjects of technological development can be divided into five levels:

- firms that create new technological principles;
- firms that develop technologies based on these principles;
- firms that design and manufacture the means of production for these technologies;
- firms that use these means of production in the manufacture of their products or in the provision of services;
- firms engaged in the extraction of raw materials, growing raw materials.
- Technological orders as large technological and, at the same time, socio-economic systems implement the following functions:
 - materialization of accumulated knowledge in the process of developing new technological principles and technologies;
 - integration of technologies of the new and previous technological order;
 - the system-forming (aggregate) function of the technological order within the framework of its implementation, which is carried out by the system integration of the structural elements of the new technological order into a single whole [V. V. Glushchenko \(n.d.-a\)](#), p. 80-93];
 - formation of new types of business processes (leasing, factoring, forfeiting, franchising, etc.);
 - creation of new types of industrial and socio-economic relations (institutions) that are more appropriate to the features of new technologies;
 - development of more effective concepts, methods, models of society management at all hierarchical levels (global, national, regions, organizations; families);
 - formation of new forms of public administration adequate to the technological basis [V. V. Glushchenko \(n.d.-c\)](#), p. 2] and political systems;
 - development of new variants of monetary relations and monetary systems (gold money, credit money, mottoes, etc.) [V. V. Glushchenko \(2009\)](#), p. 7-16];
 - creation of new methods of public-private partnership that are more adequate to the technological basis (subsidies, subventions, subsidies, etc.);
 - development of the rights of individuals and legal entities [V. V. Glushchenko \(2018\)](#), p. 303-339];

- multiplication (multiplication) of economic benefits from the practical use of new types of technologies in the economy and society. Such «multiplication» takes the form of multiple applications of new technologies. Such repeated use of new technologies occurs in the process of: creating fundamentally new products; upgrading existing products of firms during the transition to a new technological structure; modernization of technological capacities of enterprises, etc.

By implementing the described functions, the technological structure performs the following roles:

1. increasing the efficiency of the national economy based on the results of the scientific and technological revolution;
2. creating safer and / or more comfortable living conditions for the individual and society as a whole;
3. creating a qualitative leap in the development of society;
4. the formation of a new world order and others.

At the same time, such a large-scale and practically important object as a technological order requires the development of a separate scientific direction for its research. Such a new scientific direction (the science of technological order) is designed to create a scientific and methodological basis for the study of the essence of technological order. The results of such studies will be of great importance for: reducing the risks of developing a new technological order; improving the effectiveness of the management system for the formation of the sixth technological order.

The essence of the tasks of forming a new technological order can be studied at such hierarchical levels: the geopolitical (world) level (mega-level); the level of the national economy (macro-level); the level of organizations (micro-level); inter-level research (meso-level). With this approach, three types of analysis can be distinguished at the meso-level: meso-level studies that combine mega - and macro-levels (first-order meso-level); meso-level studies that jointly study the macro-level and the level of organizations (second-order meso-level studies); study of all three levels simultaneously (third-order meso-level).

When forming the science of technological orders, the methodological foundations of the general theory of science will be applied [V. V. Glushchenko et al. \(2015\)](#), p. 14-25].

The science of technological orders will be called a scientific discipline aimed at obtaining scientific knowledge about such an object of research as the technological structure. The considered scientific discipline can cover: a complex of scientific problems of technology development; the paradigm of scientific research (philosophy, ideology, policy, methodology); research methods; motives for conducting research and other aspects of studying the technological order.

The practical significance of the general theory of technological order is: to increase the efficiency of the processes of forming a new technological order; to reduce the risks associated with the development of a new technological order.

In the general theory of technological structures (orderology), we agree to call the scientific method a set of techniques and principles. The application of these principles in practice provides an objective study of the phenomena. We are talking about phenomena that: describe the specifics of a certain technological order; allow us to analyze and diagnose the situation within this technological order.

The functions of the general theory of technological orders can be called such functions. The methodological function of the general theory of technological orders consists in the development of the conceptual basis, the theoretical foundations of the methodology of scientific research of technological orders.

The process of obtaining, describing, classifying, studying, and evaluating individual phenomena within a certain technological order is provided by the cognitive function of this scientific theory.

The synthesis of effective management tools for the development of a new technological order is the regulatory (instrumental) function of the general theory of technological orders.

