

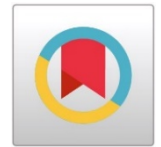


STRATEGIC PLANNING OF ORGANIZATIONS ' TRANSITION TO THE SIXTH TECHNOLOGICAL ORDER IN THE NATIONAL ECONOMY



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ABSTRACT

The paper discusses the strategic planning of the transition to the sixth technological structure of the economy; the object of the article is the sixth technological order in the national economy; the aim is to increase the effectiveness of strategic planning of development of the sixth technological order in the national economy; to achieve this goal the following tasks: a concept of "technological system"; describes the methodological principles of a scientific theory of technological structures; developed data grid technological structures; synthesized tables of the properties of technological structures; the table is formed of animation technologies of new and previous orders; it formed a methodology for strategic planning of the sixth technological structure; scientifically speaking, strategic planning, algebra, logic, analysis and synthesis, systematic approach, search and normative forecasting, heuristic forecasting, expert methods, logical and comparative analysis; the scientific novelty of the work is determined by the formation of the methodology of strategic planning of the transition of organizations to the sixth technological order in the national economy; the results of the work will be useful for various economic entities (the state, corporations, technology platforms, clusters, innovative firms).

1. INTRODUCTION

The relevance of this work is determined by the need to increase the effectiveness of strategic planning for the development of the sixth technological order in the national economy. In addition, it is necessary to take into account the conditions of the economy's exit from the global financial and systemic crisis.

The hypothesis of the article is the statement that in order to increase the efficiency of the development of the sixth technological order in the national economy, it is necessary to develop a methodology for strategic planning of this process in organizations.

The purpose of the work is to improve the effectiveness of strategic planning for the development of the sixth technological order in the national economy.

To achieve this goal, the following tasks are solved:

- the concept of "technological structure" has been clarified;
- descriptions of methodological scientific theory of technological orders;
- tables of elements of technological structures are being developed;
- a table of properties of technological structures is synthesized;
- a table of animation technologies of the new and previous styles is being built;
- the methodology of strategic planning for the development of the sixth technological order is being formed.

The object of the article is the sixth technological order in the national economy.

The subject of the article is the strategic planning of the transition of the national economy to the sixth technological order.

The systematic approach is based on the study and consideration of all parts of the technological structure in their mutual connection.

The strategic plan for the development of the sixth technological order in the national economy will be called a system of interrelated long-term measures. These measures are aimed at creating a new technological order in a certain national economy.

We will study scientific publications on the topic of the article. Researchers recognize the need to develop a methodology for strategic planning of the transition to a new technological order [1, p.488-504; 2, p. 2].

There is growing interest in the development of a strategic approach in the country's economy [3, p. 86-91]. Researchers study the conditions of sustainable development in the implementation of strategic plans [4, p. 41-45]. A strategic approach is needed when using the investment resources of organizations [5, p. 69-74]. It is important to develop the human capital of firms [6, p. 84-87].

They design strategic planning tools in the national economy [7, p. 3-8]. They note an increase in the degree of uncertainty of the development conditions in the economy [8, p. 107-110]. The development of strategic plans for the development of business processes is important [9, p. 108-113]. The methodology of strategic planning of innovative development is described in [10, p. 2-4; 11, p. 2-5].

However, the methodology of strategic planning for the development of the sixth technological order in the national economy has not yet been described.

There is a well-known proposal to identify the world economic system with the technological order. The world economic system is defined as a complex of integrated institutions. These institutions form the conditions for the expanded reproduction of capital. Such institutions create the mechanism of world economic relations [12, p. 3-29]. It is difficult to agree with this approach. It is more logical to assume that the global economic order is a geopolitical and macroeconomic "superstructure" over the technological order. The global economic structure reflects the specifics of global institutions in the period of functioning of a certain technological order. Another mistake is the identification of the technological order with the technological basis of the organization, for example, in [13, p. 70-75].

At the same time, the wrong definition of the concept of "technological order" creates risk. This risk can lead to economic damage in the practical implementation of the strategy of transition of the national economy to the sixth technological order.

