



# **THEORETICAL AND APPLIED ASPECTS OF SUSTAINABLE DEVELOPMENT**

**Monograph 33**

**Katowice**

**2020**



# **THEORETICAL AND APPLIED ASPECTS OF SUSTAINABLE DEVELOPMENT**

Edited by Tetyana Nestorenko and  
Aleksander Ostenda

Series of monographs Faculty  
of Architecture, Civil Engineering  
and Applied Arts  
Katowice School of Technology  
Monograph 33

**Publishing House of Katowice School of Technology, 2020**

**Editorial board :**

Tetyana Nestorenko – Prof. WST, PhD, Associate Professor, Berdyansk State Pedagogical University (Ukraine)

Aleksander Ostenda – Prof. WST, PhD, Rector of Katowice School of Technology

Natalia Afanasieva – Doctor of Psychological Sciences, Associate Professor, National University of Civil Defense of Ukraine (Ukraine),

Olena Chukurna – Doctor of Economic Sciences, Associate Professor, Odesa National Polytechnic University (Ukraine)

Paweł Mikos – Master, Katowice School of Technology

Anna Panasiewicz – Master, Katowice School of Technology

Victoriia Tsypko – Doctors of Pedagogical Sciences, Senior Researcher, Associate Professor, National Transport University (Ukraine)

Magdalena Wierzbik-Strońska – Vice-Rector, Katowice School of Technology

**Reviewers :**

*Tadeusz Pokusa – Prof. WSZiA, PhD, Vice-Rector of the Academy of Management and Administration in Opole*

*Olena Shenderuk – PhD, Associate Professor, Academy of the State Penitentiary Service (Ukraine)*

Series of monographs Faculty of Architecture, Civil Engineering and Applied Arts, Katowice School of Technology

Monograph · 33

The authors bear full responsible for the text, data, quotations and illustrations

Copyright by Katowice School of Technology, 2020

**ISBN 978-83-957298-0-5**

**Editorial compilation**

Publishing House of Katowice School of Technology  
43 Rolna str. 43 40-555 Katowice, Poland  
tel. 32 202 50 34, fax: 32 252 28 75

## **Part 3. APPLIED ASPECTS OF SUSTAINABLE DEVELOPMENT**

### **3.1. ENVIRONMENTAL ASPECTS OF SUSTAINABLE DEVELOPMENT**

The rapid development of the world economy in the second half of the twentieth century outlined a number of environmental issues globally.

At the UN World Conference on Environment and Development held in Rio de Janeiro in 1992, the term «sustainable development» was formally adopted – a development of a society that meets the needs of today without compromising the ability of future generations to meet their own needs (Кінаш, 2012).

Throughout its existence, humanity has given rise to a number of global environmental crises, including warming, ozone depletion, environmental pollution, desertification, acid rain, and biodiversity degradation.

According to researchers, during its existence, humanity has destroyed two-thirds of the forests. Ecologists say that only in the last 40 years, about half of the wet tropical forests where the planet's genetic biodiversity resources are concentrated have been destroyed on Earth. As noted in UNESCO documents, in the conditions of technogenic pressure of modern civilization, «genetic erosion» occurs – from 150 to 200 species of organisms disappear every year (Садовенко, 2011).

Currently, more than 2,5 billion people suffer from water-related diseases, contaminated or contaminated water. As a result of the development of civilization, the planet becomes a giant garbage dump because nature has no mechanism for the disposal and destruction of waste produced by humans (Садовенко, 2011).

All previous crises have been overcome, to a large extent, by the corresponding revolutionary actions of society, and human influence on nature has remained not as rapid and productive as in the last 50-60 years (UN, 2017).

In the middle of the twentieth century. The crisis in the relationship between society and nature has acquired a qualitatively new character – global, planetary.

The concept of sustainable development includes three main components: economic, social and environmental.

Economic – involves the optimal use of scarce natural resources, the use of environmental, environmental, resource and energy-saving technologies, as well as the corresponding forms of capital (natural and artificial).

Social – is human-centred and aimed at maintaining the stability of social and cultural systems, including the reduction of destructive conflicts between people.

Ecological – preserving the integrity of natural systems (UN 2017).

The immediate causes that led to an increase in anthropogenic impact were the rapid increase in the total population and the increase in the absolute value of consumption of natural resources per inhabitant of the Earth.

Conventionally, all the problems of degradation of the global ecological system are divided into two components:

1. Degradation and changes of the environment as a result of irrational economic development and use of the planet's natural resource potential, scarcity and depletion of natural resources for human development.

2. Environmental degradation as a result of its anthropogenic pollution (Державна стратегія..., 2000).

Limited natural resources are now becoming one of the most acute environmental problems. Solving environmental management tasks requires not only knowledge of the functioning of ecological systems, but also a certain moral education and awareness of the need to restructure social production and consumption. Currently, we live in a society characterized by wasteful use of resources.

For a conscious and qualified management of the economy and environmental management it is necessary:

- identify management objectives;
- develop programmatic achievements;
- create a mechanism for the implementation of tasks (Sustainable development. 2020).

At present, man is already approaching the limit of those possibilities that can be provided with the production properties of the biosphere. Thus, rational nature management is the only way out of the situation.

One of the main tasks of the rational management of natural resources is to develop and apply optimal ways of exploiting natural and artificial ecosystems.

The principle of rational nature management ensures the efficient use of natural resources, taking into account their possible reproduction. At the same time, the exploitation of natural resources is carried out simultaneously with a focus on sustainable development.

Rational nature management has the following features:

- using of natural resources should be accompanied by their restoration (for renewable natural resources);
- integrated use of natural resources;
- reuse of natural resources;
- environmental protection measures;
- introduction of the latest technologies in order to reduce the anthropogenic burden on the environment (FAO, 2002).

The world community is currently living in an era of progressive energy crisis. In the development of the world economy and scientific and technological progress, energy is playing an increasing role. At the same time, the rapidly developing energy economy is complex and multifaceted, and non-renewable sources such as gas and oil products, coal, and shale remain the main types of fuel.

