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TRANSFORMATION OF THE MATERIAL PRODUCTION MODEL FOR THE INTRODUCTION OF THE BIOSPHERE-COMPATIBLE ECONOMY PARADIGM

H. Shpakova, PhD of Technical Sciences

http://orcid.org/0000-0003-2124-0815

Kyiv National University of Construction and Architecture, Kyiv, Ukraine

The complication of the environmental situation in the world makes mankind look for new economic models in which sustainable development is provided. With the growing population of the planet and its needs, there is an overconsumption of natural resources. The factors that are formed as a result of polymorphism of the system components «economy»-«ecology»-«society» are considered. It is proposed to replace the linear economy model, implemented in particular in the construction industry, with a model of the circular economy with its main imperatives oriented to biosphere-compatible construction at all stages of product creation while preserving natural resources.

Keywords: circular economy, recycling, functional transformation, natural capital, greening, object life cycle

Introduction. Humanity exists because it is an element of a unique self-regulating system – the biosphere. For the loss of balance, small actions («butterfly effect» in chaos theory) are sufficient compared to the scale of global processes. Perhaps these unbalanced processes will again come to balance: the stabilization forces of nature are great. But the new balance can shift to the side where man simply does not have a place – the range of human existence is very narrow. Data characterizing the state of

the environment, obtained as a result of observations or forecast, by this time were evaluated depending on area of human activity they are used in. Typically, such an assessment involved the selection of optimal conditions for human activity, taking into account the existing economic reserves for this in aspects of social responsibility. However, in fact, a polymorphic data assessment should be applied, since it is impossible to separate the human sphere from the natural sphere.

Statement of the problem and connection with scientific and practical problems. The theoretical justification of the methodology for assessing sustainable environmental and economic development on the principles of social responsibility and the prospects for developing a biosphere-compatible economy strategy is found in the studies of many scientists on the management of systems sustainable development: D. Meadows, G. Daily, H. Folmer, S. Kuznets, T. Titenberg and others. A significant part of the work was provided by Ukrainian scientists to coverage of a promising model of the «green» economy: Borshchuk E. M., Burkinsky B. V., Orlovskaya Yu. V., Smovzhenko T. S. Skrynnik S. E., Zagorsky V. S. and others. At the same time, the scientific and methodological aspects of the development of biosphere-compatible relationships between social, economic and environmental components for designing the life cycle of a construction projects as one of the main factors of human activity with an orientation towards to recycling of final products, require additional research.

The main imperative of the future is the mandatory human collective responsibility for the actions and consequences of post-industrial technical civilization. The environmental situation in today's Ukraine is characterized as crisis, which was formed as a result of the predominance of resource-mining and environmentally hazardous industries for a long time, neglect of the objective laws of development and reproduction of natural resource

potential. Therefore, the synergy of environmentally-oriented factors in the development of production with the modernization of the construction industry can give an impetus to the greening of the entire economy.

The purpose of the article is to analyze existing environmental production strategies to identify the most suitable for implementation in Ukraine on the example of the construction industry. As a result of the analysis, an action strategy should be formed aimed at achieving the solution to the problem of greening the economy, taking into account the diversity of anthropogenic impact on the environment, namely in the field of construction.

Statement of the main material. The main responsibility for the destruction of the environment to date lies with the countries of the West, as the main consumers of primary natural resources from the time of the First Industrial Revolution. The today's threat is the Third World countries, repeating the Western economic development strategy. In the conditions of limited resources and increasing of their value, it's impossible for developing countries to rapidly pass the path to sustainable economic development. Therefore, the creation of a biosphere-compatible economy should take place on the priority of the factor of surviving natural capital over artificial (man-made) capital. At the macro level, this means that the goal of modern economic policy should be to increase productivity and the amount of natural capital, and not to build man-made capacities.

At the same time, one should take into account the requirements set out in the 2020 Manifesto of the World Economic Forum in Davos where the concept of sustainable development is laid down on the basis of a circular economy model in compliance with the principle of non-use of materials that cannot be reused. In order not to lose the last chance to humanity, it is proposed to reduce the amount of waste by a quarter compared to 2019

due to the integration of innovative elements and technologies and the introduction of more stringent environmental standards [1].