Only after determining the key concept of "technological order (structure)" (the object of planning) can we proceed to the development of its concept [13, p. 70-75]. The concept of "technological structure (order)" is important when predicting its structure [14, p. 182-189]. This concept is also important in the synthesis of the strategy for the formation of a new way of life in the national economy [15, p.82-89]. It is necessary to study the structural elements of strategic planning of the sixth technological order. They study the conditions for the formation of a new way of life in the economy [16, p. 37-40]. They study the opportunities for the development of the Russian economy in this period [17, p. 54-58]. The analysis of long-term trends of technological progress is carried out [18, p.211-217]. The process of developing a new technological way of life covers the solution of new problems of economic science [19, p. 70-86]. It is necessary to create a new scientific and technical policy of the country [20, p. 201-208]. In strategic planning of the sixth technological order in the national economy, it is recommended to take into account the crisis. The reason for this

crisis is the mismatch between the technological basis and the existing economic institutions [21, p. 24-29]. Therefore, the process of forming a new technological order is simultaneously a process of overcoming their global crisis. When forming a strategic plan for the development of a new technological order, the materials of work on such planning are useful [22, p. 58-61]. In strategic planning, general scientific and private scientific methods are used [23, p. 2]. The strategic plan is based on the scientific theory of technological orders [24, p.60-74]. With such planning, the technological structure appears as a basic factor of the progress of the national economy [25, p. 93-100]. In such planning, the functions and roles of technological order are important [25, p. 80-93].

2. METHOD

Under strategic planning, we agree to understand the process of developing a strategic plan for the development of the sixth technological order. The tasks of forming a strategic plan for the formation of the sixth technological order can be considered: external adaptation of the national economy to the structural restructuring of the external environment (world order); internal coordination of the structural segments of the national economy during the time of the sixth technological order. The most common point of view in 2021 is that the technological structure is understood as a set of interrelated production technologies. These technologies should be located at the same technical and technological level. The technologies that make up the way of life develop synchronously [13, p. 70-75]. This interpretation of the concept of "technological way of life" makes this concept equivalent to the concept of the technological basis of the company, industry, economy [24, p. 60-74].

The analysis shows the existence of a systemic relationship between the factors of the world system and the factors of the technological order. The empirical material confirms the broad interrelation of technologies in the national economy, social and economic processes, and institutions. It can be argued that there is an influence of production technologies on: types of money; the world currency system; on the forms and types of business processes in the economy. The technological structure is typical for a certain historical period. This gives grounds to call the system association (aggregation) a "technological way of life": technological basis, socio-industrial institutions, business processes, management concepts in the economy and society. The technological structure exists at a certain stage of the historical, technological, economic, social, and cultural development of the economy (society).

The theory of technological order can be an effective methodological tool for increasing the efficiency of the processes of creating such a order (structure) in the national economy. In the theory of technological order (structures), the influence of technologies is considered at the following levels: the global system (mega - level); the level of the national economy (macro-level); the level of organizations (legal entities) - the micro-level.

Under the scientific (complete, general) theory of technological order, we will understand the scientific discipline. This scientific discipline is focused on the synthesis of objective knowledge (of a scientific nature) that describes and reflects: the essence of technological order; the influence of technological order on geopolitical, social and economic processes.

Under the scientific method in the scientific theory of technological structures, we will mean a set of principles and techniques. These principles and techniques are used for scientific (objective) knowledge of all types of processes in the new technological order.

The methodological function of the theory of technological structures is the synthesis of concepts, the theoretical basis, the general theory of the method (methodology) of research. These are studies of processes, facts and phenomena that express the essence of the technological order.

The cognitive function of this science is aimed at studying the processes of registration, storage, classification, and analysis of information.

The synthesis of effective methods and programs for the development of the sixth technological order is the instrumental (regulatory) function of the science of technological systems.

The legislative function of this science is to develop the norms of positive law aimed at the development of a new technological order.

The optimization function of the science of technological orders consists in finding optimal options for the development of the sixth technological order.

The predictive function of this scientific theory is to develop probabilistic estimates of the structure and main indicators of the new technological order.

The preventive function of the science of technological order lies in the planning and implementation of measures aimed at reducing the magnitude of risks.

The psychological function of the scientific theory of technological order is to form the correct perception of the process of development of a new technological order.

The function of knowledge socialization is to transfer knowledge about the content, essence, and influence of technological orders. This is knowledge about the impact of the technological order on: the world order; the global and national economy; the social environment; the environment; the security of human life and activity in society.

The system-forming function of the science of technological orders consists in the synthesis of the system approach in the process of the formation of the sixth technological order in the economy.