At the same time, as a result of the intensive use of non-renewable energy sources for heating, vehicles, road-building machines, agricultural units and various household devices, a huge amount of carbon, sulfur and nitrogen oxides is formed. All this contributes to an increase in the temperature of the earth and water surface, causes environmental pollution, acid rain, and also stimulates intense melting of ice, raising the level of the oceans, flooding vast territories of land, the emergence of cyclones and hurricanes, spanning entire continents. These phenomena lead to large-scale destruction of agricultural land, the disappearance of forests and wildlife, increased reproduction of harmful insects, an increase in the frequency of droughts, forest fires, torrential rains, floods, etc.

With the development of industry – the main consumer of the energy industry, mankind begins to use all new types of resources, the so-called «non-traditional» energy sources, which include – solar and geothermal energy, tidal hydropower, wind and other non-traditional sources. In recent decades, valuable renewable energy sources include biohumus, which consists of bird droppings, animal manure, human waste and decaying vegetation (Sustainable development. 2020).

The use of these energy sources is caused by the need for significant financial costs for the exploration of new deposits, as often these works are associated with the organization of deep drilling (in particular, in offshore conditions) and other complex and high-tech technologies. As well as environmental issues associated with the extraction of energy resources (Sustainable development. 2020).

Therefore, the development of alternative solutions for energy use based on non-traditional approaches, as well as using renewable sources, is relevant.

The general objective of rational management of natural resources is to determine the appropriate directions for the use of natural resources depending on their properties, finding the best or best ways to exploit natural and artificial (for example, in agriculture) ecosystems.

Principles (rules) of environmental management and nature conservation.

Environmental management and conservation should be based on the following principles:

Forecasting rule: the use and protection of natural resources should be based on foresight and the maximum possible prevention of the negative consequences of environmental management.

The rule of increasing the intensity of natural resource development: the use of natural resources should be based on increasing the intensity of natural resource development, in particular, with the reduction or elimination of mineral losses during their extraction, enrichment and processing, transportation.

The rule of plural significance of objects and natural phenomena: the use and protection of natural resources should be carried out taking into account the interests of different sectors of the economy.

Complexity rule: the use of natural resources should be carried out in a complex, by various sectors of the national economy;

The rule of regionality: the use and protection of natural resources should be subject to local conditions.

The rule of indirect use and protection: the use or protection of one object of nature may lead to the indirect protection of another, and may harm it.

The rule of unity of use and nature conservation (basic principle): nature protection should be carried out in the process of its use (FAO, 2002).

A study of the processes taking place in the biosphere and the influence of human economic activity on them shows that only the creation of environmentally friendly and low-waste industries can prevent the depletion of natural resources and the degradation of the environment. The economic activity of people should be based on the principle of natural ecosystems that economically consume matter and energy and in which the waste of some organisms serves as a habitat for others, i.e. a closed circuit is carried out (Sustainable development. 2020).

An important place in the process of rational nature management is occupied by the issues of organizing environmental monitoring and ecological expertise of the environment, the natural resource potential of the territory in order to preserve biological and landscape diversity.

The most universal is integrated environmental monitoring of the environment.

Integrated environmental monitoring of the environment is the organization of a system for monitoring the state of environmental objects to assess their actual level of pollution and warn about emerging critical situations that are harmful to human health and other living organisms.

When conducting integrated environmental monitoring of the environment:

- a constant assessment of the environmental conditions of the human environment and biological objects (plants, animals, microorganisms, etc.) is carried out, as well as an assessment of the state and functional integrity of ecosystems;

- conditions are created for determining corrective actions in those cases when target indicators of environmental conditions are not achieved (Sustainable development. 2020).

The system of integrated environmental monitoring provides for: allocation of the object of observation; examination of the selected object of observation; drawing up an information model for the object of observation; measurement planning; assessment of the state of the object of observation and identification of its information model; forecasting changes in the state of the object of observation; presentation of information in a convenient form for use and bringing it to the consumer.

Environmental monitoring has arisen at the intersection of ecology, biology, geography, geophysics, geology and other sciences. There are various types of monitoring, depending on the criteria: bioecological (sanitary-hygienic), geoecological (natural-economic), biosphere (global), space, geophysical, climatic, biological, public health, social, etc.

Depending on the severity of anthropogenic impact, monitoring is distinguished between impact and background monitoring. Background (basic) monitoring – tracking of natural phenomena and processes taking place in a natural environment, without anthropogenic impact. It is carried out on the basis of biosphere reserves. Impact monitoring – tracking anthropogenic impacts in especially dangerous zones (FAO, 2002).

Depending on the scale of observation, monitoring is distinguished between global, regional and local.

Environmental monitoring points are located in large settlements, industrial and agricultural areas (cities, highways, territories of industrial and energy centres, nuclear power plants, oil fields, agricultural ecosystems with intensive use of pesticides and fertilizers, etc.).

Local monitoring (sanitary-hygienic, bioecological, impact) - the most important is monitoring the concentration of pollutants hazardous to natural ecosystems and humans in life-supporting environments:

- in atmospheric air: carbon oxides, nitrogen, sulfur dioxide, ozone, dust, aerosols, heavy metals, radionuclides, pesticides, benzo (a) pyrene, nitrogen, phosphorus, hydrocarbons;
- in surface waters: radionuclides, heavy metals, pesticides, benzo (a) pyrene, pH, mineralization, nitrogen, petroleum products, phenols, phosphorus;
- in soil: heavy metals, pesticides, radionuclides, petroleum products, benzo (a) pyrene, nitrogen, phosphorus;
- in biota: heavy metals, radionuclides, pesticides, benzo (a) pyrene, nitrogen, phosphorus (FAO, 2002)..

Regional monitoring (geosystem, natural and economic) – observations are made on the state of ecosystems of large natural and territorial complexes (river basins, forest ecosystems, agroecosystems, etc.), differences in their parameters from background territories are recorded due to anthropogenic impacts.

Global monitoring (biosphere, background) – changes in the biosphere as a whole are tracked. The objects of global monitoring are the atmosphere, hydrosphere, soil cover, flora and fauna, and the biosphere as a whole as the living environment of all mankind.

A special role in the environmental monitoring system is played by biological monitoring, that is, monitoring the biotic component of ecosystems (biota). Biological monitoring is the control of the state of the environment with the help of living organisms. The main method of biological monitoring is bioindication, which consists in recording any changes in biota caused by anthropogenic factors. The bioindication is the detection and determination of biologically and environmentally significant anthropogenic pressures based on the reaction of living organisms and their communities to them. Living organisms, by the presence, condition and behaviour of which can be judged on a change in the environment, are called bioindicators (Sustainable development. 2020).

