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A NEW VISION OF SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CONTEMPORARY DEVELOPMENT OF SOCIETY AND INFORMATION TECHNOLOGIES

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Abstract

Main goal of paper is presented bases position of the concept of sustainable development in energy units and sustainable development monitoring model. In order to approve the sustainable development monitoring model (SDMM) was analyses 15 socio-economic systems. Countries in three groups – developed, developing, EU new members after economic transformation – were selected, analysed and evaluated. Data were presented for the period from 1960 to 2019. The results include the evaluation of the historical trends and main trends of sustainable development the selected countries. The interpretation of the obtained data can be used in the planning of countries for the transition to sustainable development.

Keywords: sustainability, development, system approach, power, energy flows

1 Introduction

The development of society and transformation of the global economy on a sustainable basis is one of today's most important challenges on a global scale. It requires fundamental changes in both people's consciousness and actions, it requires a new vision and new approaches to create a new reality. The main goal of the concept of sustainable development, as a world organizing principle, has been to promote well-functioning interaction between people, society, economy and the regenerative power of the planet's life-sustaining ecosystems.

Nowadays, many countries of the world have accepted the basic principles of sustainable development, creating ever closer links between natural, economic and social phenomena. However, the analysis of these processes has shown, on the one hand, the insufficiency of data and the possibilities of their comparison, and, on the other hand, the lack of relationships between the

objective laws of nature (invariants) and the principle of sustainable development of society. It must be recognized that in the management of socio-economic systems, there are still no systemic connections expressed in a consistently measurable form with natural, economic and social processes, which in turn can lead to wrong assessments and even cause crises [1].

Definitions of the concept of sustainable development were voiced in the 1970s, when there was a need for a change in the paradigm of world economic development and new formulations.

The concept of sustainability was formulated as an extension of the neoclassical theory of economic growth, considering non-renewable natural resources as a factor of production, unlimited resources and infinite recycling possibilities, which in economics are called negative externalities. Resources are considered unlimited [2].

In this context, at the present stage, several problems can be formulated [3]:

– Inconsistency of the existing sustainable development structure with a systematic approach, because the division into three separate systems (Economy, Ecology and Society) and their separate assessment (indication) cannot provide a full picture and understanding of the performance results and development prospects of the socio-economic system

– The absence of a unified approach to the definition of quantitative criteria for sustainable development, as indicators are obtained using different methods and in different units of measurement, which are not sufficient to fully understand and adequately assess the processes necessary for qualitative monitoring

– Absence of use of an invariant coordinate system with corresponding units of measurement, because the existing system of units of measurement for the sustainable development of the socio-economic system in monetary terms is variable and unstable.

– The transition from the current linear economic model to nonlinear models is uncertain, that perceive nature as a life-support system for social well-being and respond to feedback effects.

Based on the above, the relevance of the research is determined by the need to continue improving the theory of sustainable development and evaluation methods, using the reflection of non-monetary processes of natural sciences in interdisciplinary research, taking into account the regularities of economics, mathematics, physics and the environment. Therefore, it is important to create a systemic approach to the evaluation and monitoring of sustainable development processes.

2 Methodology

Based on the principle of stable disequilibrium, the characteristic of energy flows circulating in living systems the concept of sustainable development of living open socio-economic system in energy units was formulate based on the five main laws (invariants):

1. law of power (or energy flows) conservation for social-economic system;
2. law of development conservation for social-economic system;
3. law of sustainable development (in energy units);
4. law of sustainability cyclical development (in energy units);
5. law of socio-economic system energy and money flows conversion.

In the context of the concept of sustainable development in energy units and within the framework of sustainable development monitoring model (SDMM), the object of assessment is a spatially limited part (subsystem) of the system nature – society – human, which contains natural resources, population and the management system, which performs management activities for the maintenance and development of life [4].

3 Results

In order to approve the sustainable development monitoring model (SDMM) was analyses various socio-economic systems – 15 countries in three groups were selected, analysed and evaluated:

1)five developed countries – USA, Japan, Italy France, Germany;

2)five developing countries – Brazil, South Afrika, Indonesia, China, Turkey;

3)five EU new countries – Croatia, Estonia, Latvia, Lithuania, Hungary.

The research period covers 30 years – from 1990 to 2019, with some exceptions for the data of the developed countries USA, Japan, France, Germany and Italy, where the analysis was carried out for the period from 1960 to 2019.

The indicators of useful power and quality of life in energy units of the evaluated developing countries as a potential for further development of the system (industrialization, modernization, etc.) are in a period of growth. The growth of the quality of life in the evaluated countries has different growth rates, however, all indicators are lower than in developed countries.

All evaluated new EU countries in 1990-1999 are characterized by a rapid decrease in useful power, which can be explained by changes in the socio-economic system, and in 2019, the power level in no country had reached the level of 1990. After 2001, the evaluated countries entered the stage of slow development – the stage of maturity, and an increase in the technological

efficiency coefficient can be observed for them, however, in 2019 they had not reached the world's average technological level. All of these countries had significant population declines, low rates of technological development, low productivity, and low quality of life. The SDMM model helped to identify a long period of non-growth for the evaluated countries after 2000 [5] [6].

7 Conclusions

The authors presented the results of the analysis of developed and developing countries in the context of sustainable development, the concept of natural science approach in economics.

In the framework of systems power changed analysis method presented an invariant coordinate system in energy units. The data calculated by the authors in the invariant coordinate system show linear nature of the economic growth for developing countries and non-linear nature for post-industrial developed countries.

Within the framework of the SDMM and using the system power change analysis method, it can be concluded that after 2001, the developed countries being evaluated entered a stage of slow development – a stage of maturity, which is necessary to make qualitative changes in the socio-economic system (state) and prepare for the next stage of development. At the same time, it should be emphasized that each analysed country had a different development and indicators until the period analysed by the author (1990).

The formalization of the principles of sustainable development in energy units, using the invariant coordinate system and the power change analysis approach, allows determining the indicators of the current and target state of any socio-economic system (country), problems and predictable development scenarios.

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