The legislative function of this general theory of technological order is to create legislation that provides favorable conditions for the formation of a new technological order.

The optimization function of the scientific theory of technological orders consists in choosing the most effective options for the development of parts or the entire technological order as a whole based on the accepted criterion.

The predictive function of the general theory of technological order is to form estimates of the probabilistic characteristics of the future states of the elements and the entire technological order as a whole.

The preventive function of the scientific theory of technological order is manifested in the development of an action plan aimed at reducing risks in the process of developing a new technological order.

The psychological function of the general theory of technological orders is to form a sense of the need to develop a new technological order. The implementation of this function should contribute to the perception of the new technological order as a social and economic value for society.

The function of socialization of knowledge in the general theory of technological orders is to structure, classify and transmit information about technological orders in the state, business and society.

The system-forming function of the general theory of technological orders includes: classification of elements of the technological order; structuring of knowledge; effective integrated use of knowledge. This knowledge is used to combine all parts of the technological orders into a single whole. As a result of such a combination, the emergence property of the technological order appears [V. V. Glushchenko](#)

(n.d.-d), p. 60-74].

The roles of the general theory of technological order can be called the following: increasing the economic efficiency of the processes of technological order development; reducing risks and damages in the development of a new technological order; increasing the financial results of investments in the development of a new technological order.

We formulate such laws of the general theory of technological orders:

1. The history of scientific and technical and socio-economic progress of a society can be described as a sequence of successive technological orders;
2. the change of technological patterns is accompanied by global systemic crises, in particular, the development of the sixth technological order is characterized by a global systemic crisis that began in 2008;
3. the global systemic crisis ceases at the time when social and industrial relations (institutions) come into line with the requirements of the technological basis;
4. each technological order is a large and complex system. This system can be represented as a combination of such subsystems: the technological basis of social production; business processes and their tools; credit and monetary relations; social and industrial relations; finance; management methods and models; human rights and freedoms, and others;
5. the technological order can be represented in the form of a "technological pyramid", which includes five technological levels: creators of new technological principles; creators of production technologies; developers of means of production; producers of products and / or services; organizations extracting raw materials and agricultural organizations;
6. The economic efficiency of the new technological order in the national economy is determined by the process of innovative multiplication of technologies. Innovative technology animation is the process of integrating the technology of the new way with the products and technologies of the previous technological order;
7. the systematic combination of new technologies with technologies of a new technological order creates a synergistic effect of increasing the cost of a qualitatively new product, which can be the basis of an innovative monetary multiplier in the national monetary system [V. V. Glushchenko and Glushchenko \(2016\)](#), p. 104-117]. Such an innovative monetary multiplier describes the growth of the cost of finished products in relation to the cost of raw materials. For example, a car engine is made of aluminum. But the cost of the engine is about 30 times higher than the cost of the aluminum from which it is made;
8. the value of the innovation multiplier (and the resulting innovation money multiplier) as a result of the aggregation of new technologies with technologies of previous technological modes is determined by the structure and content of

- these technologies, the possible limits and depth of modernization of technologies of the previous order (mode);
9. the value of the innovation multiplier is influenced by the technological specialization of the national economy in the previous technological orders;
 10. the innovative multiplier effect in the process of the formation of a new technological order determines the change in the global competitiveness of the national economy. The innovative monetary multiplier affects the degree of stability and firmness of the national currency. In turn, the stability of the national currency affects the level of currency risks;
 11. all technological orders in their development go through the stages of origin, growth(formation), maturity, aging, modernization within the framework of subsequent order;
 12. a new technological order is born within the previous order. A systemic crisis begins when existing socio-economic institutions become an obstacle to the development of a new order [V. V. Glushchenko \(2011\)](#), p. 15-29];
 13. each new technological order is formed as a result of a qualitative leap in the scientific and technological progress of the economy and society, and therefore characterizes a new stage of socio-economic development;
 14. the technological order as a large and complex system has at the same time a technical, economic, social, humanistic, political and geopolitical dimension;
 15. the development of a new technological order should be managed on the basis of the general theory of technological ways.

In the process of forming the sixth technological order, it is important to ensure the systematic integration of new technologies with the technologies of the new technological order. This combination creates a synergistic effect of increasing the cost of a qualitatively new product. At the same time, innovations in the economy generate an innovative monetary multiplier in the national monetary system [V. V. Glushchenko and Glushchenko \(2016\)](#), p.104-117].