The analysis shows that the science of technological orders performs the following roles:

- increasing the economic efficiency of the policy of developing the structural elements of the technological structure;
- development of the technological structure as a whole;
- reducing risks in the process of forming a new technological order;
- increase in the net present value (NPV) of the investment.

The laws of the scientific theory of technological structures can be considered as:

- 1) the technological order in the national economy should be understood as the integration into a single whole: a qualitatively new state of the technological basis of organizations; new management methods; new types of business; a new nature of social and industrial relations; new types of transactions;
- 2) the technological basis (part of the technological structure) is a set of new production and business technologies;
- 3) the world order is a geopolitical and geo-economic superstructure over the technological order;
- 4) all technological orders should be studied within the framework of a systematic approach as large, complex humanistic (including human) systems;
- 5) in the process of developing a new technological way, new technologies are integrated with the technologies of the old technological ways. This leads to the modernization of the technologies of the previous technological orders;
- 6) the economic efficiency of the technology of the new technological order is determined by the number of integrations (level animation) technology in previous technological orders (the more animations, the higher the economic efficiency of new technologies);
- 7) in the national economy, a new technological order is born and develops in the depths of the previous technological order. At a certain stage, the existing socio-economic relations (institutions) begin to hinder further development. This leads to a crisis;
- 8) the systemic crisis of 2008 will subside as a result of the formation of a new technological order. Therefore, the development of a new technological order is an anti-crisis measure.
- 9) the new technological order represents a qualitative leap in the technological development of the economy.

The laws of the theory of technological structures in mechanical engineering are described in [1, p. 488-504; 2, p. 12-20 ; 26, p. 80-93].

Methods of the science of technological structures can be: philosophy of science; ideology of management; scientific and technical policy; system approach; analysis and synthesis; heuristic, logical, structural, mathematical forecasting; economic mathematical modeling; sociological methods; methods of cultural studies; management methods; theory of organizational behavior; theories of credit, money, finance; management psychology; theory of state and law; geopolitics.

In this article, the methodology of strategic planning for the development of the sixth technological order in the national economy is formed. This method of strategic planning is part of the predictive function of the scientific theory of technological orders. At the same time, such a technique can also be attributed to the methodological function of the theory of technological orders.

To synthesize strategic plans for the development of a new technological order in the national economy, an analysis is required. This is an analysis of the elements and properties of the technological order. As a result of such a strategic analysis, it is necessary to describe the technological order as an object of strategic planning.

The essence of the scientific category reveals its functions and roles in social and economic development.

For technological orders, you can recognize the following functions:

- the function of integration into a single system: technological basis; socio-industrial institutions; management methods; business methods; organizational culture;
- the function of the development of industrial relations (institutions) is responsible for the formation of new types of industrial relations (institutions) in society and the economy;
- the function of improving management methods provides a synthesis of new management methods in the economy and society;
- the function of creating a new world order as a new system of international geopolitical relations;
- the function of the development of international monetary and financial relations (institutions);
- the function of creating a new organizational and production culture;
- the function of improving the partnership of the state, society and business [1, p. 488-504; 26, p. 80-93].

At the same time, the technological order performs the following roles:

- 1) improving the efficiency of public production on the basis of advanced achievements of scientific and technological development;
- 2) increasing the economic efficiency of investments in new technologies and / or by multiplying technologies;
- 3) increase the degree of comfort and safety of people's lives.

The strategic analysis of the structure of the technological order can be performed using the functional-decomposition representation of large systems. Such a representation was proposed in [27, p. 184-186]. Examples of using the functional-decomposition representation for the strategic analysis of elements of technological orders are given in [1, p. 488-504; 2, p. 36-38; 28, p. 44-63; 29-31].

As part of this approach, you can create several tables in the analysis.

The table of elements of the technological order (Table No. 1) will have the form of a matrix. The lines of this matrix are designated by the names of all known six technological order of the capitalist period of development. In addition, it is proposed to include two more technological ways in this table. These technological order belong to the pre-capitalist period of development. The technological way of life uses horse-drawn transport (horse traction). It is proposed to call it " -1 ("minus the first") technological order (mode). The second additional pre-capitalist technological order is based on the allocation of a windmill as an energy installation. This technological order (mode) is proposed to be called the "0-m" ("zero") technological order.

The rows of the table of elements of the technological order correspond to the names of technological orders. And the columns of this table are determined by the names of the elements of technological orders. The columns of this table can be: types of power plants (wind, horse-drawn, steam, internal combustion, piston, jet, nuclear, etc.); types of money (gold, credit, electronic cryptocurrencies); type of the world currency system (Paris, Genoa, Breton Woods, Jamaica, etc.); types of characteristic technologies (textile, information, intellectual, etc.); socio-economic formation.

