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СИСТЕМНО-ПАРАМЕТРИЧНІ ІМПЕРАТИВИ РОЗВИТКУ АКВАКУЛЬТУРИ
 В Українському Причорномор’ї

Актуальність. Сучасний соціально-економічний розвиток характеризується стійким зростанням кризових
проблем ресурсно-екологічного, економічного, політичного й іншого характеру. Ці фактори формують високий
рівень загроз продовольчої безпеки як на національному рівні, так й в міжнародному. Для України ця проблема
актуалізується внаслідок військової агресії Росії. Ця ситуація визначає необхідність високого рівня рівня
вказаніх проблем в інтересах стійкого розвитку України.

Мета та завдання. Метою статті є науково-методологічний пошук перспективних напрямів та
ефективних рішень розв’язання проблем сталого забезпечення продовольчої безпеки України у досить тривалих часова
масштабах. При цьому поставлено завдання наукового обґрунтування мобілізаційної стратегії освоєння
вітчизняного (у межах території України) природно-ресурсного потенціалу аквакультури.

Матеріали та методи. В якості інформаційного базису досліджень використано нормативно-
правові матеріали, включаючи Закон України «Про аквакультуру», звіт Держрибагентства України та ін., які
визначають державну політику у сфері розвитку рибного господарства і аквакултури.

В якості інструментарію вирішення поставлених завдань у роботі використовуються методологія і
методи теорії складних систем, принципи нелінійних і синергетичних інтерпретацій та ін.

Результати. Розроблені науково-економічні основи розробки програми розвитку аквакультури на базі
природно-ресурсного потенціалу Українського Причорномор’я.

У роботі представлені результати досліджень, пов’язаних із формуванням концептуального базису
розробки програмно-орієнтованого напряму розвитку аквакультури стосовно умов України. Виходячи з
високого рівня невизначеності досліджуваних проблем у роботі, сфера аквакультури держави (регіону)
розглядається як складна (нелінійна) соціально-еко-економічну систему (СЕЕС).

Особливе значення в роботі приділяється питанню методології формування системи імперативів розвитку
складних об’єктів, яка розглядається за такими напрямами, як актуальні, категоричні, модальні та
гіпотетичні імперативи. Зазначена система імперативів розглядається у взаємозв’язку з іншими факторами
розвитку як один із важливих елементів рухових сил розвитку СЕЕС, стосовно умов розвитку Українського
Причорномор’я.

Висновки. Методологічні та методичні підходи до системно-параметричного осмислення складних соціо-
еко-економічних об’єктів, що обумовлюється в роботі, є важливою основою об’єктивного забезпечення
ефективних напрямків розвитку та шляхів вирішення проблем сталого розвитку природно-господарських систем. Розвиток
аквакультури в Українському Причорномор’ї розглядається як проблема вирішення питань забезпечення
національної продовольчої безпеки, підвищення якості життя населення країни та фактора відродження
України як морської держави.

Ключові слова. Аквакультура як складна система, імперативи розвитку, рухові сили розвитку, стійкий
розвиток, економіка аквакультури.

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SYSTEM-PARAMETRIC IMPERATIVES OF THE DEVELOPMENT OF AQUACULTURE IN
THE UKRAINIAN BLACK SEA REGION
Topicality. Modern socio-economic development is characterized by a steady growth of resource-ecological, economic, political and other crisis problems. These factors create a high level of threats to food security both at the national and international levels. For Ukraine, this problem is actualized as a result of Russia's military aggression. This situation determines the need for comprehensive knowledge of the specified problems in the interests of sustainable development of Ukraine.

Aim and tasks. The purpose of the article is to consider some of the important scientific and practical tasks. One of the key issues in solving the problems of modern Ukraine, which is under the conditions of military aggression of Russia, is the solution of the problem of guaranteed survival, post-war reconstruction, oriented towards the bright future of the new Ukraine.

One of the key issues in solving the problems of Ukraine's survival in difficult crisis conditions is the sustainable provision of food security, which can be solved on the basis of the development of traditional (“land”) agriculture and the development of freshwater aquaculture and marine mariculture.

