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# ECONOMIC SCIENCES

## ENVIRONMENTAL MANAGEMENT IN THE STRUCTURE OF AGRICULTURAL ENTERPRISES WITH A POST-INDUSTRIAL MANAGEMENT SYSTEM

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### Abstract

The post-industrial direction of state development requires changes in the approach to the organization of the production process and the management system of all enterprises, including agricultural enterprises. Elements of digitalization, which have penetrated all areas of economic activity in all sectors of the economy, have a direct impact on the technological process and methods of managing it. The technologies of agricultural production have also changed due to modern methods of organizing the production process and the use of innovative resource-saving energy-saving technologies and technical means by agricultural enterprises. In addition, the change in the field of information exchange has facilitated the transition to the ability to fully control the phased implementation of technological operations online 24/7 with the ability to remotely control processes and monitor their implementation. The possibility of providing a wide range of services by specialized structures helps to reduce the unit cost of production, due to the quality of the tasks and the constant updating of technical means of their implementation. Management decisions, thanks to the use of automated management systems, became possible with the minimization of risks on the basis of: available current operational data on the state of the enterprise at present; information on market interest and existing demand for a specific product and with the possibility of access to developed scientifically sound technologies adapted to a specific group of enterprises. All this can be realized only if the management staff is aware of working with the appropriate tools and in close cooperation with the relevant institutions. A necessary element of the functioning of enterprises in the field of innovative technologies is the implementation of conditions for the implementation of state policy. The Government of Ukraine has decided to implement the initiatives of the World Joint Committee, and has developed its own development strategy, taking into account its main directions. One of the directions implemented by our State is the implementation of the Sustainable Development Goals. In addition to the implementation of objectives in the direction of creating a stable infrastructure, promoting all-round and stable industrialization and innovation, An important goal is to ensure the transition to rational models of consumption and production and to modernize the means of implementation and active work within the framework of a global partnership in the interests of sustainable development. This approach will contribute to the formation of a postindustrial economy focused on the realization of the goals of sustainable development. In order to realize such an ambitious initiative, it is necessary to change not only the technical means, tools and technologies for achieving the expected results, but also one's own worldliness. One of the tools for implementing the goals of old development is the implementation of environmental management and quality management in the overall system of enterprise management. Formation of integrated management systems along with the use of modern tools for their implementation require a change in the very structure of relations between the elements of such a system. Since the activity of agricultural enterprises involves interaction of a significant number of structural units, it is appropriate to use elements of both vertical and horizontal integration. Due to this hybrid structure of interrelations between the participants, the hybrid system of management of the association is formed. For the purpose of implementing the Objectives of sustainable development in terms of ensuring openness, safety, livability and environmental sustainability of cities and other settlements (Goal 11), an important point is the inclusion of activities of households in a general closed production process. Such a structure of relations oriented towards joint implementation of the specified goal will be effective in organizing cooperation in the form of a cluster. To manage such a large-profile association, it is necessary to form a unified database. However, such a database requires the distribution of access to information and its limitation based on hierarchical level of management. Today, these features provide modern complex software products, type BASE ERP, which serve as business automation systems. We recommend adapting this software product in the management of agricultural enterprises.

**Keywords:** Integrated Management System, Agriculture, environmental management, digitization, quality management system, management tools.

High level of competitive struggle of enterprises on the market urges to search for innovative methods of management and tools, which will contribute to selection of optimal solution with maximal effects. Ukraine

works in the direction of active participation in the solution of problems of global scale, following the projects and programs developed by the world consortia. UNDP's state development strategy is based on the Global Development Goals (or «Global Goals») [1].

They were adopted unanimously by the General Assembly of the United Nations Organization and presented in Resolution 70/1 «Transforming Our World: The Order of the 21st Century to 2030» of 25th December 2015. The 17 Targets of the old development were formed, which became valid in December 2016 and are

the basis of the development strategy of 170 countries [2], including Ukraine. The formed Goals became the basis of the development policy developed by UNDP (the UN development agency) and the direction of financing of projects and programs of their implementation during the whole period up to 2030.