Environmental monitoring allows you to quantify all of the negative processes in nature that cause human activity. It also allows you to see the positive results of environmental measures.

Ecological expertise – establishing compliance of the planned economic and other activities with environmental quality standards and environmental requirements, as well as determining the feasibility of the implementation of the object of environmental expertise in order to prevent possible adverse environmental impacts of this activity and related social consequences.

In Ukraine, the state environmental review and public environmental review are carried out in order to determine and limit the possible negative consequences of the implementation of the planned management, economic, investment, legislative and other activities on the environment and public health; maintaining a balance of interests of economic development and environmental protection, as well as preventing damage to third parties in the process of environmental management.

State ecological expertise is carried out by the authorized body in the field of environmental protection and local executive bodies within their competence. State environmental review is mandatory and must precede the adoption of legal, organizational and economic decisions regarding environmental management and environmental and public health impacts. Without a positive conclusion from the state environmental review, the implementation of the project is prohibited.

In recent decades, the problem of preserving biological diversity has been formulated, i.e. conservation of the entire set of biological species and their habitats existing on earth.

When using the concept of biological diversity, it must be understood that biological diversity is not equivalent to ecological well-being. First, in some cases, the formed stable ecosystems are monodominant and their destruction (for example, deforestation) leads to a change in the biogenesis and an increase in biological diversity. Environmental pollution can also lead to increased biodiversity, which is also associated with increased opportunities for interspecific competition.

Despite all the measures taken, the absolute amount of renewable natural resources – forests, arable land, suitable for drinking water reservoirs is decreasing from year to year. This suggests that they are not effective enough, and the declared tasks most often pursue political goals.

The environmental situation in Ukraine, despite the implementation of a number of environmental measures, remains extremely difficult. This situation is due to the voluntarist approach to the placement and expansion of industrial capacity without taking into account the environmental capabilities of the regions, which led to a very large man-made load on the environment, led to the violation of ecological balance, a significant change in habitat, increasing the incidence of flooding. Powerful giants of metallurgy, energy, chemistry, mining and coal industry, machine building and others are concentrated in Ukraine. For decades, no attention has been paid to improving the technical level and environmental safety of production. Fixed assets in the metallurgical and chemical industries are worn out by 60-70%, resulting in frequent accidents leading to accidental emissions and discharges of harmful substances into the environment. Financing and logistical support for the construction of nature protection objects and structures has been and continues to be carried out on a residual basis (Аналітичний звіт..., 2019).

Significant contribution to the pollutant emissions into the air is made by mobile sources: road, rail, sea, river and aviation, as well as agricultural and construction machinery, which is currently operated by more than 6 million units, according to the State Statistics Committee of Ukraine.

Monitoring of atmospheric air pollution is carried out at 171 stationary posts, which determine the content of 36 major pollutants (dust, sulfur dioxide, carbon monoxide, nitrogen dioxide and others). The largest contributors to air pollution are emissions from energy companies (over 30%), metallurgy (25%), coal (23%), chemical and petrochemical industries. And given that a number of thermal power plant have a pipe height of more than 300 m, these emissions from transboundary movements are also detrimental to many neighbor countries (Аналітичний звіт..., 2019).

As stated in the Law of Ukraine «On the Fundamental Principles (Strategy) of the State Environmental Policy of Ukraine for the Period up to 2030», air pollution is one of the most pressing environmental problems. Today, the level of air pollution in large cities and industrial regions is high despite the decline in production in Ukraine (Закон України..., 2019).

According to the World Health Organization, air pollution is a major environmental risk factor. The lower the levels of air pollution, the less cardiovascular and respiratory diseases in the long and short term (BOO3, 2018).

One of the forms of nature conservation, which is extremely important, are protected areas. The forms of protected areas in the world are very diverse: reserves, nature reserves, natural monuments, national and natural parks, botanical gardens, biosphere reserves. Protected areas currently account for about 1.6-2.0% of the world's land (FAO, 2002).

Reserves are the most perfect form of full protection, since they usually include an integral site, a natural complex and stop any economic use of natural resources. The protection of unique nature objects can be decided by the organization of a system of territories with a sparing regime of economic activity – reserves. One of the categories of protected natural habitats can also be considered natural (national) parks, the main task of which is recreational services for the population.

In Ukraine, there is a significant lag in the development of the system of territories and objects of the nature reserve fund (6.6% of the state area), compared with European countries (21.8%) (Уряд України..., 2020).



Currently, there are 19 nature reserves in Ukraine. 4 of them are in the zone of mixed forests (Polesky, Rovnensky, Drevlyansky, Cheremsky), in the forest-steppe zone – 3 (Rastochye, Medobory, Kanevsky), in the steppe zone – 7 (Dnieper-Orelysky, Kazantipsky, Lugansky, Opuksky, Ukrainian steppe, Elanets steppe, Mikhailovskaya virgin land), in the Carpathians – 1 (Gorgan), in the Crimean mountains – 4 (Karadag, Crimean, Cape Martyan, Yalta). As of 01.01.2020, there are 4 biosphere reserves in Ukraine – «Askania Nova named after FE Falz-Fein», «Chornomorsky», «Carpathian», «Danube» and «Chornobyl Radiation Biosphere Reserve» (Природно-заповідний фонд). Currently, Ukraine has 52 national natural parks (Уряд України..., 2020).

In June 1992, the Convention on Biological Diversity, ratified by more than 100 countries of the world, was signed at the Higher Earth Forum in Rio de Janeiro. The main objective of the Convention is the conservation of biological diversity and the sustainable use of its elements. The International Conference on Biosphere Reserves (Seville, 1995) developed the Seville Development Strategy and the role of biosphere reserves in the 21st century. Proposals for the creation of biosphere reserves are put forward by national governments (Декларація..., 2002).

Biosphere reserves should fulfil three complementary functions: a conservation function for the conservation of genetic resources, species, ecosystems and landscapes; a development function to promote sustainable economic and human development; logistical support function to support and encourage research, education, training and monitoring activities in connection with local, national and global activities undertaken to protect nature and sustainable development.