Under the socio-economic formation, we will agree to understand a historically defined type of social structure. This type of social structure is always based on a certain technological order. At the same time, the technological order corresponds to specific: methods of production; methods of management; types of money; production relations. It is customary to distinguish such socio-economic formations: primitive communal; slave-owning, feudal, capitalist, imperialism.

In this strategic analysis, the name of the type of element related to the content of the column is placed at the intersection of the row and column.

An example of a strategic analysis of the structure of the elements of technological order is given in Table No. 1 (Appendix No. 1, on 2 sheets).

Using the second table, you can represent the properties of technological orders. The rows of the second table are similar to the rows of the first table (defined by the name of the layout). The content of the columns of the second table must correspond to the characteristics (properties) of all 8 technological orders accepted for analysis:

- types of new technological directions;
- main types of products;
- types of money (gold, credit money, electronic money, cryptocurrencies);
- new types of business processes (leasing, factoring, franchising, forfeiting, etc.);
- forms of business organization: manufactories, enterprises, corporations (trusts, consortia, syndicates), virtual corporations, clusters, technology platforms, and more;
- types of production: conveyor, flexible automated production; computer-aided design systems of production, etc.;
- special forms of organization of scientific research;
- forms of competition between producers of goods and / or services: price and non-price competition; competition at the level of goods and services, competition at the level of organizational cultures;
- the fastest growing markets (goods, services, etc.);
- the model of interaction of the organization with the personnel (personnel work, personnel management, human resources management, formation and management of virtual teams, and more);
- the most typical types of organizational structures (functional, product, matrix, etc.).

An example of a strategic analysis of the properties of 8 technological orders is given in Table 2 (Appendix 2, on 2 sheets).

The strategic analysis gives grounds to include in the list of the main directions of development of new technologies: neurotechnologies; nanotechnologies; artificial intelligence technologies; digitalization technologies; information technologies; intelligent technologies; resource-saving technologies; environmentally friendly ("green") technologies and others.

The economic efficiency of the use of new technologies in the economy is determined by the depth and number of integrations (multiplication) of new technologies with the technologies of previous technological orders. The concept of "multiplication (multiplication) of technologies" in this paper will be called the integral characteristic of the number and depth of integration of new and old technologies during the transition to the sixth technological order. The concept of "multiplication (multiplication) of technologies" determines the economic efficiency of the use of new technologies in the national economy of the country.

To study the goals and objectives of such animation of new and old technologies in the period of formation of the new sixth technological order, a third table can be compiled. This is a technology animation table.

Such a table can be developed at two levels: first, at the level of key technologies of previous technological order (macro-level, national economy level); second, at the level of specific products of certain enterprises (micro-economic level). The row numbers of this table can correspond to the numbers of the technological orders. And the columns of this table correspond to the names of the main new technologies of the sixth technological order. At the intersection of the row and column of this table can be enumerated the practical application of the technology, a new way for technological upgrading previous technological order.

The results of drawing up such a table will be useful in shaping the policy of scientific and technological development of the national economy when it enters the sixth technological order. This table allows you to determine the main directions of practical use of new technologies. This use of new technologies leads to an increase in the economic effect of multiplying various technologies. Such multiplication (multiplication) of technologies is useful in the process of modernization of the existing technological basis in the national economy.

An example of such a table is given in Appendix No. 3, Table No. 3.

An example of constructing a table of multiplication of technologies of a new technological way when upgrading the products of a particular enterprise is given in Table No. 4. In this table, the rows correspond to the subsystems of the enterprise's products. In our example, such a product is a vehicle. The columns in Table 4 correspond to the types of new technologies .

Table No. 4 (multiplication of new technologies during vehicle modernization) is given in Appendix No. 4.

The overall strategic plan for the development of the national economy can cover the development and multiplication of all types of technologies. The development of technologies can be associated with the formation of technological platforms or clusters in the economy. Then private (industry, cluster, etc.) strategic plans can be formed. Each of these plans will cover the development of a separate type of technology (clusters, platforms). Such planning is carried out to the full depth of the technology lifecycle. At the same time, each of the types of strategic plans can contain

two parts (sections). The first part reflects measures to adapt the economy to changes in the external environment (external conditions). And the other part of the strategic plan includes measures to coordinate the internal environment. With such strategic planning, the results of the work can be useful [28, p. 44-63].