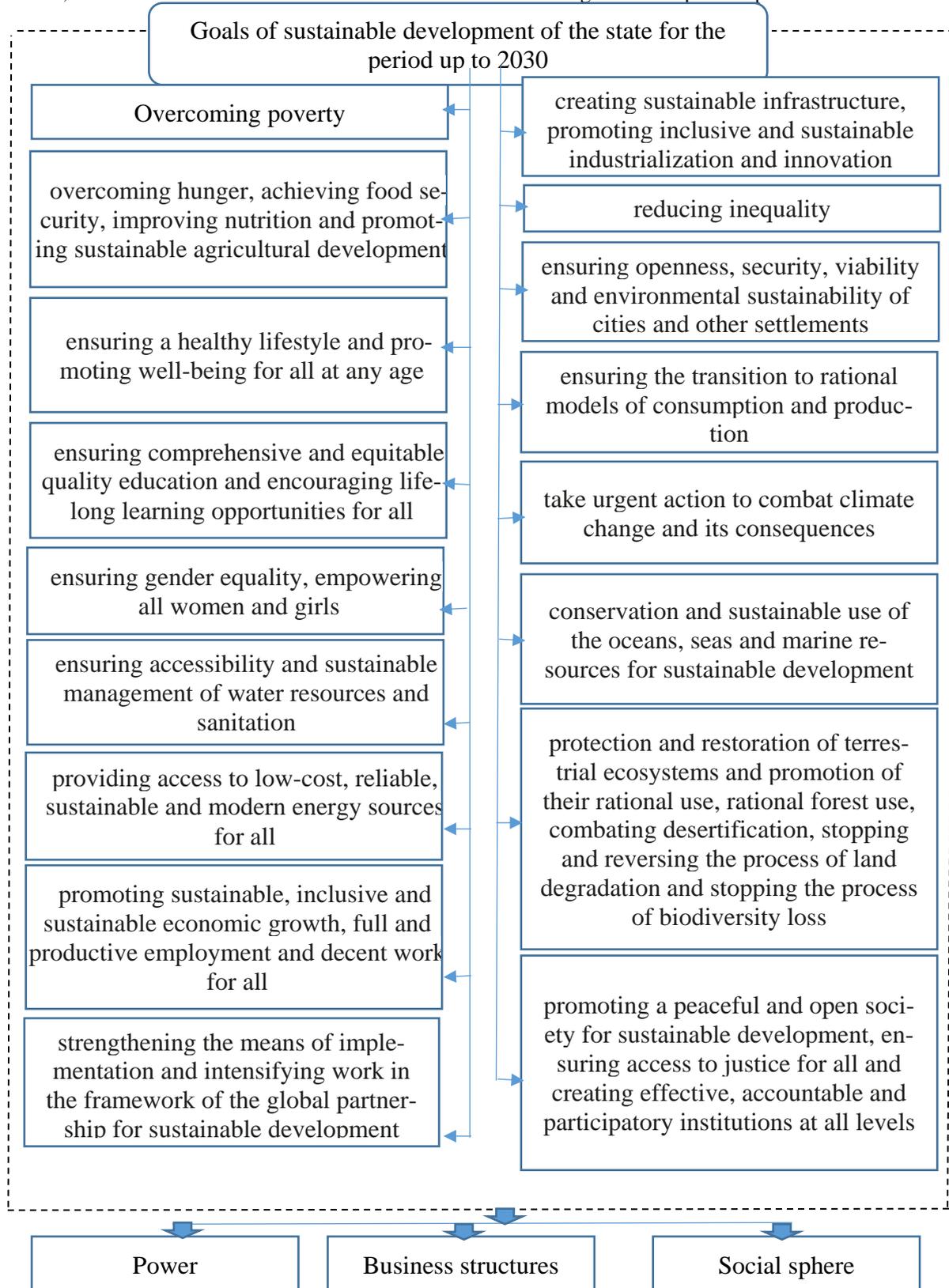


Fig. 1. Goals of sustainable development in the system of interaction with the state, business and social sphere

Developed 17 Goals of sustainable development, which is a new approach to the policy of development

of the member states (Fig. 1).

The implementation of the goals of the old

development is aimed not only at solving the problem of climatic changes, but also at solving the problems associated with economic nervousness, widespread innovation, re-orienting the society to steel consumption, the development of relations in the direction of peaceful coexistence and fairness. All of these goals are interdependent, because they are the only key to success. Integration of the old development goals into the development policy of states, including Ukraine, requires their implementation through the expansion of partnership and pragmatism between three vectors of economic entities: the state, business structures and the social sphere. Such cooperation is aimed at making the right choice in terms of stable improvement of the quality of life for the future generations. Therefore, when deciding on the implementation of the goals of sustainable development at the level of the state, it was necessary to form clear guidelines and adherence to the goals at all hierarchical levels, which include them in their own policies of development, based on their own and global priorities.

The goals of old development are characterized by the complexity of assessments and have an undifferentiated nature. The totality of calculated indicators is a linking element of the three dimensions of the old development: economic, environmental and social.

Figure 1.1. we present the main directions of the

goals of the sustainable development of the state.

Ukraine accepted the conditions for participating in the implementation of the UN plan on the sphere of "Global Goals." Therefore, the State Statistics Service of Ukraine together with VoxUkraine with the support of the UN Development Program in Ukraine.

VoxUkraine [3] Acts as an independent and non-engaged analytical platform that supports economic reforms in Ukraine by conducting analytical studies in the field of:

- meeting the conditions of economic policy,
- Independent assessment of economic transformation,
- Monitoring the implementation of the main points of the Global Goals,
- Exploring the possibilities of Ukraine's integration into the global network through economists and political leaders.

The founders and leaders of the VoxUkraine are experienced and highly qualified economists and lawyers working both in Ukraine and abroad.

VoxUkraine constantly carries out the assessment of progress of achievement of Sustainable development goals by Ukraine on a basis судьб in the form of the Voluntary national review concerning Sustainable development goals (<https://me.gov.ua>) [5] on methodology of the United Nations Economic and Social Commission for Asia and the Pacific (UNESCAP) which is according to the reference: <https://data.unescap.org>.

Table 1

**Dynamics of implementation of sustainable development goals in terms of the task «Ensure the availability of quality services for the supply of safe drinking water, construction and reconstruction of centralized drinking water supply systems using the latest technologies and equipment»**

Indicator	2015	2016	2017	2018	2019	Plan until 2020
Safety and quality of drinking water according to microbiological indicators (% of non-standard samples)						
by type of water supply						
urban area	3,1	4,3	4,6	5,1	5,7	-
countryside	7,6	10,4	11,2	11,8	11,4	-
by type of water supply						
centralized	4,6	6,4	6,7	7,7	8,2	-
decentralized	18,0	23,1	20,4	23,4	24,6	-
Safety and quality of drinking water according to radiation indicators (by% of non - standard samples)						
by type of water supply						
urban area	1,6	1,1	4,3	4,0	4,1	-
countryside	0,0	0,5	6,6	9,8	12,5	-
by type of water supply						
centralized	1,1	1,1	3,9	4,0	4,6	-
decentralized	1,7	0,4	3,0	2,5	4,0	-
Safety and quality of drinking water by organoleptic, physicochemical and sanitary-toxicological indicators (% of non-standard samples)						
the type locality of residence						
urban area	12,4	13,7	16,2	18,5	17,2	-
countryside	22,5	25,5	27,4	29,8	31,2	-
by type of water supply						
centralized	15,7	18,4	20,0	22,7	22,3	-
The share of the rural population that has access to centralized water supply, %	25,0	29,0	30,0	30,1	25,0	20
Share of urban population with access to centralized water supply,%	99,0	99,0	99,3	99,2	99,0	90

Source: Generalized by the author based on [12]

The following were involved in the development of the Voluntary Survey of Sustainable Development Goals:

- Representatives of the central executive authorities,
- Representatives of United Nations agencies in Ukraine,
- Representatives of the National Academy of Sciences of Ukraine,
- representatives of scientific institutions,
- representatives of public organizations,
- business representatives, especially those business entities that are parties to the UN Global Compact in Ukraine.

Analytical assessment of compliance with sustainable development goals was conducted for 110 national indicators of Sustainable Development Goals out of 183, approved by the order of the Cabinet of Ministers of Ukraine dated 21.08.2019 from 686 «Data collection issues for monitoring the implementation of sustainable development goals» [4], and for which targets for 2030.

Based on the task of ensuring the availability of quality services in terms of safe drinking water supply and in terms of construction and reconstruction of centralized drinking water supply systems using the latest technologies and equipment, we noted a positive direction of change. Taking into account the planned indicators of the share of the rural population that has access to centralized water supply as of 2020 - 20%, it

should be noted that in 2019 this figure was 25.0%. Similarly, the value of the share of urban population that has access to centralized water supply is higher than planned. The target value of this indicator for 2020 is 90%, however, in 2019 it was 99.0% (Table 1).