Each biosphere reserve should include a strictly protected zone, a buffer zone and a flexible transition zone where some types of agricultural activity can be carried out, settlements can be located or which can be used for other purposes and within which local administrative and scientific institutions, non-governmental organizations, cultural Societies, business circles and other partners work together for the sustainable development and rational use of the resources of this territory (Biosphere reserves..., 2000).

Biosphere reserves play an important new conservation role. They are not only a means of allowing the people living in these areas to develop in equilibrium with the natural environment, but also contribute to meeting the needs of society as a whole, showing the way to more sustainable future development.

Based on the environmental principles of sustainable development of Ukraine include a number of provisions, namely:

1. Formation of legislative and institutional framework for balanced development. The transition to balanced development is a new political challenge, not only for Ukraine but for other countries in the world.

2. Structural adjustment and greening of the economy. But, while maintaining the existing structure of the economy, it is impossible to achieve its real development, because every unit of GDP growth requires even greater expenditure of natural resources, even more pollution of the environment. Therefore, it is necessary to develop programs of structural restructuring and greening of the economy according to the innovation model, which envisages a significant increase in the share of technologically high production and the share of high-tech products in the economy, a significant expansion of the number of enterprises introducing innovations.

3. Conservation of biological and landscape diversity. Natural areas are at risk of theft. Conservation of biological and landscape diversity should be a national priority.

4. Addressing regional environmental problems in the context of the transition to balanced development and the realization that a geographical or spatial factor has a significant impact on development effectiveness (Садовенко, 2011).

#### **References:**

1. Аналітичний звіт «Базове дослідження стану та напрямів розвитку екологічної політики України та перспектив посилення участі організацій громадянського суспільства у розробці та впровадженні політик, дружніх до довкілля» (період: 2018 – січень 2019). Київ. 2019. [онлайн]. [Цитовано 7. 03. 2020.] Доступно онлайн:

- [https://www.irf.ua/wp-content/uploads/2019/12/baseline-research\\_report\\_publishing-dec-2019.pdf](https://www.irf.ua/wp-content/uploads/2019/12/baseline-research_report_publishing-dec-2019.pdf)
2. ВООЗ (2018) Качество атмосферного воздуха и здоровье. Основные факты. Информационный бюллетень. Всемирная организация здравоохранения. 02 мая 2018 года. [онлайн]. [Цитовано 7. 03. 2020.] Доступно онлайн: [https://www.who.int/ru/news-room/fact-sheets/detail/ambient-\(outdoor\)-air-qualityand-health](https://www.who.int/ru/news-room/fact-sheets/detail/ambient-(outdoor)-air-qualityand-health).
  3. Декларація та план виконання рішень Всесвітньої зустрічі на вищому рівні зі сталого розвитку. 26 серпня – 4 вересня 2002 року. Йоганнесбург, Південна Африка. К.: ПРООН/МПВСР, 2007. 97 с.
  4. Державна стратегія регіонального розвитку на період до 2020 року. Постанова КМУ від 6 серпня 2014 р. № 385 1. Програма дій «Порядок денний на ХХІ століття». К.: Інтелсфера, 2000. 360 с.
  5. Закон України «Про Основні засади (стратегію) державної екологічної політики України на період до 2030 року» від 28. 02. 2019 р. № 2697-VIII. [онлайн]. [Цитовано 7. 03. 2020.] Доступно онлайн: <https://zakon.rada.gov.ua/laws/show/2697-19>.
  6. КІНАШ, І. П. (2012) Сталий розвиток як парадигма суспільного зростання. Вісник Дніпропетровської державної фінансової академії: Економічні науки. 2012. № 1. С. 5-9.
  7. САДОВЕНКО, А., МАСЛОВСЬКА, Л., СЕРЕДА, В., ТИМОЧКО, Т. (2011) Сталий розвиток суспільства: навчальний посібник. К., 2011. 392 с.
  8. Природно-заповідний фонд України [онлайн]. [Цитовано 5. 03. 2020.] Доступно онлайн: <http://pzf.land.kiev.ua/pzf3.html>.
  9. Уряд України (2020) Програми діяльності Кабінету Міністрів України. Проект Концепції державної політики щодо досягнення цілі 9.7 «Українці зберігають природні екосистеми для нащадків» [онлайн]. [Цитовано 7. 03. 2020.] Доступно онлайн: <https://program.kmu.gov.ua/meta/ukrainci-zberigaut-prirodni-ekosistemi-dla-nasadkiv>.
  10. Biosphere reserves: special places for people and nature; illustrated synthetic report (2000) UNESCO Division of Ecological Sciences 1 rue Miollis. [online]. [Cited 2. 03. 2020.] Available online: <https://unesdoc.unesco.org/ark:/48223/pf0000121361>.
  11. FAO (2002) Environment in Decentralized Development. Economic and Institutional Issues. Training materials for agricultural. No. 44. Vito Cistulli Agricultural Policy Support Service. Policy Assistance Division, FAO, Rome. [online]. [Cited 7. 03. 2020.] Available online: <http://www.fao.org/3/y4256e/y4256e00.htm#Contents>.
  12. Sustainable development [online]. [Cited 5. 03. 2020.] Available online: [https://en.wikipedia.org/wiki/Sustainable\\_development](https://en.wikipedia.org/wiki/Sustainable_development).
  13. UN (2017) Our Common Future, Chapter 2: Towards Sustainable Development. UN Documents: Gathering a body of global a...3/21/2017. [online]. [Cited 7. 03. 2020.] Available online: <http://www.un-documents.net/ocf-02.htm>.

## ANNOTATION

### Part 1. THE ECONOMIC COMPONENT OF SUSTAINABLE DEVELOPMENT

#### 1.1. Nataliia Hembarska, Khrystyna Danylkiv, Khrystyna Gorbova. SOCIAL RESPONSIBILITY FOR BUSINESS AS AN INTEGRATED SUSTAINABLE DEVELOPMENT

The essence of the concept of sustainable development and the components that provide it in the process of doing business have been clarified. Priorities in achieving the desired results of sustainable development have been identified. The interpretation of the concept of corporate social responsibility by international organizations is considered. The characteristics of sustainable development have been isolated and their alignment with the components of business social responsibility according to international standards has been carried out. The models of corporate social responsibility are indicated. The conclusions about the causes and purpose of the concept of corporate social responsibility and its impact on sustainable development are made.