For a long time, there have been attempts to develop the theory of technological order (structures) as part of economic theory [G. S. Yu \(2016\)](#), p. 3-29]. These attempts have not been sufficiently practically productive, because the technological order is not only an economic system. The technological order is a complex, large technical system.

For the study of large systems, the theory of hierarchical systems was proposed [Mesarovich et al. \(1973\)](#), p. 2]. The scientific theory of technological order developed in this article should relate to the theory of large systems.

The functions of the scientific theory of technological order should act as the key theoretical tasks of the development of the scientific foundations of the theory of this scientific theory.

The following tasks can be considered as the main practical tasks of the general theory of technological order: the development of methods for the modernization of

products of enterprises of the during their transition to a new order; the formation of methods for the modernization of production technologies during the transition of enterprises to a subsequent technological order; the analysis of technological order and its parts; forecasting the development of technological order and its elements; and others.

Methods of the general theory of technological order can be called: expert assessments; decomposition and aggregation; system analysis and synthesis; heuristic forecasting; mental, mathematical, simulation modeling; geopolitics; theory of state and law; methods of theory and money; methods of organization theory; methods of the theory of organizational behavior; international monetary relations; innovation; financial relations; organizational culture and cultural studies; psychology and others.

The analysis of the technological order is the study of the causal relationships between: the structure of the order and its indicators; individual parts and processes within the framework of the studied order; technological, social, economic, political and geopolitical results of the development of the technological order. The analysis of the technological order is usually accompanied by the division (decomposition) of the technological order into its separate parts.

The analysis of technological orders (structures) can include the following sections: historical (retrospective) analysis and structural (vertical) analysis of the technological order.

At the same time, the structural analysis of the technological order can include the following types of analysis: analysis of the technological basis; analysis of business forms; analysis of social and industrial relations, analysis of conflicts; analysis of methods of working with personnel; analysis of credit and monetary relations; analysis of human rights; analysis of forms of the state and other types of analysis.

For the analysis of the functional structure, elements of the technological order, a functional-decomposition representation of the technological order can be recommended. This kind of representation was developed specifically for the analysis of large technological humanistic systems.

The standard representation of the system is called the minimum amount of information necessary for the correct solution of problems of analysis, design, forecasting of large systems (in the case of the technological order under consideration) [V. V. Glushchenko \(2021c\)](#), p.30 – 46; “[GlushchenkoVV 1990 Functional decomposition representation of complex technical systems](#)” (n.d.), p. 184-186].

In the process of studying approaches to the periodization of technological orders, the following was revealed. Firstly, the sequence of technological orders is determined only for the period of development within the framework of capitalism (since 1770) [Aivazov \(2015\)](#); [G. S. Yu \(2016\)](#), pp. 3-29]. Therefore, it was proposed to introduce two additional technological orders. These technical orders characterize the technological development of the economy in the period preceding capitalism (see [Table 1](#)).

Secondly, in the works [Aivazov \(2015\)](#); [G. S. Yu \(2016\)](#), p. 3-29], the fourth technological order is called "internal combustion engine" (see [Table 1](#)).

However, the analysis showed that historically the internal combustion engine became the property of our civilization much earlier than it was commonly believed in the theory of technological orders [Aivazov \(2015\)](#); [G. S. Yu \(2016\)](#), p. 3-29]. For example, mass production of cars (Ford T) began in 1908. At the same time, large-scale production of cars is not possible without reliable internal combustion engines. Around the same time (1903, the Wright brothers), the production of aircraft with internal combustion engines was started. On this basis, the third technological order (1880-1930) is proposed to be called "internal combustion engines and an electric engine".

The fourth technological order is proposed to be called "electronic computing machines (computers) and means of automation of production processes" (1930-1970). In 1941, Konrad Zuse developed the Z3 electronic computer. This electronic computer had all the properties of a modern computer. On this basis, it became possible to develop production automation tools. Therefore, the fourth technological order can be called an "electronic computer".

The method of analyzing the technological order was developed in the works [V. V. Glushchenko \(2021d\)](#), p. 22-34; [V. V. Glushchenko \(2021c\)](#), p. 30-46]. The study of changes in the properties of technological order is given in [Table 1](#) .