To achieve the goals of sustainable development for the period up to 2030, it is necessary to perform the relevant tasks. Thus, in terms of fulfilling goal 6 «Clean water and proper sanitation» the tasks are:

- Ensure the availability of quality services for the supply of safe drinking water, construction and reconstruction of centralized drinking water supply systems using the latest technologies and equipment;
- Ensure the availability of modern drainage systems, construction and reconstruction of water intake and sewage treatment plants using the latest technologies and equipment;
- Reduce discharges of untreated wastewater, primarily through the use of innovative water treatment technologies at the state and individual levels;
- Increase water efficiency.

It should be noted that an important task of the state is to increase the level of availability of modern drainage systems, and to carry out the construction and reconstruction of water intake and sewage treatment plants using the latest technologies and equipment. To assess the actions aimed at fulfilling this task, the share of rural and urban population that has access to centralized drainage systems, expressed in relative terms, is determined..

Table 2

**Dynamics of implementation of sustainable development goals in terms of fulfilling the task of ensuring the availability of modern drainage systems, construction and reconstruction of water intake and sewage treatment plants using the latest technologies and equipment**

Indicator	Years				Plan until 2020
	2015	2016	2017	2018	
Share of rural population with access to centralized drainage systems,%	3,0	2,2	2,5	2,5	-
Share of urban population with access to centralized drainage systems,%	92,0	94,0	95,0	96,1	90

Assessing the share of urban population that has access to centralized drainage systems in the dynamics over the years, it should be noted that during the analyzed period (2015-2018) its value increased by 4%, which is a positive direction of change. At the same time, the target set for 2020 is 90%. The analysis of this indicator shows the fulfillment of the conditions of the goals of sustainable development of the state in terms of the defined task.

One of the most difficult and capital-intensive tasks in terms of achieving the goal of sustainable development №6 « Clean water and proper sanitation » is to reduce the discharge of untreated wastewater, primarily through the use of innovative water treatment technologies at the state and individual levels. Indicators of this task are the assessment of the volume of discharges of contaminated (contaminated without treatment and insufficiently treated) wastewater into water bodies.

Evaluation of these indicators indicates the implementation of a significant number of measures

and actions in the direction of the tasks (Table 3).

The efficiency of water use testifies not only to the ecological orientation of business processes, but also, first of all, to their economic efficiency. Because the reduction in the quantity and cost of a resource per unit of output leads to a reduction in production costs and increase the economic result.

For example, assessing the dynamics of water capacity of GDP, we noted quite clear plans in the system of assessing the implementation of state environmental policy of Ukraine until 2030, which are recognized at the legislative level and presented in the Law of Ukraine «On Basic Principles (Strategy) of State Environmental Policy of Ukraine until 2030» [5].

If, in 2015, the level of water use per 1000 UAH of GDP (in actual prices) was 23.85, then in 2019 the value of this indicator decreased to 10.3 m<sup>3</sup> of used water per 1000 UAH of GDP, which more than doubled the actual level of water capacity GDP to the projected target values of the State Strategy (Fig. 2).

Table 3

**Dynamics of untreated wastewater discharges and water use efficiency in Ukraine (2015-2019)**

Task	Indicator	Years					Target benchmark for 2020
		2015	2016	2017	2018	2019	
Reduce discharges of untreated wastewater, primarily through the use of innovative water treatment technologies at the state and individual levels	Volumes of discharges of polluted (polluted without treatment and insufficiently treated) wastewater into water bodies, million cubic meters. m	875,1	698,3	997,3	952,0	737,2	725,0
	Share of discharges of polluted (polluted without treatment and insufficiently treated) wastewater into water bodies in the total amount of discharges,%	16,38	12,93	21,15	18,27	13,72	13,0
Increase water efficiency	Water capacity of GDP, cubic. m of water used per 1000 UAH of GDP (in actual prices)	23,85	19,61	15,27	11,73	10,30	3,2
	Current water content of GDP,% to the level of 2015	100,00	82,23	64,02	49,16	43,19	90,0

Source: Generalized by the author on the basis [12]

In the period up to 2030, the strategy envisages reducing the level of water capacity of GDP to 2.5 m<sup>3</sup> of used water per UAH 1,000 of GDP. Such goals are focused not only on solving the global environmental problem, however, have a direct impact on the unit cost of production, helping to improve the overall economic performance of enterprises and the economy as a whole. In line with Goal 8 of the Sustainable Development Strategy, decent work and economic growth are ensured. Tasks aimed at achieving this goal are:

1. To ensure sustainable GDP growth through modernization of production, development of innovations, increase of export potential, introduction to foreign markets of products with a high share of value added in terms of estimates: Index of physical volume of GDP, %; The share of gross fixed capital formation in GDP, %; The share of exports of goods used in the production of high and medium-high technologies in total exports of goods, %; Ukraine's place in the Global Innovation Index;