#### 1.2. Nadiya Dubrovina, Oksana Tulai, Erika Neubauerova. TENDENCIES OF FUNDING HEALTH CARE IN EU COUNTRIES: THE FEATURES AND PERSPECTIVES

The article considers the problems of functioning and financing mechanisms of national health care systems in the EU countries. The characteristics of the distribution of total government expenditure on health as percentage of GDP were studied on the sample of the values for EU countries for period of 2000-2018. The tendencies of the dynamics of total government expenditure on health as percentage of GDP were analyzed by means of linear trends and Holt's models and predicted values for next time period were given.

#### 1.3. Nataliia Ivasyshyna, Anton Palchyk. EVALUATION OF THE TOURIST ROUTE OPTIONS

The article describes the method of comparison of options of choice of tourist routes is considered in the work. A method of comparing passenger transportation routes with regard to the cost of transportation and the socio-economic cost of time spent by passengers is proposed. The cost of transporting passengers by bus depends on many factors: geometric elements of the highway, weather conditions and type of buses. It is suggested to take into account the speed reduction in settlements, at pedestrian crossings. The end result will be the sum of the cost of transportation and the monetary expression of the time spent by the bus passengers.

#### 1.4. Olha Khaietska. INVESTMENT ATTRACTIVENESS OF UKRAINIAN REGIONS IN CURRENT CONDITIONS

Attracting foreign investment is an important and topical issue for Ukraine. Improved investment attractiveness will lead to the emergence of new opportunities for the development of promising industries and regions of the country, improving economic stability, increasing business activity, will ensure the country's GDP growth.

The article defines the integral assessment of the investment attractiveness of the region and the factors that influence it. The importance of the factors and indicators that determine the investment attractiveness of the region is noted. The dynamics of capital investment by regions of Ukraine presented and analyzed, places of individual regions of Ukraine for the assessment of capital investments has identified, and it have noted that it is necessary to make a region in order to get a high rating.

The strategic goals and guidelines for enhancing the investment attractiveness of the national economy and the stages of the process of development of the investment infrastructure of the region are proposed.

### **1.5. Olena Polova. CONCEPTUAL FOUNDATIONS OF UKRAINE AGRARIAN SECTOR DEVELOPMENT**

The emergence of global economic chains has led to an intensification of competition between countries. For Ukraine, the agro-industrial complex has traditionally remained a priority and strategically important sector of the economy. The full utilization of the export potential of the country's agro-industrial complex plays an important role in its integration into the world economic space. Therefore, it is relevant to determine the conceptual basis for the development of the agricultural sector of Ukraine in the conditions of increased international competition. Ensuring the sustainable development of the agrarian sector of the economy is based on the realization of its multifunctional mission as a whole and the harmonization of the main components (economic, social and environmental) in particular.

### **1.6. Valentyna Smachylo, Taras Nalyvaiko. ADAPTIVE CONTROL OF THE PERSONNEL OF THE ENTERPRISES: THE THEORETICAL ASPECT**

The category "adaptive control" was identified, the basic approaches to its conception were determined and the author's vision statement was provided. The concept "the personnel of the enterprise" was defined. The structural and logical scheme of adaptive control was suggested, and also the hierarchy of adaptive control of the personnel of the enterprise was defined.

### **1.7. Yulia Stavskaya. THE COMMUNICATION COMPETENCE AS THE BASIS OF PROFESSIONALISM IN SOCIO-ETHICAL MARKETING**

The article examines the views of domestic and foreign scientists on the reorientation of production from the mass to the individual consumer; In a context where job creation in manufacturing is usually preceded by marketing research on individual demand, social communications begin to fulfill the functions of the "central nervous system", which provides vitality for the economy as a whole organism. The essence of the category "social and ethical marketing" is considered. It is proved that in the theory of social communication it is accepted to distinguish between practical and proper communicative effectiveness of social interaction. It is determined that the communication competence of the personal sale operator is defined as the system unity of four factors: communication knowledge, creativity, responsibility, initiative.

## **Part 2. THE ROLE OF EDUCATION IN SUSTAINABLE DEVELOPMENT**

### **2.1. Inna Siaska. THE CONCEPT OF SUSTAINABLE DEVELOPMENT AS A METHODOLOGICAL BASIS FOR THE ECOLOGICAL OF EDUCATION IN HIGHER PEDAGOGICAL INSTITUTIONS**

The article highlights the main approaches to understanding the concept of sustainable development in education. Its realization in higher pedagogical education of other countries is analyzed. The characteristic features of education for sustainable development are highlighted. The ways of introduction of education for sustainable development in the system of professional training of future teachers are established.

### **2.2. Zhanna Chernyakova, Mikhail Lyannoy, Tetiana Buhaienko, Yurii Kurnyshev. KEY COMPETENCIES IN THE CONTEXT OF EDUCATION FOR SUSTAINABLE DEVELOPMENT**

The main aim of the scientific study is to analyze the normative documents and recommendations in order to define the essence of the term «education for sustainable development». The pedagogical approaches to the education for sustainable development have been

described: the competence approach, the emancipatory approach. On the basis of analysis of normative documents and literature the classification of the key competencies is presented in the research. The characteristics of the competencies (systems thinking, anticipatory, normative, strategic, collaboration, critical thinking, self-awareness, integrated problem-solving) are offered. The pedagogical methods which help to foster the mentioned competencies are characterized and outlined in the study.

### **2.3. Tetiana Khrystova, Yevhen Karabanov, Inessa Rebar. IMPROVEMENT OF PROFESSIONAL COMPETENCE OF PHYSICAL CULTURE TEACHER IN THE SYSTEM OF POSTGRADUATE PEDAGOGICAL EDUCATION**

Based on the systematic analysis of scientific and pedagogical literature and generalization of own experience, the pedagogical conditions are grounded, which determine the level of professional competence of the teacher of physical culture in the postgraduate education system. A detailed description of each pedagogical condition is provided and its informative components are revealed, which positively influence the professional development, self-development and self-improvement of the teacher of physical culture during the period of advanced training, pedagogical staff. The generalized algorithm of technology of organization and holding of master classes in physical education at secondary school, which most effectively influence on dynamics of professional competence development of the teacher, is given.