The analysis of the technological order (structure) can have a qualitative and quantitative character; a complex and thematic character, and more.

The development of a new technological order is characterized by a leap in scientific and technological development. Therefore, the use of statistical methods, the method of extrapolation of trends in forecasting such a development is not recommended. Attempts to model jumps in development based on statistical empirical data may be methodically incorrect.

The theory of forecasting recommends using heuristic methods, the method of morphological analysis, predictive scenario, and others in situations of high uncertainty and jumps in development.

We will call the project of the technological order (way) the image of the future technological order. The appearance of the technological order can be considered the structure and main characteristics of the technological order.

The structure of the new technological order includes the following types of new technologies: intelligent technologies; nanotechnology; digitalization technologies; neurotechnologies; information technologies; artificial intelligence technologies; resource-saving technologies; environmentally friendly technologies and more.

The development of these technologies can have an organizational form of the formation of new technological platforms

For each case of using new technologies as part of the products of the previous technological order, a scenario for the introduction of a new technology into the

Table 1 Study of changes in the properties of technological structures (the beginning)

№ n/π	Properties of the technological order / time period, number, names technological order (structures),	Type of state, state system, world order	Forms of organization of scientific and innovative activity
1	2000 BC. – IX century AD; " -1 " technological structure, Horse traction	Communities, community-tribal, regional relations	Random scientific discoveries, Personal schools of famous scientists, thinkers and inventors
2	IX century-1770 ; "0" technological structure, Windmill(windmill), a water mill	Principalities, regional geopolitical relations	Random scientific discoveries of individuals, the University of Bologna, founded in 1088 and others
3	1770-1830; the first technological way, Textile machines	Empires, monarchies, Imperialism in geopolitical relations	Scientific research in academies of sciences and universities, inventive activity of factory workers
4	1830-1880; The second technological order (mode), the Steam engine	Empires, monarchies, imperialism in geopolitical relations	Scientific research in academies of sciences and universities, inventive activity of factory workers
5	1880-1930; the third technological order (mode), the internal combustion engine and the electric motor	The collapse of empires, National States, republics, currency blocs of states (Genoa Conference)	Scientific research in academies of sciences and higher technical schools, recognition of copyright in 1886 under the Berne Convention
6	1930-1970; the fourth technological order, electronic computing and automation	States, military-political blocs, a bipolar world, the UN	Scientific research in academies of sciences, technical institutes, departments, development of patent law
7	1970-2010; the fifth technological order, semiconductors and microelectronics	States, trade, economic and military blocs, the unipolar world, the UN	Development of technology platforms and clusters, research laboratories of large corporations
8	2010-2040; the sixth technological order, nanotechnologies, neurotechnologies, IT technologies, Resource-saving technologies, etc.	States, trade, economic and military blocs, BRIC, virtual blocs of states, multipolar world, UN	Development of technological platforms and clusters, research laboratories of corporations, creative laboratories of individuals, innovative startups

Source: developed by the author

design and/or production of products of the previous technological order should be built.

The process of repeated application of new technologies for the modernization of products of previous technological order will be called the process of multiplication (multiplication of application) of new technologies.

The economic efficiency of multiplying technologies of a new way in products and production systems of previous ways is determined by the number of such applica-

Table 2 Study of changes in the properties of technological structures (the continuation)