Environmental protection measures are based on the principles of normalizing the quality of the environment. Modern world standards on the regulation of environmental parameters of the architectural and construction industry relate mainly to the environmental, energy and economic efficiency of the so-called «green technology» and are developed as voluntary rating certification systems. The mechanisms of these systems, in turn, are developed on the basis of monitoring environmental indicators. But, as noted earlier, the environmental assessment of production, technology, product or service is not in itself self-sufficient and objective. Assessment of the industrial component by the future commercial potential of an object without taking into account economic reserves in the aspect of the social responsibility of the manufacturer will also be biased [2]. For a symbiotic assessment of technology, a polymorphism of parameters and criteria should be applied that can evaluate production in the system «ecology»-«economy»-«society».

Of course, the quantitative predominance of the anthropogenic component in the modern big city, which is a complex system with inextricably linked natural and human components, leads to the dominance of anthropogenic environmental impacts. But even in this case, there is always a reverse (investigative) effect of ecology on humans. Modern design, construction of any local facilities or large urban complexes, reconstruction of buildings and territories, as well as the production of building materials can no longer be carried out without taking into account environmental standards. Such approaches are being actively implemented in countries with a high level of economic development, which are not faced with the task of quickly overcoming poverty, as one of the factors of human environmental problems [3]. For countries with transition economies, like

Ukraine, a transformation to an ecologically centered model should be carried out taking into account the national historical heritage in the manufacturing sector. As follows, the adaptation of the biosphere-compatible economy model in order to maximize the level of economic downturn during the transition period should not be done on the basis of the linear production model that remained in the country along with the resource-mining industry.

The linear model assumes an increase in the expenditure of resources in direct proportion to the volume of production, which contradicts the task of preserving valuable natural capital. In contrast to the linear model, the circular economy is based on the principles of continuous circulation of technical and biological materials in production and on imperatives related to the durability of goods [4, 5, 6]. Increasing the product life cycle is a difficult principle to implement in the modern business, as it goes against the idea of parameterization. Parameterization provides for the release of goods with a fixed (warranty) service life, at the end of which the consumer buys a new product, providing the manufacturer with the planned amount of profit, while increasing the proportion of waste. However, focusing on profit leads society to simplify natural cenoses, introduces chaos into their natural orderliness and hierarchy. Therefore, it is necessary to work out a model of economic growth and social development, which would take into account the fact of the limited nature of natural resources by spatio-temporal determinants.

To build any model should be based on the postulate that each system is a consumer of resources. Energy and resources entering the system from outside can be estimated as the amount of natural capital needed to produce a given type of goods or services. But at the same time, this is also a fraction of the decrease in the potential of natural capital. In fig. 2 a model of a biosphere-compatible production cycle for a circular economy is shown,

which takes into account the possibility of replacing – partial or full – natural capital with man-made [7].

