

THE CONCEPT OF DEVELOPING A "BLUE ECONOMY" AS A BASIS FOR SUSTAINABLE DEVELOPMENT

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Abstract. The *relevance* of the problem under study is that the concept of the development of the "blue economy" represents the most modern development of ecopolises based on the ingenuity of ecosystems and the provision of numerous products and services on which human life and humanity depend. The *aim* of the article is to create conditions for the development of a "blue economy" as the basis of an ecologically sustainable ecopolis, in which a new culture of agro-ecology is revived as a new type of agricultural product. This study identifies the problems of today's agricultural production model, which generates a lot of waste and leads to genetic manipulation. The "blue economy" as a new direction of production cultivates the effective development of waste potential, demonstrating the evolutionary path of nature, which restores its balance and evolves from scarcity to abundance. The *main approach* of the study is the systemic method, which makes it possible to show the development of the "blue economy" as a system consisting of interconnected components that function as a whole, as well as methods for modelling the processes of a regenerative economy, of which the "blue economy" is a variety. People live in a complex system of the natural environment, in which they face the problems of environmental pollution, the overcoming of which leads to the need for new types of circular economy, of which the blue economy is a variant. The article analyses the conditions for the emergence of a "blue economy" based on the ingenuity of ecosystems to continue to provide humanity with the best products on which the quality of sustainable human life and the capacity of society to renew itself depend. Today's agricultural production is a model that produces a lot of waste, which can be used to process weeds, to make animal feed and to develop "coffee chemistry" by growing mushrooms on coffee biomass. The "blue economy" as a new direction of agricultural production can be a response to the innovative development of the food industry – from food to the production of animal feed and ingredients for cosmetics – which represents the formation of new values of the "blue economy" as a sustainable provision of new products. The combination of sustainable agriculture, new agricultural production and human health requires innovation and the development of the blue economy as a new culture of agroecology – environmentally friendly products and food.

Key words: agricultural production, "blue economy", sustainable development, ecopolises, agro-ecology.

JEL Classification: A13, B49, O39, P16, P49, Z10

1. Introduction

The *relevance of the problem under study* lies in the fact that the concept of "blue economy" development is one of the directions of transformation of agriculture, which is based on the modern development of ecopolises, based on the ingenuity of

ecosystems and the provision of numerous products and services on which human life and humanity depend. In 1982, Ashok Khosla created the organization Development Alternatives, with a guaranteed project in the amount of \$100,000, which was funded by the UN Environment Program (UNEP) and aimed

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at efficient implementation of the environmental mission (Sharma, 2018). Development Alternatives began by analysing the changes needed in existing economic systems, society and governance to ensure the health of the environment and renew it for future generations. It is based on the idea that technology should generate waste, respond to people's basic needs and be the main tool for preserving the environment. For the development of "blue economy" were established other organizations such as "Technology and Action for Rural Advancement" (TARA), "Research and Development Innovation Centers", which develop special technologies of environmental sustainability, conservation of healthy land, water and forest resources, overcome the poverty problems, environmental and technological security preservation (Voronkova, & Nikitenko, 2022). The aims of the organization "Technology and Action for Rural Advancement" (TARA) were aimed at increasing the housing construction in rural areas, the search for renewable energy technologies, water management, waste management and recycling, which should lead to the agricultural sustainability. This concept is based on a new understanding of the economy as a subsystem of society and nature, a tool for achieving a socially just and environmentally stable future, because the planet does not have time to renew itself and the state increases the volume

of production, wasting resources and causing many problems with risks, crises, instability, uncertainty and volatility of development (Buhaychuk, Nikitenko Voronkova, Andriukaitiene, & Malys, 2022). Geldermann and Kogel states that considerations of global agricultural production in the future must take into account the certainty that the world population will increase (Geldermann and Kogel, 2002). Figure 1 shows the growth in the number of people to a projected 9.5 billion in 2050. UN reports predict population growth only in developing and emerging countries. Any consideration of global agricultural production in the future must take into account the certainty that the world's population will increase.

What are the strategies for agricultural production to sustain food for a growing human population? A powerful vision of sustainable development has emerged from global discussions about the limits of agriculture. Terms such as limitation, sustainability, sufficient supply, equitable distribution, and productivity of resources are no longer obstacles, but guidelines for a fairer and safer world. Natures Concept focuses on biological and ecological principles. On this basis, criteria for action must be defined in order to determine the long-term economic consequences of agricultural production. More than ever, the solution to sustainable agriculture lies in