### **2.4. Kateryna Kovalova. COMMUNICATIVE COMPETENCE IN THE SYSTEM OF EDUCATIONAL TRAINING OF FUTURE ENGINEERS-AGRARIANS**

The communicative competence in the system of professional training of future engineers-agrarians is studied. The structure of the professional competence of a specialist in which scientists distinguish communicative competence is examined. It is shown that the communicative competence is a necessary component of the professional development of future engineers-agrarians, which promotes their professional success, career growth and helps to meet the modern requirements of society. The specialists' communicative competence should include knowledge of professional terminology, the ability to use it in oral and written professional speech, based on their own internal motivation and experience, recognizing the need for self-improvement. In the article we define the model of formation of the communicative competence of a student. It includes motivational-emotional, gnostic, conative and reflexive components.

### **2.5. Olena Lakomova, Daria Shyian. TOURISM EDUCATIONAL PRACTICES AS THE TOURISM INDUSTRY SUSTAINABLE DEVELOPMENT GUARANTEE**

Tourism educational practice use as the guarantee of tourism industry sustainable development is analyzed in the article. The practice organization and completion basic stages are discussed, the main tourist sites are highlighted according to the different tourism types, the professional skills and abilities acquired by the students during the tourism educational practice are clarified.

### **2.6. Diana Lohvinova, Oleksandr Lohvinov. THE PROBLEM OF COGNITIVE PROCESSES STUDY THROUGH THE USE OF COMPUTER TECHNOLOGIES**

This article is devoted to the problem of attention development at school age, as well as the problem of development of methodological tools for studying its properties. The article presents a computerized method "Corrective Test", which allows to obtain quickly reliable data of concentration, switching and distribution of attention in a large sample of examined people, as well as to receive empirical data of high school students in relation to their educational progress at school.

## **2.7. Oksana Loiuk, Tetyana Gritchenko. THE ALGORITHM OF SCIENTIFIC CONCEPTS FORMATION IN THE JUNIOR PUPILS IN THE LEARNING PROCESS**

The article reveals the urgency of the problem of scientific concepts formation in junior pupils. The algorithm for the scientific concepts formation in junior pupils has been based on the synthesis of M. Maslova's concept of thinking integrity; Y. Ponomariov's research on the inner action plan; Yu. Kulyutkin and G. Sukhobskaya's position on transition from the operational components of visual-thinking to the content components of the conceptual, research psychologists (O. Kulchytska, O. Luk, O. Molyako, etc.) about the creative process structure; P. Halperin and N. Talyzina's research results concerning mental actions and concepts formation.

The conclusions about the algorithm effectiveness for the scientific concepts formation in junior Pupils in the process of studying the disciplines "I am in the world" and "Natural science" have been presented.

## **2.8. Svitlana Skvortsova, Anastasiia Ishchenko, Tetiana Britskan. USING OF INFORMATION AND COMMUNICATION TECHNOLOGIES IN THE PRIMARY SCHOOL TEACHER'S PROFESSIONAL ACTIVITY**

The article is devoted to the study of peculiarities of the use of information and communication technologies (ICT) by primary school teachers in their professional activities, in particular, with regard to the use of various online services for teachers. The work functions of the Ukrainian primary school teacher have been studied and on this basis a set of online services has been selected to help the teacher in his professional activity. The advantages and disadvantages of using the online services included in the complex are revealed. The results of a survey of teachers of primary school of Odessa region on the use of ICT in professional activity are presented. The results of diagnostics are analyzed and the main reasons that hinder the implementation of ICT in the professional activity of primary school teachers are found out.

## **2.9. Yuriy Slysarchuk, Olha Slyusarchuk. FORMATION OF COMPETENCES IT-PROFESSIONALS DURING PROJECT STUDY**

The ways of solving the problem of improving the quality of bachelor education in IT specialties are offered. Formation of competencies of future specialists is based on the technology of project-oriented study. Evaluation of competency formation indicators is made using scrum methodology

## **Part 3. APPLIED ASPECTS OF SUSTAINABLE DEVELOPMENT**

### **3.1. Oleksandr Nepsha, Olga Levada, Iryna Arsenenko, Larysa Donchenko, Larysa Prokhorova. ENVIRONMENTAL ASPECTS OF SUSTAINABLE DEVELOPMENT**

Limited natural resources are now becoming one of the most acute environmental problems. Solving environmental management tasks requires not only knowledge of the functioning of ecological systems, but also a certain moral education and awareness of the need to restructure social production and consumption. Environmental monitoring allows you to quantify all of the negative processes in nature that cause human activity. It also allows you to see the positive results of environmental measures.

### **3.2. Vadym Abyzov. SUSTAINABLE DESIGN. INNOVATIVE GREEN BUILDING MATERIALS**

The need of creating a harmonious environment and solving diverse and complex aspects related to its development and construction in line with the concept of sustainable development is a major and urgent task in front of modern architecture and construction science. In this regard, the

article discusses and summarizes the features and advantages of using innovative building materials, and in particular such as: recycled materials; traditional natural building materials made on the basis of modern technologies; nanomaterials. Various examples of their successful application in modern buildings are given.

### **3.3. Ina Isac, Ana Simac. ENHANCING INTERDISCIPLINARY CONNECTIONS BY APPROACHING THE ARTISTIC POTENTIAL**

The transmission of the values produced by experience from one generation to another gives rise to new needs, such as those of raising, socializing and culturalizing the younger generations. Educational systems reforms around the world are oriented towards global transformations with maximum efficiency in the educational process – what is learned should be attractive, easy to assimilate and useful. The development of creative-human skills allows the growth of an intelligent and praxiological generation. Arts have a substantial role in the realization of the meaning of learning contents and offer students an abundant source of means of self-expression in arts – both mental and communicative. These are essential for formulating their own meaning, but also for understanding the messages transmitted from outside and act as a link between all the cultural and scientific fields in school.