№ п/п	Properties of the technological order / time period, number, names technological order (structures),	Social system, human rights, the elite of society	Organizational forms and technologies of higher education
1	2000 BC. – IX century AD; " -1 " technological structure, Horse traction	community-tribal, natural human rights, the elite is elected by the clan; slaveholding, slavery, slaveholders	Vocational training of children with a master, literacy training in monasteries, home schooling
2	IX century-1770 ; "0" technological structure, Windmill(windmill), a water mill	Feudalism, Limited human rights, the elite prince and the squad	Professional training of children with a master, training in monasteries, The first universities
3	1770-1830; the first technological way, Textile machines	Capitalism, recognition of the right of a person to dispose of his labor force; elite monarchs, feudal lords, capitalists	Professional training of children with a master, training of children in universities, parochial schools
4	1830-1880; The second technological order (mode), the Steam engine	Capitalism, recognition of the right of a person to dispose of his labor force; elite monarchs, feudal lords, capitalists	Vocational training of children with a master, training of children in universities, parochial schools, home schooling
5	1880-1930; the third technological order (mode), the internal combustion engine and the electric motor	Capitalism, recognition of human rights by one's work; recognition of copyright; elite hereditary capitalists	Vocational schools, technical schools, technical institutes, universities
6	1930-1970; the fourth technological order, electronic computing and automation	Capitalism+socialism, the Universal Declaration of Human Rights; elite hereditary capitalists	Vocational schools, technical schools, technical institutes, universities
7	1970-2010; the fifth technological order, semiconductors and microelectronics	Capitalism, the Universal Declaration of Human Rights; elite capitalists who have made their own fortune	Development of multifunctional universities, distance (smart) education, the Bologna process
8	2010-2040; the sixth technological order, nanotechnologies, neurotechnologies, IT technologies, Resource-saving technologies, etc.	Capitalism, the Universal Declaration of Human Rights; recognition of the rights of minorities; elite capitalists from the field of information technology	Customization in education, student-oriented approach, development of project education, distance forms of higher education

Source: developed by the author

tions. Each application of a new technology for the modernization of old products gives an additional economic effect. The more such applications of new technologies for the modernization of old products, the higher the economic effect of the development of new technologies. An increase in the number of multiplying of new technologies leads to an increase in the economic efficiency of new technologies.

«Multiplying» of a new technology with an old one is possible if it is possible to combine the two technologies systematically.

When designing and creating neurotechnological and other types of scientific and technical platforms, the results of the study described in [V. V. Glushchenko \(n.d.-e\)](#), pp. 44-63] can be effective. When creating new technology platforms, it is necessary to take into account the impact of external and internal factors.

It may be recommended to take into account such external factors:

- the formation of new geopolitical poles and the associated change in the segmentation of markets and the positioning of firms in the markets;
- the post-industrial nature of marketing management of business processes, which means that the company must first identify a latent or create a new need and at the same time offer a product and technology to meet this need;
- transfer of competition between high-tech firms to the field of organizational cultures;
- the growth in the number of buyers and employees of people from generation Z;
- the almost continuous and permanent nature of innovation activity within the framework of the sixth technological order, which will change the balance between routine and innovative activities in organizations and others.

3. DISCUSSION

In the process of managing the formation of the sixth technological order, the importance of: innovation activity; organizational culture; the moral and psychological production environment of firms; the organizational design of the firm; the functional (production) architecture of the firm and others may increase.

We will understand the set of elements of this system as a control system for the formation of a new technological order. These elements provide with their common effects an increase in the efficiency (and / or reduction of risks) of the development of the sixth technological order.

The mission of the management system for the formation of the sixth technological order can be called the benefit to society from the creation of such a system. The mission of the management system for the formation of the sixth technological order can be: to increase the comfort and safety of the population's life.

The vision of the development of the sixth technological order can be an inspiring scenario for the development of this mode for the participants of this process.

As participants in the process of managing the formation of the sixth technological order in the national economy, we can name: the national government, scientific organizations, public business organizations, corporations, technology platforms, clusters, firms, universities and others.

The vision of the process of formation of the sixth technological order is to increase the global competitiveness of the national economy, increase the degree of comfort and security of the population's life.

For firms, the vision of the process of becoming the sixth technological order is to strive to improve their competitive position, increase the value of the company and others, etc.

The philosophy of the development of the sixth technological order is a general and wise view of this process. This philosophy is embodied in the principles of the development of a new technological order.

The principles of the formation of a new technological way of life can be called: increasing the comfort of life of the population; reducing the risks of the population's vital activity; respect for human rights (and, in particular, copyright); constant innovation; economic independence; self-sufficiency; material, social and national responsibility of participants; material interest and others. These principles should be perceived by the participants as the values of the organizational culture of the process of formation of a new technological order.

4. CONCLUSION

The article develops a general theory of technological order. The technological order is considered as a large technical and, at the same time, humanistic system. The article describes the functions and roles of technological order in socio-economic development. The properties of the technological order as a large humanistic system are described. In addition, two technological structures characterizing the pre-capitalist period of human development are considered. The fourth technological order is called "electronic computing machines". The paper develops the main methodological provisions of the general theory of technological order. The analysis of the properties of technological order in the form of a table is carried out. The mission, vision, and management system for the development of the technological order are described.

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