3. DISCUSSION

A distinctive feature of the formation of the sixth technological order can be considered the presence of a qualitative leap in scientific and technological progress (STP). The presence of a qualitative leap in the NTP limits the possibility of using the analogy. In addition, the existence of a qualitative leap in development prevents the use of statistical methods in such planning.

The next (second) characteristic feature of the synthesis of such a strategic plan can be considered its systematic nature. The systematic nature of the strategic plan is explained by the integration of technical, economic, and organizational parts.

The third special methodological feature of this strategic plan should be recognized that the planning period is equal to the life cycle of technologies in the national economy.

The fourth feature of this plan is that such a strategic plan includes a risk analysis. In addition, it also includes a list of measures to reduce the risks of implementing this plan.

The fifth difference of such a strategic plan is the use of the results of the forecast analysis of the sixth technological order.

The sixth feature of this strategic plan is the need for periodic adjustments to this plan.

The seventh feature of the strategic plan for such development is its flexibility. This means that there is a possibility of making changes to the development goals when the situation in the economy changes.

The strategic plan should take into account the development of innovative activities. Innovation activity will become permanent.

Therefore, it will be necessary to develop new forms of venture financing of innovation activities [32, p. 60-75].

Matrix organizational structures will be further developed and implemented. This is determined by the higher ability of matrix structures to respond to dynamic changes in the external environment. An integral element of the matrix structure is the formation and management of project teams. Often, a project team is created at the stage of project inception. The project team functions throughout the entire project life cycle [33, p. 272-287].

The strategic plan for the development of a new technological order can be recommended to take into account the development of partnership between the state and business. The forms of such partnership can be: state participation in the project; state credit; state subsidies, subsidies, subventions; state guarantees, and others.

The results of the article will be useful for various economic entities (the state, corporations, technology platforms, clusters, innovative firms) in strategic planning.

4. CONCLUSION

The article develops the science of technological orders, describes the functions and roles of the scientific theory of technological orders. The article offers methods for analyzing the elements and properties of technological orders. To analyze the structure and properties of technological orders, a functional decomposition representation of complex systems is used. The article describes the features of strategic planning of the transition to the sixth technological order. The principles of strategic planning of the transition to the sixth technological order are justified. The structure and elements of the strategic plan for the transition to the sixth technological order are described. The results of the article will be useful for various economic organizations (government, corporations, technology platforms, clusters, innovative firms) in strategic planning.

Appendix No. 1 Table No. 1: Table of elements of technological orders (beginning)

№ π/π	Elements of the technological order /Names	Time period of Existence of the	Basic technological or propulsion system of the technological order	Key types of new products in the social production of technological order	Socio-economic pharmacy in the period of the existence of the
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	technological order	technological order			technological order
(1)	(2)	(3)	(4)	(5)	(6)
	"-1" technological order (structure)	2000 BC – 9th century AD	Horse-drawn (horse-drawn) traction	Agricultural products, transport services	Social-tribal system, slave-owning system
	"0" technological order	9th century AD-1770	Windmill (windmill) and water mill	Flour and other processed agricultural products	Slaveholding, feudalism
	The first technological order	1770-1830	textile machinery	Machine-made fabrics, manufactory products	Feudalism, capitalism
	The second technological order (way of life)	1830-1880	steam engine	Metal products as a result of mechanical processing	Feudalism, capitalism
	The third technological order	1880-1930	electric motor	Locomotives, airplanes, telephone, telegraph	imperialism
	The fourth technological order	1930-1970	internal combustion engine	Cars, diesel locomotives, airplanes, washing machines, refrigerators,televisions	imperialism
	The fifth technological order	1970-2010	microelectronics	Flexible automated manufacturing, cell phones, plastic bank cards	globalism
	Sixth technological order	2010-2040	nanotechnology	3-D printing products, information products, transformation of human thinking (clip thinking)	globalism

Source: developed by the author

Appendix No. 1. Table No. 1: Table of elements of technological structures (continued, end)