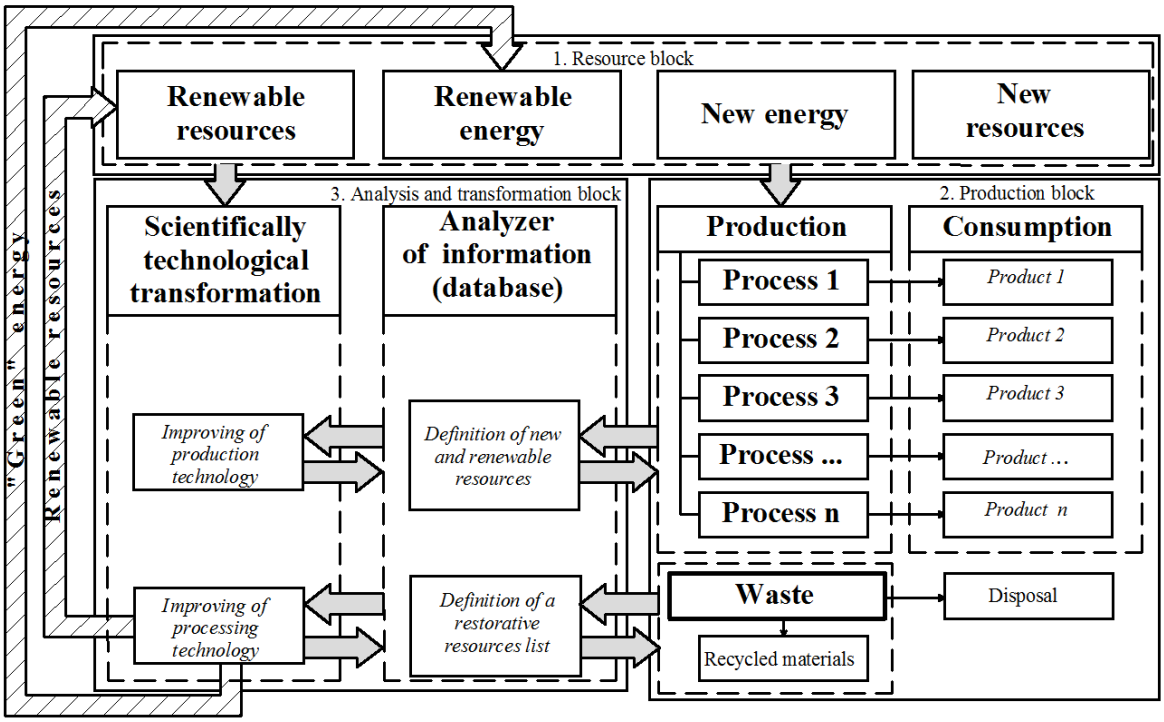

Fig. 2. Model of biosphere-compatible production cycle.
(*Developed by the author*)

Attraction of a secondary raw material base to energy and resource flows is proposed to be carried out through information analyzers. This block traces the entire spectrum of the qualitative and quantitative component of any product or service, reports are streamlined, and promising areas for reuse or modernization are recommended. Based on the analysis of information and the creation of a database, the collected resources are redirected for scientific and technological transformation at the processing plants into green energy and resources, which, after necessary processing, are included in the new production cycle.

It is logical to note that according to the concept of natural resource saving, the volumes of new (primarily used) energy and resources entering the resource block should be minimized. Accordingly, their share should be replaced by reuse resources. As can be seen from the model, recyclable resources and renewable («green») energy will also require resource and

energy costs during the transformation process. That is, it turns out that a decrease in the use of natural capital in production leads to an increase in its use. In economic theory, it offers a way out through the development of technologies that ensure maximum productivity of the used natural resources while it is impossible to replace them in full with renewable resources, at least at the current level of development of science and technology. This is fully consistent with the basic principle of the circular economy «efficiency above all»: ensuring the maximum efficiency of each process of production, consumption and operation of products [6].

One of the preventive steps should be the rejection of production, whose products during the life cycle become harmful to the environment. This may be the replacement of a non-renewable raw material component of the technology with an artificial analogue, the production of which does not require significant resources, or the unification of products to enable the replacement of components with elements of similar goods without the need for new production.

An example in the construction field is the replacement of asbestos thermal insulation panels with bio-panels from a renewable resource – reed, or the use of concrete scrap as a filler in concrete work instead of crushed granite. The idea of unification of building structures is the basis for the concept of functional transformation of a building object during its life cycle [8]. The processing and recycling of building materials (recycling) best demonstrates the principle of the circular economy of «enrichment without consumption»: through the recycling of resources (man-made capital), economic growth occurs without an increase in the consumption of natural resources (natural capital).

Conclusions. Very often, in politics, economic growth is considered only as a way to solve various social problems – unemployment, poverty, hunger, etc. But the economy is not a mechanically isolated, closed and

self-sufficient system in which the money cycle between producer and consumer occurs in a closed cycle. It functions within the global ecosystem. As a result, the strategy for the implementation of environmental policy aimed at the functioning of a biosphere-compatible economy should be based on the concept of interaction between society, the environment and the economic model on the priorities of sustainable development and the principles of balancing the three components of the development of the state: economic, environmental, social. Each industry should have an apparatus of estimated parameters that affect the formation of environmental «green» technology. Given that none of the systems is closed, they all have interconnecting relationships that allow us to highlight most of the common activities aimed at minimizing the negative impact of human activities on the environment. The formation of a standards' system to balance the development of biosphere-compatible construction will bring significant changes to the economic, social, environmental and ethical spheres of production. As a part of the implementation of the strategy in the context of biosphere-compatible construction, it is possible to envisage industry modernization by introducing environmental standards, structuring the secondary raw materials market using recycling tools, and also by developing a methodology for evaluating production efficiency based on the concept of resource conservation with the development of appropriate tools.

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