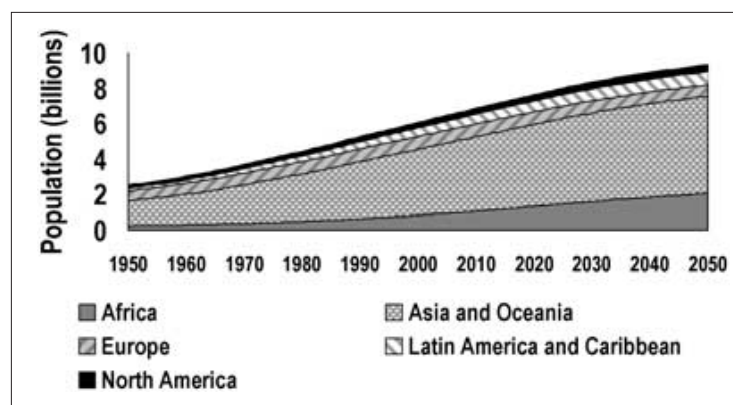


Figure 1. World population changes

Source: (Geldermann and Kogel, 2002)

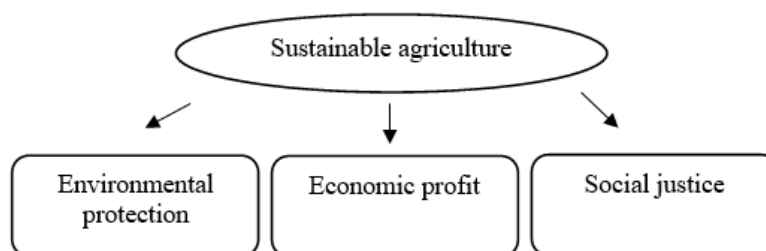


Figure 2. Schematic representation of sustainable agriculture

Source: (Blazheva, 2020)

the scientific development of tools for sound resource management (Geldermann and Kogel, 2002).

The concept of sustainability is based on the idea that the needs of humanity today must be met without compromising the ability of future generations to meet their own needs (Figure 2).

2. Literature analysis and problem statement

A seminal work of new thinking was the Club of Rome's first report, "The Limits to Growth" (1972), which forced us to think about the physical limits to human economic growth. The focus will be on the book by Donella Meadows, Jorgen Randers, and Dennis Meadows, "The Limits to Growth". Thirty years later, based on information from the second half of the twentieth century, information emerged about the depletion of global natural resources and the limited assimilative capacity of the planetary ecosystem. An updated study by representatives of the Club of Rome concludes that if economic growth rates remain unchanged, the depletion of natural resources and significant pollution will lead to the ultimate destruction of the world's systems (Meadows Donella, Randers Jorgen, Meadows Dennis, 2018).

3. Purpose and tasks of the study

The *purpose of the article* is to formulate the concept of the "blue economy" as the basis for the ecologically sustainable development of an ecopolis, which revives a new culture of agroecology as a new type of agricultural production. *Research objectives*: 1) to study the problems of agricultural development and outline the transition to a new development paradigm; 2) to formulate the main provisions of the new concept of the "blue economy"; 3) to investigate the innovative development of agricultural production as a basis for the development of the "blue economy" concept; 4) to clarify the main directions of development of the "ecopolis" as a basis for the development of the "blue economy" concept (Nikitenko, Voronkova, Andriukaitiene, Oleksenko, 2021).

4. Research materials and methods

The leading approach to the study is a systematic approach, which allows to show the development of the "blue economy" as a system consisting of interconnected components of subsystems that function as a whole, as well as modeling the processes of the regenerative economy, of which the "blue economy" is a type. The methodology of system dynamics and modern computer capabilities developed by the authors of the Club of Rome helped to create

an environmentally balanced and socially oriented model of the economy that will bring prosperity to all. To do this, it is necessary to revise the worldview, behavioral and political models, develop new trends, and model new development scenarios (Voronkova, Kaganov, & Metelenko, 2022).

5. Research result

In 2009 Günter Pauli published the local economic development concept as a possible draft report to the Roman Club under the title "The Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs" (The Blue Economy: 10 Years, 100 Innovations, 100 Million Jobs). He started from the assumption that nature has overcome all the challenges and ways for human survival throughout its existence, which can be built on the ingenuity of ecosystems that continue to provide humanity with numerous products and services, contributing to the renewal of environmentally friendly products. Günter Pauli formulated some fundamental principles of the "blue economy" concept, which helps transform many industrial sectors through recycling products from waste and functions better and more efficiently as a hope for human and human survival (Voronkova, Nikitenko Teslenko, Bilohur, 2020).

1. *The problems of agricultural development* are related to the fact that the old development paradigm is based on deindustrialization, inequality, and constant economic growth through aggressive expansion, which has gradually degenerated into an economy of absurd speculation. Therefore, scientists have developed a qualitatively new concept of the "blue economy" as a new innovative philosophy of the production and consumption system that uses the properties of nature, optimizes natural processes, and demonstrates nature's ability to recover. The "blue economy" as a new concept opposes the outdated market fundamentalism with a new anthropocentrism, demonstrates the evolutionary path of nature, which restores its balance and evolves from scarcity to wealth (Kyrychenko, 2019).