№ п/п	Type of international monetary system	The form of the state, political syst	Manufacturing enterprises	Key types of public production technologies	Structure and characteristics of labor
(1)	(7)	(8)	(9)	(10)	(11)
	Individual products that act as an equivalent	Communities, community-generic	Gender	transport and agricultural technologies	simple abstract work
	Gold as a universal equivalent	principalities	Family, clan, craftsman,	Mechanized processing technologies	simple abstract work
	Gold as a universal equivalent	Empires, monarchies	Manufactories, factories,	Technologies of mechanized textile production	simple abstract work
	Paris currency system, full-fledged (gold) money	Empires, monarchies	International monopolies	Mechanized metalworking technologies	simple abstract work

	gold-currency system, three international currency blocks, credit money	National States, the Republic of	Multinational corporations,	Technologies of electric welding of metals, mechanical processing	special knowledge and skills (competencies)
	gold-currency system, international Bretton Woods monetary system, credit money	States, military-political blocs, bipolar world	Multinational corporations,	Technology of execution of works, machining equipment	special knowledge and skills (competencies)
	demonetization of gold, the Jamaican monetary system, electronic and digital money	States, trade and economic blocs, Global unipolar world	Multinational corporations, virtual corporations,	Flexible automated technologies, technologies for the production of trace elements and printed circuit boards	competencies, intellectual capital
	international cryptocurrency system, virtual, technological money	States, trade and economic blocks, virtual blocks of states, A global multipolar world	Clusters, technology platforms, global information systems,	Nanotechnologies, nanotechnologies, information technologies, digitalization technologies, resource-saving and environmentally friendly technologies	competencies, intellectual capital

Source: developed by the author

Appendix No.2. Table No. 2: Table of properties of technological structures (beginning)

№ п/п	Properties of Technological orders /Names Technological orders	Time period, Base technology, the propulsion system	New types of production	The most intensively developing segment of the economy, new types of business processes	Types of technologies, scale of production
(1)	(2)	(3)	(4)	(5)	(6)
	«-1» Technological order	2000 BC-9th century AD, horse-drawn traction	Horse-drawn transport services	Agriculture, Bill circulation, money changers	Manual single and small-scale production
	«0» Technological order	9th century-1770 , Windmill(windmill), a water mill	Mechanized flour-milling production based on wind and water energy	Agriculture, Promissory note circulation	Manual single and small-scale production
	The first technological order (way of life)	1770-1830, Textile Machinery	Mechanized textile production	Industrial production, Bank settlements and payments	Machine serial production
	The second technological order	1830-1880, Steam engine	Mechanized mechanical processing and	Industrial production, factoring	Machine serial production

			transport services based on the steam engine		
	The third technological orders (mode)	1880-1930, Electric motor	Mechanized mechanical processing and transport services based on an electric motor	Industrial production, factoring	Конвейрное крупносерийное производство
	The fourth technological order	1930-1970, Internal combustion engine	Automated production facilities and transport services based on the internal combustion engine	Industrial production, leasing	Mass automated production
	The fifth technological order	1970-2010, microelectronics	Automated production of trace elements and printed circuit boards, microprocessor devices	Service sector, Franchising, forfeiting, online trading	Flexible automated production facilities
	Sixth technological order	2010-2040, nanotechnology	Production of materials with specified properties, nanotechnological production, environmentally friendly production	Service sector, Online settlements, online trading, cross-border settlements in cryptocurrencies	Technologies for the production of materials with specified properties, the transformation of human thinking

Source: developed by the author

Appendix No.2. Table No. 2: Properties of technological structures (Continued)

№ п/п	Properties of Technological orders /Names Technological orders	The time period of the existence of technological orders	Technologies, methods and scale of production, labor	Экономическая политика, Виды организационных структур	Концепции управления, работы с персоналом
(1)	(2)	(3)	(7)	(8)	(9)
	"-1" technological order (structure)	2000 BC-9th century AD, Horse traction	Technologies of manual single and small-scale production, simple abstract work	Informal economic policy, traditional organizational structures	Centralization, organization, control, labor promotion, management as an art, unity of command, human relations
	"0" technological order (structure)	9th century-1770, Windmill(windmill), a water mill	Technologies of manual single and small-scale production, simple abstract work	Informal economic policy, Traditional organizational structures	Formation of requirements for the manager, the theory of power, the study of the impact of automation
	The first technological	1770-1830, Textile Machinery	Mechanized technologies of mass production,	Informal economic policy, Traditional	Economic theory, financial theory, the principle of