### **3.4. Tetiana Koliada-Berezovska, Olga Romanova. DIGITALIZATION OF EDUCATION FOR THE SUSTAINABLE DEVELOPMENT SAKE: LINGUISTIC ASPECT**

The education is considered in the context of modern society's basic processes digital transformation, therefore analyzed are that digitization communicative, terminological, and linguistic aspects. Attention is paid to the most debatable categories of scientific discourse, new trends and opportunities in linguistics, while emphasizing the fact that digital technologies in the course of teaching a non-native language contribute to the sustainable development of the independent, extra-curricular work skills, since these types of educational activities are specific with their developing, stimulating and researcher functions, and the classes' distant-learning format gives every ground to speak here about a fundamentally new principle of linguistic-educational activity organization, based on a motivated attitude towards self-education and self-improvement as sustainable personal development components.

### **3.5. Andrii Lagun, Nataliia Kukharska. INTERDISCIPLINARY CONNECTS FOR EDUCATIONAL PROGRAMS IN THE SPECIALTY "CYBERSECURITY"**

The nowadays issues of modern society is tied with cybernetic threats and terrorism and tell the universities requirements of quality of studies for future information security professionals. In this article it is considered features of creating the new education program following the new Ukrainian standard for preparation bachelors in the specialty "Cybersecurity". Also there are full analysis of interdisciplinary connects and features for creating new fundamental and professional modules using educational program. These modules were coordinated by employers.

### **3.6. Iryna Mironova. EDUCATION DEVELOPMENT OF THE POLISH POPULATION IN SOUTHERN UKRAINE (FROM IMPERIAL TIMES TO THE PRESENT)**

The article covers the development of Polish community education in Southern Ukraine in the imperial, Soviet and modern epochs. It is specified number of the Polish population, the percentage of educated persons and the number of Polish educational institutions in the region by census results 1897, 1926 and 2001. The primary focus is on the opening of Polish language teaching schools. The negative ideological pressure of the imperial and Soviet governments on Poles' education, aimed at the continuous Russification of the population, is revealed. The role of the independent Ukraine government and non-governmental organizations in reviving the language, education and culture of the Polish population in the country is shown.

### **3.7. Tatiana Spirina, Marina Sytnik. AGGRESSIVE BEHAVIOR OF TEENAGERS: CAUSES AND CONSEQUENCES**

In today's conditions of much more liberal values, a certain level of individual aggression becomes a factor not only of social adaptation and the survival of a part of the population. And in this context, an important role is played by the study of forms of its manifestation, which, in particular, may include criticism, humor, attempts to build a career by identifying the shortcomings of their competitors, unwillingness to start a family, participating in protests and active position in social networks. The article deals with the analysis of various manifestations of aggression and aggression in the teenage environment, and analyzes the causes and consequences of adolescent aggressive behaviour.

### **3.8. Inna Pidbereznykh. INTERNATIONAL EDUCATION STRATEGY IN THE ASEAN COUNTRIES' POLICIES**

The current study explores contemporary trends, challenges, and opportunities in the ASEAN (Association of Southeast Asian Nations) region toward developing a culture of harmonization among all nations and determining how the internationalization of higher education can assist in this process. Explores different reform agendas undertaken by policy-makers of some South-East Asian countries and examines the development of the regionalization and inter-regionalization processes of higher education as a challenge to the narrow focus of a center-periphery framework. The internationalization of higher education over the last two decades has transformed the education sector into a globalized, interconnected knowledge-based society. Higher education institutions and national governments have been compelled to pay more attention to academic relations and knowledge exchange opportunities with partners in other countries, particularly in the same region. The current study aims to investigate the role of higher education internationalization in Southeast Asian nations for the development of a more harmonized region. An exploratory comparative approach has been used to identify and investigate recent internationalization trends in ASEAN member countries. The internationalization of higher education is a compelling and logical approach to increasing harmonization at the intra-regional and interregional levels. ASEAN has looked to the architecture and initiatives of the European Higher Education Area as a source of inspiration. Should it wish to, the approach to the development of an ASEAN Higher Education Area will be qualitatively different. This has as much to do with the paradigmatic differences between these two regional communities as their structural differences.

### **3.9. Nataliia Shevchenko. THE CONTRIBUTION OF POLISH SCIENTISTS TO THE DEVELOPMENT OF EDUCATION AND SCIENCE IN THE SOUTH OF UKRAINE (SECOND HALF OF XIX – BEGINNING OF XX CENTURIES)**

The article highlights the contribution of Polish scientists to the development of education and science in Southern Ukraine in the second half of the XIX and early XX centuries. In particular, it is disclosed an activity of A. Artsymovych, as appointed trustee of the Odesa Educational District, his work in the course of reforming higher, secondary and elementary education in the region, as well as the opening of Novorossia University in Odesa. Particular attention is paid to the scientific activity in the field of natural sciences of the following professors of the University: L. Tsenkovsky, F. Kamensky, B. Verigo, V. Rotert, F. Porodko, B. Grinevetsky, L. Berkevych, O. Verigo. The role of J. Pachoski and S. Mokrzhetsky in the foundation of the Kherson and Tavria Natural and Historical Museums is shown.



## ABOUT THE AUTHORS

### Part 1. THE ECONOMIC COMPONENT OF SUSTAINABLE DEVELOPMENT

**1.1. Nataliia Hembarska** – PhD in Economics, Senior Lecturer, Institute of Entrepreneurship and Advanced Technologies, Lviv Polytechnic National University, Lviv, Ukraine

**Khrystyna Danylkiv** – PhD in Economics, Senior Lecturer, Institute of Entrepreneurship and Advanced Technologies, Lviv Polytechnic National University, Lviv, Ukraine

**Khrystyna Gorbova** – PhD in Economics, Senior Lecturer, Institute of Entrepreneurship and Advanced Technologies, Lviv Polytechnic National University, Lviv, Ukraine

**1.2. Nadiya Dubrovina** – CSc., PhD, Associate Professor, School of Economics and Management in Public Administration in Bratislava, Bratislava, Slovakia

**Oksana Tulai** – Doctor in Economics, Professor, Ternopil National University of Economics, Ternopil, Ukraine

**Erika Neubauerova** – PhD, Associate Professor, Comenius University, Bratislava, Slovakia

**1.3. Nataliia Ivasyshyna** – PhD in Economics, Associate Professor, National Transport University, Kyiv, Ukraine

**Anton Palchyk** – Postgraduate Student, National Transport University, Kyiv, Ukraine

**1.4. Olha Khaietska** – PhD in Economics, Associate Professor, Vinnytsia National Agrarian University, Vinnytsia, Ukraine