In this work, the task is to consider some of the most pressing issues of the effective development of aquaculture in Ukraine, focused on the significant water natural resource potential of the Ukrainian Black Sea region. At the same time, the work highlights in more detail the problems of the most significant in terms of scale and relevance of the imperative of modern times, which can be considered as driving forces for the development of the aquaculture economy in Ukraine.

Analysis of recent publications on the problem. Despite the crisis conditions of development in Ukraine, the problem of aquaculture development has received considerable attention in recent years. The most significant works in this regard include, first of all, the analytical assessments carried out directly by the State Fisheries Agency of Ukraine (Ukrinform TV, 2023), which draw attention to the losses in the field of aquaculture, which are expressed in the fact that, as a result of Russia’s aggression in Ukraine, 60% of aquaculture farms don’t work (direct economic losses in 2022 are estimated at 21.6 million USD).

We consider it necessary to pay attention to publications on the specified problem, focused on the post-war revival of the aquaculture economy. Such publications include the developments of the Institute of Market and Economic and Environmental Research of the National Academy of Sciences of Ukraine related to the prospects for the development of aquaculture in the Ukrainian Black Sea region (Kupinets, L., 2023, Rubel, O., et al, 2023, Tyutyunnik H., 2022). We also consider it necessary to emphasize that the previously completed works of Ukrainian scientists and
specialists retain their unconditional relevance for solving the problems of aquaculture development in Ukraine.

**Allocation of previously unsolved parts of the general problem.** In modern publications, the complex problems of the development of fish farming and aquaculture are considered, as a rule, within the framework of certain simplifications, the factors of conflictogenicity, the inevitability of risk events, etc. are not taken into account. Issues of the strategy of long-term development of the industry in connection with the trends of modern multidimensional transformations are especially weakly worked out.

**Formulation of research objectives (problem statement).** The purpose of this work is the need for some methodological understanding of the problems of forming a system of imperatives for the development and implementation of aquaculture development programs in the conditions of Ukraine, aimed at maximizing synergistic effects.

**Materials and methods.** Regulatory and legal materials, including the Law of Ukraine "On Aquaculture", the report of the State Fisheries Agency of Ukraine, etc., which determine state policy in the field of fisheries and aquaculture development, were used as the information base of the research.

The work uses the materials of the Black Sea Environmental Program (BSEP) of the Global Environmental Fund (GEF), in particular, the development of the Black Sea Strategic Action Plan for the Rehabilitation and Protection of the Black Sea (BSSAP), etc.

The methodology and methods of the theory of complex systems, the principles of nonlinear and synergistic interpretations, etc. are used as tools for solving the tasks in the work.

**An outline of the main results and their justification.** At the current stage of aggravation of socio-economic, resource-ecological and many other problems, the issue of solving food problems, which are complicated by the growth of the population and the increase in specific consumption, the significant deterioration of the resource-ecological reproduction of the natural environment, primarily associated with the development of traditional ("land") agriculture.

In this regard, modern science and practice are turning their attention to the possibility of large-scale development of the marine environment for the production of human food, animal feed, medicines and many other products and goods based on the development of marine and freshwater aquaculture.

A large number of works have been written on the problem of aquaculture development. In this work, we draw attention to the special need to consider the problems of aquaculture development in combination with the possibilities of system-oriented requirements (imperatives) of the program-target organization of effective solutions to the problems of aquaculture development in Ukraine.

The starting imperatives for planning the development of the Ukrainian sector of the aquaculture economy include the Ukrainian Black Sea region, which has one of the best natural resource potentials in Europe for the development of the state's "blue" (water) economy.

Let's consider the issue of systemic imperative "measurement" of the problems of the development of the economy as a whole, including aquaculture of Ukraine in the context of the presented system of imperatives as a starting factor for the activation of the driving forces of the state's development and its survival in conditions of a deep crisis, in particular related to the military aggression of the Russian federation.

Recently, many intellectuals of the world have been concerned with the search for and implementation of development imperatives based on a new world order focused on dialogue and solidarity of peoples, solving global problems and ensuring sustainable development in accordance with the Resolution of the UN General Assembly, which approved the UN Program for Sustainable Development until 2030 (United Nations, 2017).