	order (way of life)		simple abstract work	organizational structures	specialization of industrial workers
	The second technological order (way of life)	1830-1880, Steam engine	Mechanized technologies of machine-building mass production, simple abstract work	Informal economic policy, Traditional organizational structures	The theory of public services, the analysis of motivation of employees
	The third technological order (mode)	1880-1930, Electric motor	Technologies of large-scale conveyor production, special management and labor skills	Approved economic and industrial policies, Functional organizational structures	Scientific management, methods of statistics in management, personnel work
	The fourth technological order	1930-1970, Internal combustion engine	Technologies of automated large-scale production, job descriptions	Approved economic and industrial policy, strategic management, product organizational structures	Operational research, system analysis, marketing, program-target approach, personnel management, personnel motivation systems
	The fifth technological order	1970-2010, microelectronics	Flexible automated, production, competence cards and qualification cards	Approved innovation policy, matrix organizational structures, clusters, technology platforms	Project approach, post-industrial marketing, participatory management, human resource management
	Sixth technological order	2010-2040, nanotechnology	Nanotechnology, nanotechnology, information technology, the study and transformation of the properties of materials and human thinking	Approved innovation policy, Organizational architecture, design, culture	Theory of technological structures, project approach neuromanagement, neuromarketing, management of social development of personnel, project education

Source: developed by the author

Appendix No. 2. Table No.2: Table of properties of technological orders (structures) (End)

№ п/п	Human rights, family relations	Hierarchy in society, the elite of society	Types of higher education institutions,	the higher education model	Organizational forms of science and innovation
(1)	(7)	(8)	(9)	(10)	(11)
1.	Equality of members of the genus, family-genus	A classless society, the elite is elected by the clan	Teaching in the home	Teaching in the home	Research, innovation in the genus, family
2.	Slaves and slaveholders,	Class society, elite princes and the	Teaching in the home	Teaching in the home	Research, innovation in the genus, family

	serfs and landowners, monogamous family	prince's retinue, nobles			
3.	Property inequality of rights, monogamous family	Class society, a hereditary elite of the feudal lords and capitalists	Universities, vocational schools	Subject higher education	Science and innovation in universities, academies of sciences
4.	Property inequality of rights, monogamous family	Class society, a hereditary elite of capitalists	Universities, Technological institutes	Subject higher education	Science and innovation in technological institutes, academies of sciences
5.	Property inequality of rights, monogamous family	Class society, elite-hereditary capitalists	Universities, Technological institutes	Subject higher education	Наука и инновации в технологических институтах, научно-исследовательских институтах, академиях наук
6.	Universal Declaration of Human Rights, equality of rights, monogamous family	Class society, elite-hereditary capitalists	Universities, Technological institutes	Subject higher Education, integration of science and education	Research and production associations, experimental design bureaus
7.	equality of rights, monogamous family, «sexual revolution»	Class society, elite-capitalists who made their own fortune, innovators, cultural figures	Universities, educational platforms, globalization of education	Competence-based higher education, distance "smart" education	Research departments within global corporations
8.	equality of rights, civil partnerships	Class society, elite-capitalists who made their own fortune, innovators, internetocracy (netocracy)	Universities, university entry into clusters and technology platforms	Project-based higher education, distance education, integration of science, practice and education	Scientific and technological platforms, research laboratories

Source: developed by the author

Appendix No. 3. Table 3: Objectives of animation of the key technologies of the sixth technological mode with the technologies of the previous technological modes

№ п/п	Technologies of the sixth technological order /Names, period Technological order	Nanotechnology	of nanotechnologii	Information technology	Technologies of digitalization