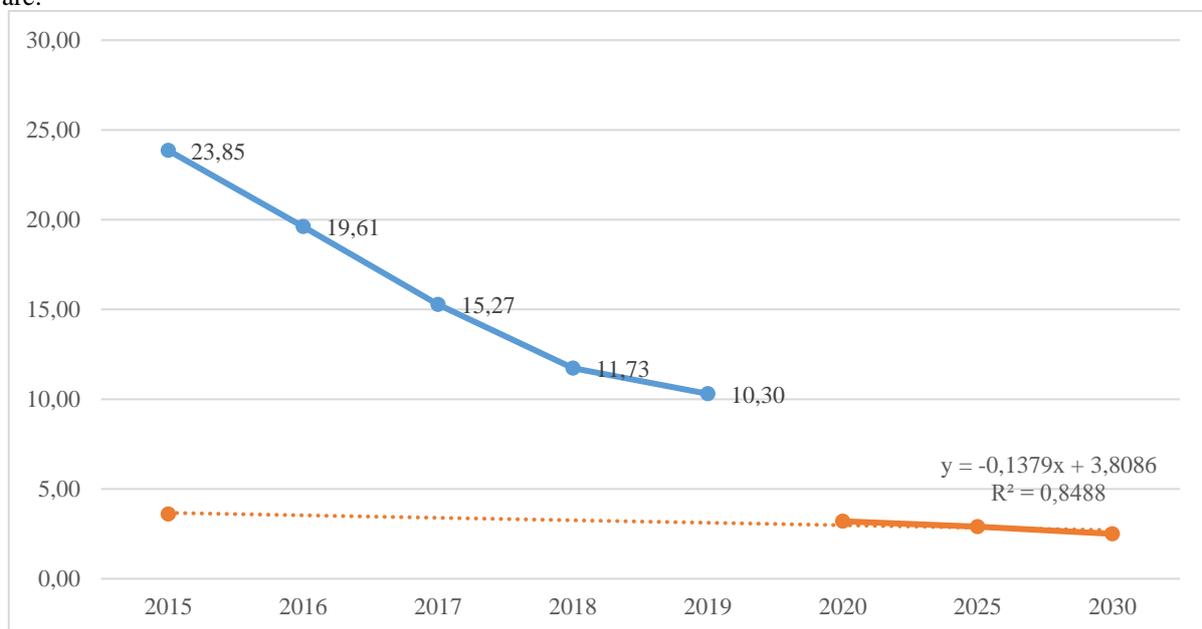


Fig. 2. Reservoir of GDP, m<sup>3</sup> of used water per 1000 UAH of GDP (in actual prices), 2015-2030.

2. To increase the efficiency of production on the basis of sustainable development and the development of high-tech competitive industries. Assess the level of

implementation of this task is based on estimates:

- Coefficient return on fixed assets;
- Productivity change index, %

Table 4

**Dynamics of sustainable development goals in terms of sustainable GDP growth based on modernization of production, development of innovations, and increasing production efficiency on the basis of sustainable development and development of high-tech competitive industries (2015-2019)**

Indicator	Years					Target benchmark for 2020
	2015	2016	2017	2018	2019	
Index of physical volume of GDP, %	90,2	102,4	102,5	103,4	-	104,0
The share of gross fixed capital formation in GDP, %	13,5	15,5	15,8	17,7	-	23,0
The share of exports of goods used in the production of high and medium-high technologies in total exports of goods, %	19,2	17,3	16,8	17,0	16,4	25,0
Ukraine's place in the Global Innovation Index	64	56	50	43	47	50
Coefficient return on fixed assets	0,1194	0,1199	0,1195	0,1204	-	0,1300
Productivity change index, %	99,2	103,5	103,2	102,1	-	104,0

Source: Generalized by the author on the basis [12]

Table 5

**Dynamics of indicators of realization of the goals of sustainable development in the part of performance of the tasks focused on maintenance of decent work and economic growth, (2015-2019.)**

Assignment	Indicator	Years					Target benchmark for 2020
		2015	2016	2017	2018	2019	
Increase employment	Employment rate of the population aged 20-64,%	64,4	64,2	64,2	65,6	66,9	66,0
Reduce the proportion of young people who do not work, study or acquire professional skills	The share of young people who do not work, study or acquire professional skills, in the total number of people aged 15-24,%	17,2	17,8	15,9	14,5	15,6	17,0
Promote the provision of reliable and safe working conditions for all workers, in particular through the use of innovative technologies in the field of labor protection and industrial safety	Number of victims of accidents at work that resulted in disability for 1 working day or more,% to the level of 2015						
	<b>Ukraine</b>	100	104	101	97	91	75
	Vinnitsia region	100	109	98	122	115	
	The number of deaths from accidents at work,% to the level of 2015						
	<b>Ukraine</b>	100	107	98	109	113	70,0
	Vinnitsia region	100	93	100	60	140	
	Proportion of employees engaged in work with hazardous working conditions in the total number of full-time employees, %	28,9	-	28,4	-	29,6	22,0
Create institutional and financial opportunities for self-realization of the potential of the economically active part of the population and the development of the creative economy	Number of employees in medium and small businesses, million people	6,5	6,5	6,6	7,0	-	8,3
	Share of value added by production costs of medium and small enterprises, in% of the total amount of value added by production costs	58,1	62,3	62,6	64,3	-	70,0
	Ukraine's place in the ranking of ease of doing business Doing Business	81	80	76	71	64	30,0

3. Increase employment;

4. Reduce the proportion of young people who do not work, study or acquire professional skills. To this end, measures are taken and their effectiveness is determined through the evaluation ratio «The share of young people who do not work, study or acquire professional skills, in the total number of people aged 15-24 years», which is expressed in%;

5. Promote the provision of reliable and safe working conditions for all workers, in particular through the use of innovative technologies in the field of labor protection and industrial safety;

6. Create institutional and financial opportunities for self-realization of the potential of the economically active part of the population and the development of the creative economy. Realization of such task in the context of the purposes of sustainable development is possible through use of modern tools in system of management of the enterprise and assistance to the state. The analysis of the effectiveness of actions and measures aimed at implementing this task is carried out thanks to the assessment:

- Number of employees in medium and small businesses, million people;

- Share of value added by production costs of medium and small enterprises, in% of the total amount of value added by production costs;
- Ukraine's place in the ranking of ease of doing

business Doing Business.

We have made such an assessment in the table 4-5.

Table 6

**Dynamics of indicators in terms of implementation of sustainable development goals in terms of implementation of tasks aimed at reducing the level of marine pollution, (2015-2019)**

Tasks of Sustainable Development Goals	Goal evaluation indicator	Years					Plan until 2020
		2015	2016	2017	2018	2019	
Reduce marine pollution	The share of discharges of polluted wastewater in the total discharges to the marine environment , %	29	28	30	27	-	11
Ensure the sustainable use and protection of marine and coastal ecosystems, increase their resilience and restore them through innovative technologies	Area of territories and objects of the nature reserve fund of coastal regions,% of the territory of coastal regions	5,81	5,82	5,82	5,84	5,93	7,0
	Area of territories and objects of nature reserve fund in the waters of the Black and Azov Seas, thousand hectares	612,8	612,8	612,8	612,8	625,9	650,0
Introduce effective regulation of marine bioresources extraction	Volumes of extraction of aquatic bioresources in the exclusive (marine) economic zone of Ukraine, thousand tons	34,2	40,3	42,5	30,0	30,2	36,

In order to reduce the level of pollution of the marine environment (Goal 14. Conservation of marine resources) work is being done to reduce the share of discharges of polluted wastewater in the total discharges into the marine environment.

This indicator is calculated as a percentage and in accordance with the State Development Strategy provides for a reduction by three times by 2030 compared to its base value. If in 2015 its target was 15%, in 2030 it should not exceed 5%. Today, assessing the dynamics of its change, we noted that it is not possible to implement this task in full, because in 2020 its target value should not exceed 11 ;, and in 2025 and 2030 - respectively 9 and 5%.