The value-imperative basis of this Program is 17 goals aimed at eliminating poverty, preserving the planet's resources and ensuring well-being and which should be considered as imperatives of sustainable development and as a driving force for human development.

Regarding the importance of finding similar forces of development, including on the basis of compromises, Pope John Paul II expressed himself in an address to the Pontifical Academy of Social Sciences: "Common human values exist in all the diversity of cultural forms and should be found and highlighted as the leading force of all development and progress" (Dialogue, 2001).

A number of interesting works by Ukrainian scientists were devoted to the problem of imperatives in the development of society (Chekhovska, N., 2012, Ilyina, M., Shpilova, Yu., 2017). In modern literature, it is often stated that "the imperative is an absolute that requires categorical and unconditional fulfillment, that the imperatives of socio-economic development are "inevitable, mandatory and unwavering"
(Gubanov, S., 2004). Such a postulation of the imperative implies their unquestionable fulfillment and the impossibility of any compromise with the imperative.

Some works also claim that imperatives are not the driving force of society, since they do not have the ability to automatically resolve inevitable contradictions, but only point to those contradictions that should be directly resolved in the context of the chosen strategy of socio-economic progress.

In the context of the above, in our opinion, attention should be paid to some subtleties of the interpretation of the conceptual-categorical essence of the imperatives of the development of socio-economic systems in relation to the category "driving forces of development" (DFD) and the possibility of compromises with imperatives.

In modern philosophical and economic science, DFD is interpreted: a) as essential, necessary, long-term causes that ensure functioning and socio-economic progress; b) as a complex, developing system, within which the unconditional primacy and determining nature of material driving forces in the development of society is ensured in relation to political and spiritual ones.

The world experience of the development of civilization in the 20th century shows a very high efficiency of intelligent use of the imperative of the primacy of material driving forces in the formation of many countries. For example, the country-state of Singapore, a former colony of England, which received the status of independence in 1959, from a very poor country in 30 years turned into the world's TOP economic country, which, according to the main economic indicators, is constantly among the leaders of the countries. At the beginning of its difficult journey, Singapore declared as an imperative (national idea) a fundamental improvement in the quality of life of the population based on all kinds of integration of economic development. At the same time, it should be noted that one of the driving forces of the breakthrough economy (as the state language) was the choice of English (with a population of 85% Chinese and less than 0.5% English, about 12% Malay, etc.).

Imperatives reflect patterns of relationships between objective and subjective factors of development. Scientifically based and scientifically implemented imperatives ensure sustainable progress of the state. Some narrowly limited, local imperatives in the historical dimension cause damage. On this occasion, the famous physicist S.P. Kapitsa especially emphasized: "Neither tanks, nor glorious traditions, nor the wealth will not help, if the imperatives are not proper".

In this regard, let us especially emphasize that in the conditions of possible liberalization and denationalization for Ukraine, the preservation of the state and the improvement of centralized state regulation of the economy, as well as the flexible use of the extensive experience of centralization with the concentration of the necessary resources (financial, material, innovative, labor) on priority areas.

The specified cornerstone paradigms of "imperative development" are extremely relevant for Ukraine as well. We have considered this context to some extent earlier in relation to the problems of the development of the maritime economy of Ukraine (Burkinsky, B., Stepanov, V., Stepanova, E., 2018).

From the above, in this paper, when considering the problem of the imperatives of the development of society, the following system of axiomatic ideologues is adopted:

1. Any development imperative, in particular a categorical imperative, cannot be considered absolute, that is, unconditional. Everything in this world is relative. In the course of further development of knowledge and human practice, ideas about any subject of research are clarified and improved. At a certain stage of development, a new absolute truth (imperative) is formed taking into account the sums of new relative truths.

2. Any imperative, including a categorical one, in its content allows for possible compromises that contribute to the resolution of inevitable contradictions in the development of society.

3. The accepted development imperatives should be considered as extremely important elementary driving forces for the development of society and civilization as a whole. The accepted and approved system of imperatives determines the definition of the main target orientations and the construction and formation of a strategy for the progressive movement of society, which should be of an imperative nature.

On the basis of the stated axiomatic prerequisites, we have formulated the following system of imperatives for the development of complex economic objects such as aquaculture (AK).