2. *These changes in agriculture have been facilitated by*: 1) depletion of the stratospheric ozone layer; 2) loss of biodiversity and extinction of many biological species; 3) chemical pollution and newer chemical releases (radioactive materials, genetically modified organisms, nanomaterials that have the potential for undesirable geophysical and/or biological effects); 4) climate change; 5) ocean acidification; 6) landscape changes; 7) saltwater use and the global hydrological cycle; 8) nitrogen and phosphorus inputs to the biosphere and oceans; 9) atmospheric aerosol concentrations. Modern, innovative agricultural production is a model of economic development with the use of many wastes in further processing,

for example, weeds for animal feed or the mushroom growing on coffee biomass (Boschen-Rose, Ferreira, Johnson, and Gianni, 2020).

3. *The main provisions of the new concept of the "blue economy"*. The Blue Economy is based on the ingenuity of ecosystems that continue to provide humanity with the best products on which the quality of sustainable human life and society's ability to renew itself depend. There is no unemployment problem in ecosystems, so the implementation of the blue economy concept improves the life of biopolises and their quality, develops new business models that increase the efficiency of resource use, and generates new ways of producing different types of food using mainly local resources (Blazheva, 2020).

In this regard, there are examples of the introduction of a "blue economy" of final consumption based on the consistent development of natural resources, such as the cultivation of mushrooms on coffee biomass plantations, which is called "coffee chemistry". The fermentation process leads to the use of only a tiny part of it, and the rest is disposed of as waste, so the critical factor in development depends on the availability of raw materials. The "coffee logic" can be applied to the production of other products – tea and dozens of other crops – combining innovations that can change toxic chemicals, generate income and create new jobs (Uhl, and Hanslik, 2017).

To develop a "blue economy," it is possible to use various types of waste products, such as weeds, and process them into a variety of biochemicals, and recycle the waste back into animal feed, which could then be the answer to many of society's needs. The cultivation of seaweed, mussels, oysters and lobsters was a new and effective way to revive healthy seafood production. A wide variety of foods can be grown in this way, from animal feed to all kinds of ingredients for cosmetics and pharmaceuticals, and all the waste can be turned into fertilizer. All this lends itself to the creation of a philosophy of new "blue economy" values, in the context of lower investment costs, more efficient results, more jobs and innovative development of food products (Li, Bao, Sun, Wang, 2019).

As Zhang (2020) pointed out, the concept of sustainable development has become the main development concept. With the gradual deepening of the concept of sustainable development, the blue economy has become the main voice calling for a more rigorous accounting of marine resources (Zhang, 2020). Boschen-Rose (2020) asserts that improving the management and governance of marine resources requires linking science and socio-economics, which is key to the development of the Blue Economy. The sustainable growth of the Blue Economy (Blue Growth) requires robust scientific

information on the marine environment, detailed knowledge of the activities taking place in the ocean space, and a comprehensive understanding of the environmental impacts (Rios, Charnley, 2016).

The development of the "Blue Economy" concept is based on: 1) the concept of "renewable energy sources", wind and solar energy technologies, on which agroecology is based; 2) the concept of circular metabolism, that is, the return of nitrogen, phosphate and potassium to new agricultural land, which contributes to the revival of agricultural production; 3) the concept of urban revitalization, based on the revival of culture, education, science, new investments in their development (Cherep A., Cherep O., Krylov, Voronkova, 2019).

According to Uhl, A. and Hanslik, O. (Uhl, Hanslik, 2017), innovation is a prerequisite for the continued existence of a prosperous society and its survival in a competitive economic environment. Following this path, the blue economy approach promises a combination of sustainability, innovation and competitiveness. The basic idea is to rediscover traditional business models and processes under the premise of using sustainable resources. Existing principles from physics and chemistry are combined to create new business models while making a significant contribution to environmental protection (Kyrychenko, Nikitenko, Voronkova, Harbar, Fursin, 2021).

Innovative development of agricultural production as a basis for the development of the concept of "blue economy". The concept of "blue economy" as a new direction of agricultural production can become a response to the *innovative development* of industry, as already mentioned, from food to the production of animal feed and ingredients for cosmetics, which represents the formation of new values of the "blue economy" as a sustainable provision of new products. The combination of food security, sustainable agriculture and health protection requires entrepreneurs to implement innovations in various areas – social, technological, managerial and organizational, creating such development tools that help redesign processes in relation to the standards and requirements of eco-civilization – producing high quality products, free from large quantities of chemicals (Cherep, Voronkova, Kurdupa, 2021).