The implementation of these goals is focused on increasing economic potential, achieving the main parameters of environmental safety and the development of socio-economic infrastructure. This approach contributes to the implementation of the main directions of the State Policy of Ukraine in the direction of economic security, ecological balance and social security.

It is possible to implement such a strategy for the development of the state through the use of modern tools that allow on the basis of current data of evaluation indicators and the use of methods of evaluation, analysis, budgeting and forecasting to make effective management decisions..

The implementation of the state development strategy until 2030 is focused on the harmonization of the coexistence of business (small, medium, large and households), the social sphere and the state. Such changes are connected with the transition of all countries of the world to a socially oriented direction of development and to the improvement of the ecological situation in order to avoid a global ecological

catastrophe. Therefore, the activities of modern business structures are refocused on obtaining not only a positive economic result, but also on the spread of corporate social responsibility along with the implementation of state-defined environmental parameters and social protection measures..

We believe that in order to achieve the goals of sustainable development of the state by 2030, the activities of each enterprise should be focused on clearly defining the actual data of the economic situation, social measures and their effects and environmental impacts, with the development of forecasts taking into account state targets.

Such activities will contribute to ensuring economic development, balanced environmental status and the formation of socially oriented business, operating within the framework of regional plans and development strategies of the state, focused on solving socio-economic problems and ensuring sustainable environmental development while maintaining existing natural resource potential. Therefore, the legislation of Ukraine today is formed in such a way as to adapt the environmental standards of the European Union in the practice of management of domestic enterprises. One of the elements of the implementation of such a strategy for the development of a balanced development of society is to implement environmental management systems in the management system of the enterprise at all its levels. The formation of integrated management systems by implementing an environmental management system in the overall management system in compliance with all the principles and requirements of its operation will contribute to significant environmental and economic and social effects.

Therefore, according to the results of our study, we noted not only the rapid pace of development of

information exchange, but also the rapid pace of forced adaptation of society to such changes, and the existence in the digital environment. The development of technology is carried out with such speed that the transitional stages of levels of intensification become blurred and the state of consciousness of the social sphere does not always have time to adapt to too rapid radical changes..

The concept of "post-industrial society" was explored and proposed by D. Bell [13], who noted that «...post-industrial society is a society in whose economy the priority has passed from the production of goods to the production of services, research, organization of the education system and improving the quality of life; in which the class of technical specialists has become the main professional group and, most importantly, in which the introduction of innovations ... increasingly depends on the achievements of theoretical knowledge».

Post-industrial development of society has a direct impact on «sustainable development». Vernadsky's prediction of the intense human impact on the environment during the post-industrial stage of development was noted by many scientists who studied the theory of the «post-industrial» stage of development of society, in particular [14, 15]. Researchers who have studied the peculiarities of social philosophy have noted in their research that sustainable development can only provide a post-industrial economy.

The rapid pace of modern development of inter-economic relations encourages the fact that the concept of post-industrial development is constantly improving, and is not complete in scientific terms.

If the pre-industrial stage of development of society was focused on the use of the physical system of man and animal in the production process, the industrial development of society was focused on the intensive use of steam and electric machines in the production process. Whereas the basis of post-industrial development is the intensive use of the human mind aimed at the creation of artificial intelligence to develop technologies focused on the production of the maximum amount of high quality product with minimal resource costs and management of the whole process. The development of nanotechnologies and the rapid pace of their introduction into the production process of all sectors of the economy encourage changes in the very structure of enterprises engaged in such activities. In addition, the use of digital technologies has made it possible in the process of managing the performance of the enterprise to take into account the different interests of the enterprise, business, state, and combine them into a model of a single goal.

In the activities of enterprises of all industries, including in the process of economic activity of

agricultural enterprises, information has become one of the main factors determining the effectiveness of their activities. The ability to use information, analyze it and adapt it to specific business conditions is an important sign of the transition of the enterprise to the level of post-industrial development.

The main problem of the global transition to the stage of post-industrial development of society is the uneven level of development of different countries, and at the level of Ukraine - the uneven level of development of different regions. Uneven development, creates a disproportionate competitive economic conditions. Intensive digitalization of some enterprises or spheres of activity contributes to reducing the unit cost of production and reducing the complexity of them, which are the main factors that determine the economic performance of enterprises. Products manufactured by similar structures with higher costs are uncompetitive. The same situation has developed in the creation of interstate cooperation, where high-tech countries that are constantly updating their own technologies, from genetic engineering to space technology, automatically gain a competitive advantage at every stage of their development..

In the process of studying the main indicators of post-industrial development of society, we analyzed the assessment of the innovation potential of the European Community, candidate countries for accession to the EU and some other countries. This assessment was implemented through the «EU Innovation Scoreboard». Methodologically, the Scoreboard calculates the average index of innovative development of the participating countries on the basis of twenty-seven indicators. When grouping the obtained results of these indicators, which form the index of innovative development, the division of countries into four groups is carried out:

- «innovation leaders» (120% of the EU average),
- «strong innovators» (90-120%),
- «average innovators» (50-90%).
- «emerging innovators» (below 50%) [7].

We conducted a comparative assessment of the index of innovative development of Ukraine and the index of individual European countries in accordance with the «EU Innovation Scoreboard» (Fig. 3). The results of this evaluation obtained through the use of an electronic tool are used by the European Innovation Inspectorate to carry out a comparative evaluation of research results and determine the effectiveness of innovation in the EU and in other European countries. In the process of such assessment, a meticulous analysis of the strengths and weaknesses of the existing innovation systems of each country is conducted.. This helps to clearly identify the problem areas in the field of innovation. Which allows them to evaluate and develop measures to address.