I. Actual imperatives – 1) preventive measures to prevent the disintegration (degradation) of the AK under the existing crisis conditions; 2) measures to expand and preserve the activities of the AK.

II. Categorical imperatives – 1) formation of an integral state complex of international-class
aquaculture of Ukraine; 2) maximizing the level of food security of Ukraine; 3) acquiring the status of an aquaculture state.

III. Modal imperatives are imperatives that state the rule: in order to achieve the planned result X, it is necessary to do Y. - 1) intensification of the development of innovative technologies; 2) organization of new forms of program development of AK; 3) all kinds of environmentalization of production, etc.

IV. The hypothetical imperative is the transformation of Ukraine into one of the leading (TOP) countries in the world in the production of aquaculture products.

On the basis of the above-mentioned imperative approach to studying the problem, we developed a general target model of the post-war revival of the aquaculture sector and the formation of a complete system of large-scale aquaculture in Ukraine, which is presented in fig. 1.

Fig. 1. Model of goal setting of a system of strategic imperatives of formation new economy of aquaculture in Ukraine

Source: author's development

Designation:
1.1. - Preventive approaches to avoid the collapse of the aquaculture sector;
2.1. - Creation of a comprehensive and highly effective complex of the aquaculture economy of Ukraine;
2.2. - Maximizing the level of food security in Ukraine;
2.3. - Achieving high status as an aquaculture power;
3.1. - General innovation in the field of aquaculture production;
3.2. - Improved organizational and economic mechanisms for the development of the
aquaculture sector;
3.3. - Worldwide ecologization of the aquaculture sector;
4.1. - Inclusion of Ukraine to the number of leading (TOP) powers in the world in the production of aquaculture products.

The formation of an imperative basis for the development of aquaculture in Ukraine also conveys the need to focus, first of all, on the rich fishery resource potential of the Ukrainian Black Sea, which in the context of the review of the task was reviewed in the report more from the work of V. Stepanov and O. Iermakova. The development of the economy of aquaculture, in interaction with the development of the fishing traditions, can be seen, first of all, as an important factor of the emergence of Ukraine as a maritime state, as well as an important factor of the seaside regions development in the wartime and post-war reconstruction.

Conclusions and perspectives of further research.
1. Based on the set of historical prerequisites, the new strategy for the development of aquaculture in Ukraine in the post-war period should be based on the priorities of the implementation of state policy aimed at creating an innovative model of the aquaculture economy as a "big" system capable of ensuring a significant increase in production, which is measured by the order parameter.

2. The considered imperatives of large-scale and effective development of aquaculture in Ukraine on the basis of the large natural resource potential of the Ukrainian Black Sea region are considered by us as an important socio-economic strategy, primarily as a factor in improving the safety and quality of life of the population, as well as a factor in the consolidation of Ukrainian society and an element of an effective national idea.

3. For Ukraine, the development of aquaculture is an important, but an underestimated element of the development of the country's economy, its formation as a maritime state. The development of the sea-oriented sector of aquaculture (mariculture) can become one of the important factors (along with the development of the navy, shipbuilding, marine recreational complex, etc.) of the revival of Ukraine as a maritime state. Strategic realities are such that without the sea, without a maritime economy, Ukraine has no future.

4. The Ukrainian Black Sea Aquaculture Development Program fully complies with the strategic objectives of the national report "The Goal of Sustainable Development: Ukraine", which defines 17 goals in our country until 2030, which include: overcoming poverty and hunger, developing agriculture, good health self and well-being, decent work and economic growth, innovation and infrastructure, etc.

5. This program together with other economic programs, in particular, related to the development of agriculture, maritime complex, industry, etc. will provide very significant synergistic socio-economic and political effects for Ukraine and will contribute to bringing it to the orbit of success.

6. At the next stages of the development and implementation of the aquaculture development program in Ukraine, it is advisable to carry out research studies in the following directions:
   a) development of the aquaculture sector as an object of critical infrastructure, which solves the task of guaranteed supply of the country's population with food, medicine, etc.;
   b) the development of the aquaculture economy as a potential solution to acute problems of import substitution in Ukraine;
   c) the development of aquaculture as an economic niche for the survival of individual settlements.

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