(1)	(2)	(3)	(4)	(5)	(6)
1.	"-1" technological order, 2000 BC-9th century AD, Horse-drawn (horse-drawn) traction	Strengthening of cart materials, improving the quality of paint	Registration of the psychophysical state of the draft animal and the driver	Informing the driver about the condition of the draft animal	Registration and recording of the conditions of the draft animal and the driver
2.	"0" technological order, 9th century-1770, Windmill(windmill), a water mill	Strengthening the materials of windmills and mills, improving the quality of paint	Registration of the psychophysical state of mill workers	Informing mill workers about their operating modes, loads, etc.	Registration of information about the operating modes of a windmill, windmill, etc.
3.	The first technological order, 1770-1830, Textile Machinery	Strengthening of materials of fabrics and textile machines, improving the quality of paint	Registration of the psychophysical state of weavers, registration of buyers ' reactions to various fabrics	Optimization of the loom operation process, selection of patterns and colors, informing weavers about shift tasks and resources	Recording the operating modes of the loom, recording the consumption of fabric, paints, and electricity in production
4.	The second technological order, 1830-1880, Steam engine	Strengthening the materials of steam engine parts, improving the quality of paint	Registration of the psychophysical state of the operator, registration of the reactions of others to various modes of operation of the engine	Optimization of the steam engine operation process, informing the operator about the safety of the operating mode, resource consumption	Digital recording of steam engine operating modes and operator control actions
5.	The Third technological order, 1880-1930, Electric motor	Strengthening the materials of electric motor parts, improving the quality of paint	fixing the psychophysical state of the operator, registering the reactions of others to various modes of operation	Optimization of the electric motor operation process, informing the operator about the safety of the operating mode, resource consumption	Digital recording operation modes of the electric motor and the control actions of the operator
6.	Fourth technological order, 1930-1970, Internal combustion engine	Strengthening the materials of internal combustion engine parts, improving the quality of paint	Registration of the psychophysical state of the engine operator, registration of the reactions of others to various modes of operation	Optimization of the internal combustion engine operation process, informing the operator about the safety of the operating mode, resource consumption	Digital recording of internal combustion engine operating modes and operator control actions

7.	The fifth technological order, 1970-2010, microelectronics	The creation of microelectronics with desired qualities	Fixing the psychophysical state of the production operator, the reactions of others to the various modes of operation of the plant	Optimization of the production process of trace elements, informing the operator about the safety of the operating mode, resource consumption	The digital recording of the modes of production of trace elements, control commands and effects operator
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Source: developed by the author

Appendix No. 4. Table No. 4: Table of multiplication of technologies in the modification of vehicles (TS) during the transition to the sixth technological order

№ п/п	Technologies of the sixth order /Names of vehicle subsystems	nanotechnology	of nanotehnologii	Information technology	Resource-saving technologies
(1)	(2)	(3)	(4)	(5)	(6)
	Vehicle housing	Increasing the strength of the body parts of the vehicle, increasing the wear resistance of the paint	Registration of human reactions and identification of the most dangerous parts of the body	Informing others about the approach of the vehicle body during maneuvers	Selection of materials with the specified qualities for different parts of the vehicle body
	vehicle engine	Increasing the strength and wear resistance of the engine parts of the vehicle, its anti-corrosion coating	Registration of psychophysical reactions of the driver and others to various modes of vibration and noise during engine operation	Identification of dangerous engine operating modes, informing the driver about it	Optimization of vehicle engine operating modes based on the criterion of minimizing fuel consumption, in particular at start-up and at idle
	Undercarriage of the vehicle	Increment of the strength and wear resistance of the undercarriage parts of the vehicle	Recording the reactions of the driver's body to noise while driving	Informing about the defects in the tires of vehicles with damaged wheels	Adjusting the pressure in the wheels of a vehicle based on the criterion of minimizing fuel consumption when driving on various types of roads
	Cabin means of transport	Improving the strength and wear resistance of the materials of the cab of the vehicle	Registration of temperature conditions in the cab and their impact on the driver's condition	Informing the driver about non-calculated temperature conditions in the cab	Optimization of temperature conditions in the cab of the vehicle based on comfortable conditions for the driver

	The subsystem of washing the windows of the cab of the vehicle	The increase in wear resistance and strength of the parts of this subsystem of the vehicle	Registration of the influence of glass pollution on the quality and safety of the driver's work	Voice and other information about the need to clean the windows, tips in emergency situations	Minimization of the washing liquid consumption provided that the windows of the vehicle cab are sufficiently clean
	electrical equipment means of transport	Increase of specific characteristics of accumulators, increase of durability and wear resistance of elements of electric equipment of means of transport	Warning of dangerous and illogical behavior of the driver in emergency situations in the electrical equipment system means of transport	Voice prompts, information and indication of emergency situations in the electrical equipment subsystem means of transport	Ensure resource savings by optimizing operating modes to maximize the service life of batteries and other electrical equipment elements
	Fuel system means of transport	Ensuring the growth of specific characteristics of fuel, increasing the wear resistance, strength of fuel system parts	Warning of illogical or dangerous behavior of the driver in case of emergency situations in the fuel system	Voice notification of the driver and indication of emergency situations in the fuel system	Achieving resource savings by optimizing the use modes and maximizing the service life of fuel system elements

Source: developed by the author

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CONFLICT OF INTEREST

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