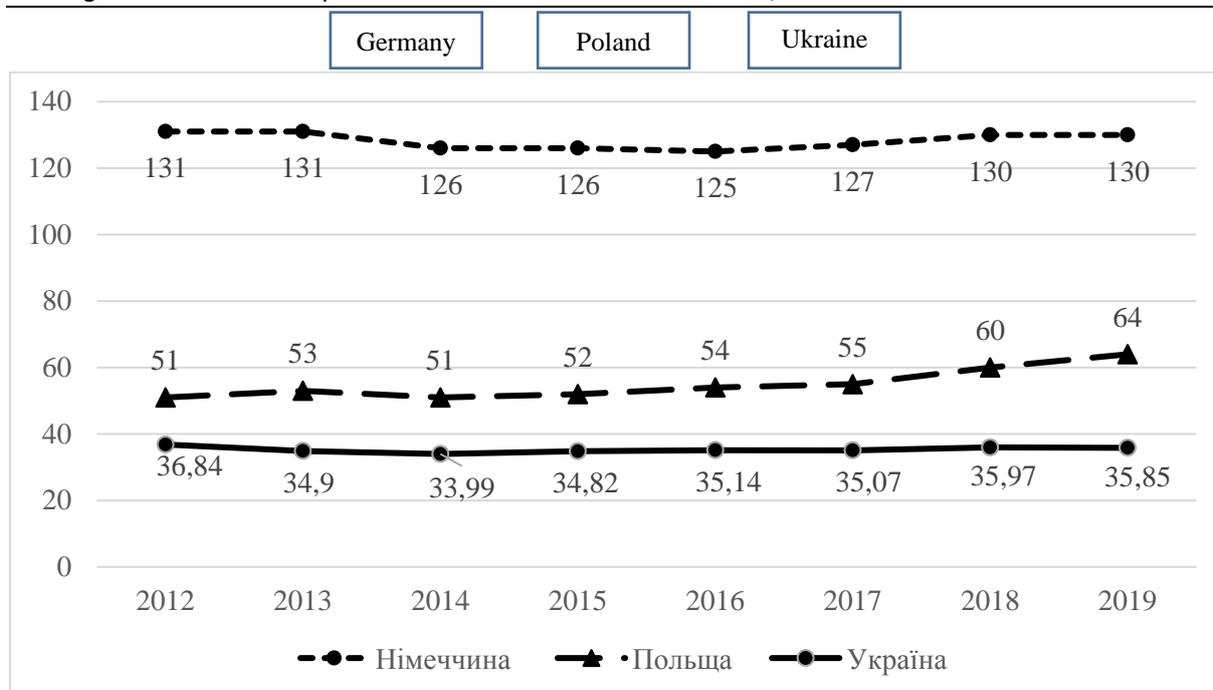


Fig. 3. Comparative assessment of the index of innovative development of Ukraine with other EU countries in accordance with the «EU Innovation Scoreboard» (2012-2019)

Source: Created by the author based on data [7]

We noted that in 2019, according to the Innovation Index, Ukraine is classified as: «An emerging innovator». The value of the innovation index for Ukraine in 2019 is 35.85. The negative is that when estimating this index, we noted that in the dynamics over the years, its value tends to decrease. Thus, in 2012 the value of the Innovation Development Index was 36.84..

Analyzing components of the index of innovative development, among the weaknesses noted the great importance of the indicator of unrealized opportunities in the innovative development of Ukraine in the direction of commercialization of innovations and in the field of protection of intellectual property rights.

Important strengths in assessing the index of innovative development of Ukraine should be identified:

- favorable geographical location,
- capacious market,
- the existence of a deep and comprehensive free trade area between Ukraine and the EU,
- human development.

A similar assessment of the level of innovative development of various countries, including Ukraine, is conducted jointly by Cornell University with the INSEAD Business School and the World Intellectual Property Organization, forming the Global Innovation Index..

Table 7

**Comparative assessment and rating of the Global Innovation Index (GII) of Ukraine and other countries, 2013-2019**

Years	Country							
	Ukraine		Germany		Poland		USA	
	Index	Rating	Index	Rating	Index	Rating	Index	Rating
2013	35,8	71	55,8	15	40,1	49	60,3	5
2014	36,3	63	56	13	40,6	45	60,1	6
2015	38,5	64	57,7	12	40,2	46	60,1	5
2016	35,7	56	57,9	10	40,2	39	61,4	4
2017	37,6	50	58,4	9	42	38	61,4	4
2018	38,5	43	58,03	9	41,67	39	59,81	6
2019	37	47	58,19	9	41,31	39	61,73	3

Source: Generalized by the author on the basis [16]

Thus, the leading industrialized countries occupy the leading positions annually in terms of this index of innovation, which corresponds to the economic indicators of their development that they occupy.

However, we believe that full digitalization without human intervention is not able to anticipate all risks and develop algorithms to minimize them. Only

the optimal combination of digital technologies and human intelligence is able to control production processes and direct them towards the development of economic well-being, social welfare and environmental security..

It should be noted that the absolute transition to the post-industrial stage of society, which involves the

exclusion of intelligence and human labor from the chain of production process, can generate a crisis. For example, the US financial crisis has prompted the country's leadership to support the industrial sectors of the economy.

According to its specifics, Ukraine is an agrarian state, therefore, it is at the stage of industrial development with the active development of the agricultural sector in the direction of post-industrialization.

Not only the financial crisis can affect the post-industrial stage of development. In recent years, the globalization of post-industrial development has been complicated by both environmental and social crises. The unwillingness of states to abruptly move to post-industrial development is associated with the lack of technologies that would be able to completely replace the use of non-renewable energy sources in the production cycle and in the life of society..

In the course of our research, it was confirmed that Ukraine is a country with complex environmental problems. Unbalanced use of natural resources and lack of waste recycling are typical problems for developing countries. We noted that with increasing indicators of economic development there is an intensive increase in the use of non-renewable natural resources, increasing the amount of waste. All this increases the level of anthropogenic pressure on the environment.

Whereas, Ukraine has accepted the conditions for the implementation of the Sustainable Development Goals, supporting the global goals of sustainable development to 2030 proclaimed by the resolution of the United Nations General Assembly of September 25, 2015 № 70/1 and the results of their adaptation taking into account the specifics of the development of Ukraine, there was a change in the approach to the organization of management at all levels. Efforts of both political, economic and social spheres are necessary for the realization of the Sustainable Development Goals of Ukraine. All management

decisions should focus not only on environmentally oriented production, but also on environmentally oriented consumption.

In the formation of Ukraine's GDP, the maximum share is occupied by energy- and resource-intensive industries. It is possible to change this only by changing the approach to the enterprise management system. Priority areas in the management system should be the introduction of non-resource-intensive technologies aimed at ensuring the development of the «green economy».

Integration of the environmental management system into the general management system of the enterprise is currently recommended at the level of legal regulation, as well as the conditions of cooperation of Ukrainian enterprises with international partners.

We believe that the most effective way to initiate the introduction of an environmental management system into the overall management system is to include it in sectoral development strategies and regional target programs.. The main initiative of the transition to environmentally oriented enterprise management should be to assess the effects of their implementation and recognition of such enterprises at the state level in terms of benefits (taxation system) and additional opportunities (priority recognition, benefits of participation in programs, etc.). Such tools of state support in initiating the implementation of integrated management systems in agricultural enterprises are currently lacking.