Innovation in agriculture, often called technological progress, gradually increases the productive potential of the economy, which is facilitated by the development of science, technology, social science and management science, – notes Chandran Nair (Chandran Nair, 2020). Innovations in agriculture can become a locomotive of technological and social transformations and serve as a basis for building an ecopolis. The economy of innovation in ecopolises leads to constant regeneration of knowledge, thanks

to which they have the opportunity to increase their capitalization. If primary economy works with limited and non-renewable sources of natural resources, which come to their exhaustion and depreciation of assets of traditional industries, in "economy of innovation" of ecopolises the main assets are transferred from knowledge production to processing of raw materials. According to Blazheva (2020), in *smart agriculture* or future agriculture, the so-called third green revolution driver is the concept of connected smart machines and sensors integrated into farms to make data-driven and data-activated agricultural processes. Smart Farming enables the potential of an *intelligent network* of sensors, actuators, cameras, robots, drones, and other connected devices to deliver unprecedented levels of control and *automated* decision making, enabling the creation of a sustainable, *innovative ecosystem*. (Melnik, 2019)

Circular production is known as closed-loop agriculture: a farming method in harmony with nature, not against it. Residues from one chain are raw materials for another (Cherep, Voronkova, Kurdupa, 2021). The focus of circular agriculture is on reducing the use of raw materials, not on mass production at the lowest possible price. At the

European level, the circular economy is expected to increase global competitiveness, stimulate sustainable economic growth and create new jobs.

The circular economy of resource-based industries embraces the goal of sustainable development and requires that economic activities be conducted according to natural ecosystem patterns. It is a new mode of economic development, and it is a repeated flow process of "resources-products-recycled resources" (Chandran Nair, 2020). At the heart of the "new economy" concept is new knowledge, which is transformed into innovation and then into capital as a self-growing value (Nikitenko, Andriukaitiene, & Punchenko, 2019).

4. *The main directions of development of "ecopolis" as a basis for development of the concept of "blue economy"*. Ecopolis is a regenerative city that stimulates the return of rural activities to the city, such as the development of horticulture or renewable energy, which reduces dependence on exhaust fuels, in accordance with the basic laws of ecology (Nikitenko, 2020).

Synonymous with "ecopolis" is the biopolis as an ecologically clean city with zero waste, which is also recycled, where people live in harmony with nature and regenerate the nature and culture of the city.



Figure 3. Circular agriculture model

Source: <https://agri.bg/novini/predstavayat-modeli-na-kragovata-ikononika-v-zemedeletio>, 12.06.2020, cit. Blazheva (2020)

Ecopolis creates regenerative urban systems of production, consumption, and transportation that develop a new concept of services. Thus, in connection with the implementation of the concept of "Five Factors" there is a fivefold increase in resources in agriculture, which in turn ensures the stability of product quality and the achievement of sustainable development of agriculture (Rybalchenko, Bilohur, Oleksenko, Voronkova, Verkhovod, 2021).

Today, food trade is based on the ability of the exporting country to ensure the quality of products and their safety by identifying unsafe factors (microbiological, toxic, mechanical, physical, etc.). In an ecopolis, everyone is responsible for protecting the environment, so there is no conflict between economic development and environmental protection. It is the course of innovative development that provides the opportunity to create products with global innovation potential in the future, thus ensuring economic prosperity (Tetlock, Gardner, 2018).

6. Conclusions

Thus, the formation of the "Blue Economy" concept as the basis for the development of a sustainable ecopolis, in which a new agro-ecological culture is revived as a new type of agricultural production, represents a new economic model for the creation of an eco-civilization. Günter Pauli, the founder of this concept, was based on the conclusion that nature evolves from scarcity to abundance, relentlessly

manipulating matter, energy and food, each component of which contributes to achieving efficient agricultural production and the country's transition to sustainable development, prosperity and well-being (Schwab, 2019).

The integration of sustainable agriculture leads to the creation of new agro-production based on vertical farming, hydroponics (a plant growing technology using substrate and nutrient solution), aeroponics (a growing process in an airy environment without soil, in which nutrients are delivered to the plant roots as an aerosol); solidarity farming or community-supported farming, an alternative economic model designed for small area coverage and for efficient management and distribution of crops), which is the basis of the "blue economy". The soil is "fed" with organic, not mineral fertilizer, compost. Such soil provides all the opportunities for the growth of healthy, wholesome plants.

The "Blue Economy" as a new environmentally friendly way of growing agricultural crops promotes innovation as a new culture of agricultural ecology, ensuring a basic standard of living and a comfortable level of life, moving away from excessive use of resources and externalization of costs, which requires competent agricultural management, investment in agriculture and a strong policy of state management structures. The scale, complexity, and urgency of the challenges facing the world require leaders to act swiftly to forge shared values aimed at creating inclusive, equitable, and prosperous societies.

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