**1.5. Olena Polova** – Doctor in Economics, Associate Professor, Vinnytsia National Agrarian University, Vinnytsia, Ukraine

**1.6. Valentyna Smachylo** – PhD in Economics, Associate Professor, Kharkiv National University of Civil Engineering and Architecture, Kharkiv, Ukraine

**Taras Nalyvaiko** – Postgraduate Student, Kharkiv National University of Civil Engineering and Architecture, Kharkiv, Ukraine

**1.7. Yulia Stavska** – PhD in Economics, Associate Professor, Vinnytsia National Agrarian University, Vinnytsia, Ukraine

### Part 2. THE ROLE OF EDUCATION IN SUSTAINABLE DEVELOPMENT

**2.1. Inna Siaska** – PhD, Associate Professor, Rivne State University of Humanities, Rivne, Ukraine

**2.2. Zhanna Chernyakova** – PhD of Pedagogical Sciences, Associate Professor, Sumy State Pedagogical University named after A. S. Makarenko, Sumy, Ukraine

**Mikhail Lyannoy** – PhD of Pedagogical Sciences, Professor, Sumy State Pedagogical University named after A. S. Makarenko, Sumy, Ukraine

**Tetiana Buhaienko** – PhD of Pedagogical Sciences, Senior Teacher, Sumy State Pedagogical University named after A. S. Makarenko, Sumy, Ukraine

**Yurii Kurnyshev** – PhD of Pedagogical Sciences, Associate Professor, Yuriy Fedkovych Chernivtsi National University, Chernivtsi, Ukraine

**2.3. Tetiana Khrystova** – Doctor of Biological Sciences, Professor, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**Yevhen Karabanov** – PhD in Physical Education and Sport, Senior Lecturer, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**Inessa Rebar** – Senior Lecturer, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**2.4. Kateryna Kovalova** – PhD of Pedagogical Sciences, Associate Professor, Vinnytsia National Agrarian University, Vinnytsia, Ukraine

**2.5. Olena Lakomova** – PhD in Geography, Senior Lecturer, Kryvyi Rih State Pedagogical University, Kryvyi Rih, Ukraine

**Daria Shyian** – PhD in Geography, Senior Lecturer, Kryvyi Rih State Pedagogical University, Kryvyi Rih, Ukraine

**2.6. Diana Lohvinova** – PhD of Psychological Science, Associate Professor, Donbas State Pedagogical University, Slovyansk, Ukraine

**Oleksandr Lohvinov** – Student, Kharkiv National University of Radio Electronics, Kharkiv, Ukraine

**2.7. Oksana Loiuk** – PhD of Pedagogical Sciences, Senior Lecturer, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine

**Tetyana Gritchenko** – PhD of Pedagogical Sciences, Associate Professor, Pavlo Tychyna Uman State Pedagogical University, Uman, Ukraine

**2.8. Svitlana Skvortsova** – Doctor of Pedagogic Sciences, Professor, South Ukrainian National Pedagogical University named after K. Ushynsky, Odesa, Ukraine

**Anastasiia Ishchenko** – Senior Lecturer, South Ukrainian National Pedagogical University named after K. Ushynsky, Odesa, Ukraine

**Tetiana Britskan** – Postgraduate Student, Izmail State University of Humanities, Izmail, Ukraine

**2.9. Yuriy Slysarchuk** – PhD of Physical and Mathematical Sciences, Associate Professor, Institute of Enterprise and Advanced Technologies Lviv Polytechnic National University, Lviv, Ukraine

**Olha Slyusarchuk** – PhD of Physical and Mathematical Sciences, Associate Professor, Lviv Polytechnic National University, Lviv, Ukraine

### **Part 3. APPLIED ASPECTS OF SUSTAINABLE DEVELOPMENT**

**3.1. Oleksandr Nepsha** – Senior Lecturer, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**Olga Levada** – PhD of Geographical Sciences, Associate Professor, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**Iryna Arsenenko** – PhD of Geographical Sciences, Associate Professor, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**Larysa Donchenko** – PhD of Geographical Sciences, Associate Professor, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**Larysa Prokhorova** – PhD of Geological Sciences, Associate Professor, Bogdan Khmelnytsky Melitopol State Pedagogical University, Melitopol, Ukraine

**3.2. Vadym Abyzov** – Doctor in Architecture, Professor, Kyiv National University of Technology and Design, Kyiv, Ukraine

**3.3. Ina Isac** – PhD, Ion Creangă State Pedagogic University in Chisinau, Chisinau, Moldova

**Ana Simac** – PhD, Associate Professor, conf. univ. dr., Ion Creangă State Pedagogic University in Chisinau, Chisinau, Moldova

**3.4. Tetiana Koliada-Berezovska** – PhD in Philology, Associate Professor, Odesa National Polytechnic University, Odesa, Ukraine

**Olga Romanova** – PhD in Philology, Associate Professor, Odesa National Polytechnic University, Odesa, Ukraine

**3.5. Andrii Lagun** – PhD of Technical Sciences, Associate Professor, Lviv Polytechnic National University, Lviv, Ukraine

**Nataliia Kukharska** – PhD of Physical and Mathematical Sciences, Associate Professor, Lviv State University of Life Safety, Lviv, Ukraine

**3.6. Iryna Mironova** – Doctor of Historical Sciences, Associate Professor, Petro Mohyla Black Sea National University, Mykolaiv, Ukraine

**3.7. Tatiana Spirina** – PhD of Pedagogical Sciences, Associate Professor, Borys Grinchenko Kyiv University, Kyiv, Ukraine

**Marina Sytnik** – Master`s Degree, Associate Professor, Borys Grinchenko Kyiv University, Kyiv, Ukraine

**3.8. Inna Pidbereznykh** – PhD of Historical Sciences, Associate Professor, Petro Mohyla Black Sea National University, Mykolaiv, Ukraine

**3.9. Nataliia Shevchenko** – PhD of Historical Sciences, Senior Lecturer, Petro Mohyla Black Sea National University, Mykolaiv, Ukraine



**ISBN 978-83-957298-0-5**