An important characteristic for making decisions on the effectiveness of cooperation of the external partner with the enterprises of Ukraine is the assessment of the share of innovatively active enterprises in the total number of industrial enterprises.. In the process of analyzing the dynamics of this characteristic assessed by the State Statistics Service of Ukraine, we noted the diverse nature (Fig. 4).

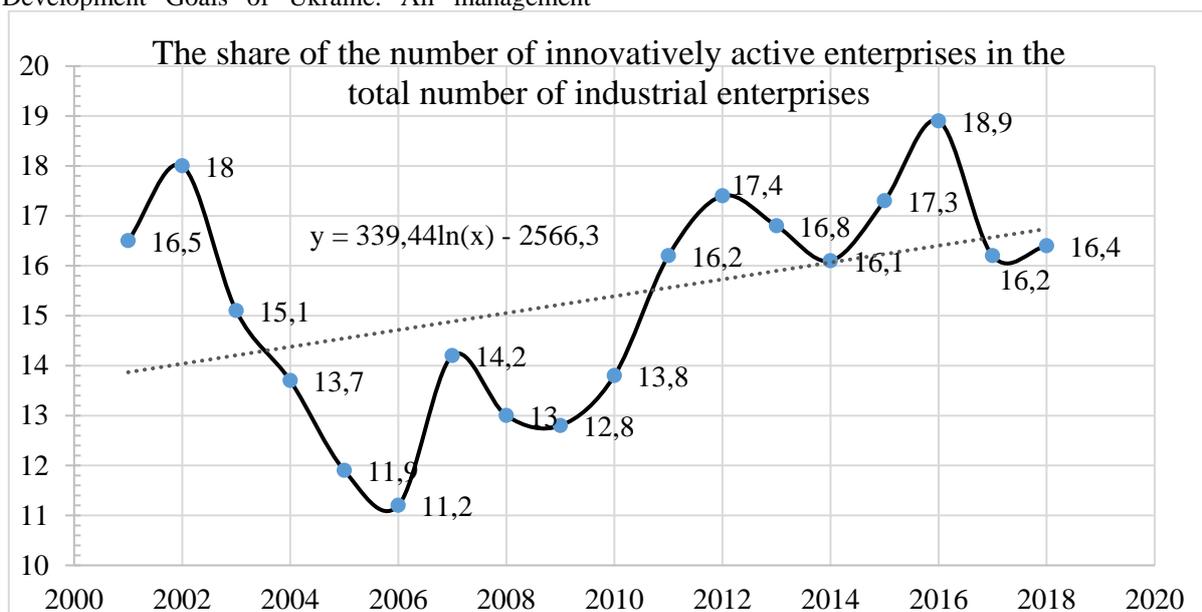


Fig. 4. Share of the number of innovatively active enterprises in the total number of industrial enterprises, % (2001-2019)

Source: Formed by the author on the basis of data from the State Statistics Service of Ukraine [9]

Share of value added by production costs of enterprises belonging to the medium-high-tech sector of the processing industry (in particular, production of chemical products; electrical equipment; machinery and equipment; vehicles, trailers and semi-trailers; other vehicles according to NACE) in total value added by production costs in the dynamics over the years decreased from 4.7% in 2015 to 3.8% in 2019. However, the target set for 2020 is 7.5%, which indicates the need to introduce changes in the technological process to fulfill the task.

Therefore, in the framework of ensuring the interests of the state and to meet the requirements of the legislation of Ukraine (Decree of the President of Ukraine 22722/2019 of 30.09.2019 "On sustainable development of Ukraine until 2030") companies need to form strategic plans and apply modern tools to the system management, which will contribute to the implementation of state strategy.

In a market environment, the activities of economic entities are based on commercial principles, which encourages active innovation, which is a determining factor in increasing the competitiveness of goods and services of domestic producers. We believe that the competitiveness of production can be ensured by:

- improving the quality of manufactured goods, works and services;
- improving environmental parameters and production characteristics;
- reducing the cost of goods, works and services through the introduction of resource-saving, low-waste (waste-free) environmentally friendly technologies;
- improving the management system through the formation of logistics links and solutions in the production process, which will reduce inefficient costs and losses of raw materials, energy, resources;
- cooperation and coordination of enterprise groups within regions forming regional clusters in the implementation of joint projects and programs;
- other.

Implementing such an initiative, based on

adherence to principles such as the functioning of the world's most promising clusters, will enable Ukrainian agricultural enterprises to work towards continuous improvement with the subsequent expansion of partnerships in the international market. Entry of enterprises into international trade markets is possible only in compliance with the requirements and rules established by them (certification of product quality, certification of the production process, etc.). One of the important requirements is compliance with environmental safety standards, indicators of product quality that they produce and then sold. The level of compliance is determined and regulated by international standards of the ISO 9000, ISO 14000 series, etc. Achieving the implementation of certain parameters at the enterprise is possible only with the introduction of innovations focused on a high level of environmental friendliness and economic efficiency (so-called environmental innovations), which will ensure a worthy place for Ukrainian enterprises and their products, goods, works and services in the international market. We have developed a mechanism to increase the competitiveness of enterprises in domestic and international markets (Fig. 5).

This mechanism involves the active implementation and use in the management system of elements of an integrated system using at each stage of the principles of international standards. The main condition for the implementation of the developed mechanism is the constant fulfillment of the condition of constant improvement of economic, environmental and social components. It is possible to realize it by development and introduction of ecological economically effective innovative technologies introduced at the enterprises of various forms of managing and kinds of activity..

Ensuring sustainable growth and a high level of competitiveness of Ukrainian enterprises in modern conditions is possible only on the basis of intensifying environmental, innovation and investment development, taking into account the latest requirements, in particular: environmental security, social protection and economic well-being

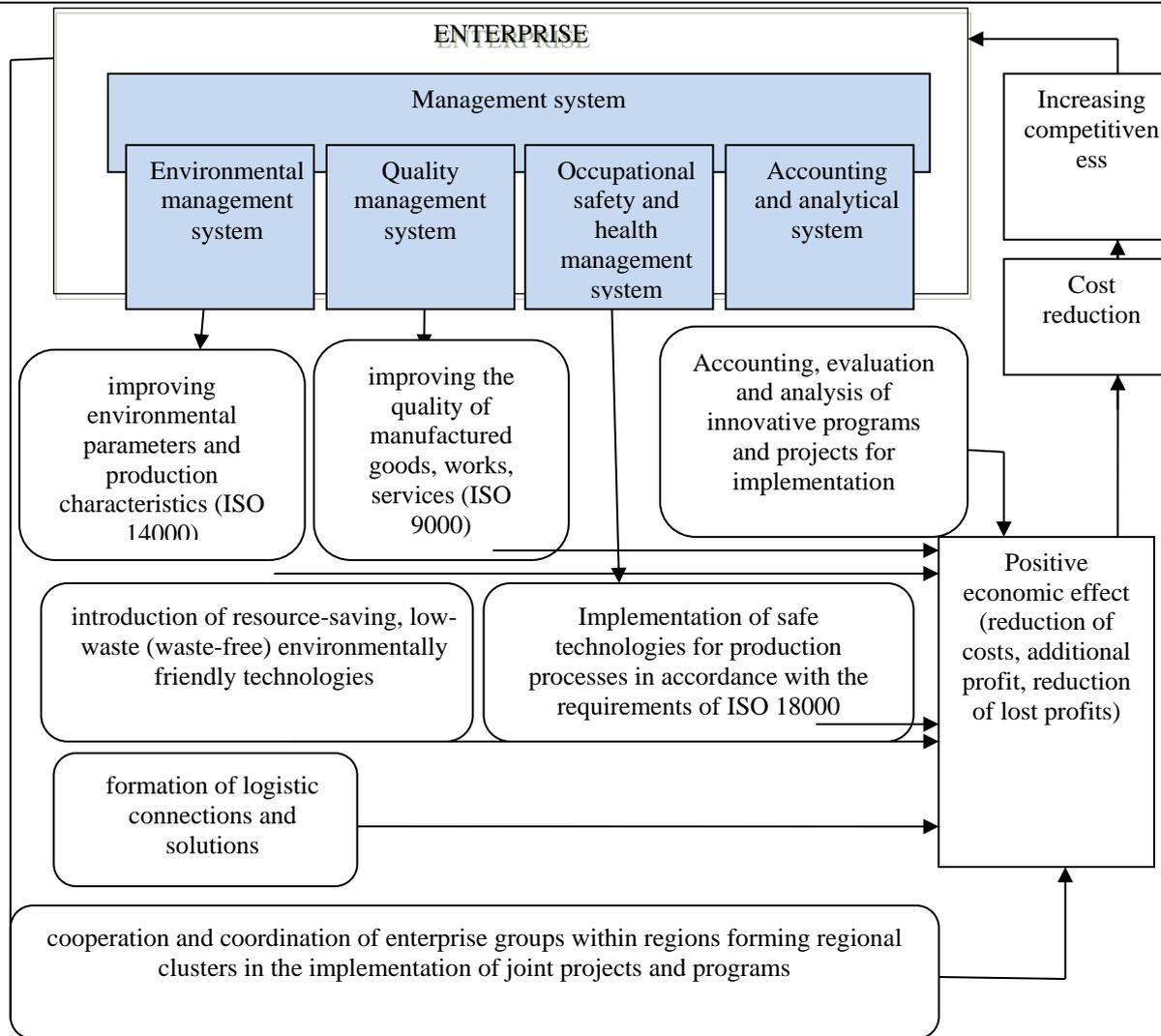


Fig. 5. The mechanism of increasing the competitiveness of enterprises in the domestic and international markets

Source: Own development

It is worth noting that in the business system, all industries can not exist separately from each other, because their activities are complementary, and therefore it is more appropriate to study them together and interact with each other (comprehensively) by sector.

In modern conditions, we consider it more appropriate to form a business with maximum use of all available benefits, which will ensure its competitiveness.

For example, using the advantages of regional clusters of enterprises that function interconnectedly with the joint use of resources, technologies, logistics - production becomes more efficient by creating added value within one territorial association.

This makes any project more efficient by saving on management, logistics costs, partnership, use of resources and raw materials..

Consequently, in Ukraine and the world there are practices of effective cooperation of enterprises of various organizational and legal forms and the private sector.

Failure to offer a competitive service or product and its price by large business structures necessitates

the involvement of private enterprises and households in cooperation.

Because, the simplified taxation system proposed in Ukraine allows households and small private entities to participate in market processes not only as an end consumer, but also as a direct participant.

Thanks to this scheme of business organization, all participants in the business process will feel the positive effect.

The ability to provide competitive services and goods to households and small and micro enterprises creates an environment in which the price offer depends on quality. This approach promotes the development of "healthy" market relations saturated with competition.

Thus, enterprises of different organizational and legal forms and sizes work closely together in a joint business scheme, forming an appropriate competitive environment.

In the interests of the state, it is important that clusters work within a single strategy for the development of the state. Therefore, in our opinion, it is expedient to create a coordinating cluster structure (institution) that will manage clusters within the framework of the main strategic tasks of the state

It should be noted that due to this, each region will have a similar cluster management scheme, using automated management systems to form a single information database and a transparent reporting system to ensure uniform distribution of state financial resources and opportunities to participate in various grand programs and projects..

The coordinating cluster body should not interfere in the work of the clusters themselves, but only promote the dissemination of accurate and complete information about markets, supply and demand, expand opportunities for interregional cooperation and form convenient for efficient logistics. An important task of the coordinating cluster body is to initiate and assist in the implementation of digitalization in all spheres of life of each of the cluster members.

For many years, discussions have been held to choose the type of organizational structure of the agricultural production cluster in Ukraine. However, we believe that the main thing is to understand the value of acquiring knowledge and developing innovative products based on them, which must be adapted to production. Their competitiveness depends on the priority of adapting cost-effective innovations in enterprises. It is worth noting that if the company has little intellectual potential, it needs the support of specialists.

Therefore, the most effective way to build a business is to form strong ties with participants in various fields of activity while creating a strong management system and a single information base. We believe that this is exactly the opportunity provided by the cluster structure. The most positive effect of cooperation in the cluster system is felt by agricultural enterprises, most of which are small and medium-sized in Poland, as well as in Ukraine. Since the most underdeveloped in the separate agricultural units is the management system and marketing system, when cooperating in such an association with scientific support, the company gets the opportunity of consulting, scientific support, knowledge in innovation, training and internships, business partnerships, additional markets, etc.

Consequently, we see the solution of such a problem in today's conditions for agricultural enterprises of Ukraine in the formation of territorial and sectoral corporate structures, which will be based on the principles of self-government.

The high level of digitalization and automation of production processes and a wide range of software products to service the production of various fields of activity makes it possible to combine all components of such a model into a single information database system for analysis for management decisions.

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