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THEORETICAL CONCEPTUALIZATION AND ASSESSMENT OF GLOBAL ECONOMIC PROGRESS SCENARIOS

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ТЕОРЕТИЧНА КОНЦЕПТУАЛІЗАЦІЯ ТА ОЦІНКА СЦЕНАРІЇВ ГЛОБАЛЬНОГО ЕКОНОМІЧНОГО ПРОГРЕСУ

Statement of the problem. The global economy has been undergoing profound transformation in recent decades, with the dynamics of globalization, technological change, climate challenges, and social divergence shaping a future that is difficult to predict. Under such conditions, global economic progress is viewed as a set of alternative scenarios, each of which reflects possible configurations of the interaction between productivity, resource constraints, institutional adaptability, and the value orientations of societies. The paradigm shift from "progress as economic growth" to "progress as balanced development" necessitates a systematic analysis of possible scenarios. Scenario modelling of global economic progress is important from the standpoint of studying future trends, which allows us to combine the structural patterns of world development with multi-vector trajectories of economic system transformation. Unlike forecasting, which assumes the relative stability of trends, the scenario approach recognizes that the modern geo-economic environment is characterized by nonlinearity, stochasticity and the existence of "points of uncertainty." In this context, scenarios cannot be considered forecasts, but they are conceptual models of future configurations of the global order that can create either favourable conditions or obstacles to achieving economic progress.

Analysis of recent research and publications. The scientific and expert discourse on long-term scenarios for global development has been formed at the intersection of economics, ecology and climate change, social inequality and demography, technological change and political instability. The fundamental work in this direction is considered to be "Limits to Growth" [1]. The scientific study "Great Transition: The Promise and Lure of the Times Ahead" [2] expanded the range of scenarios, taking into account transformative options for the future, based on changing civilizational values.

Shared Socioeconomic Pathways (SSPs), scenarios developed within the framework of climate research, have also received proper theoretical substantiation [3]. Conceptually, this term was substantiated in the collective work of researchers from leading international scientific centres [4]. Despite the significant number of analytical and program documents devoted to global scenarios, interdisciplinary scenarios of global economic progress require systematic substantiation.

Formulation of the task. The purpose of the article is to provide a theoretical substantiation the scenario approach to global economic progress and to develop probable scenarios with subsequent evaluation of the integral index of global economic progress for each of them.

Presentation of the main material of the study. In modern analytical and prognostic practices, the toolkit of scenario analysis is widely used, as it allows characterizing processes with a high level of uncertainty and multivariate future development, and forming several alternative trajectories. Depending on the object of the study, scenario modelling affects various components of global economic progress and

development: economic growth, human development, climate change, competitiveness of the global economy, etc.

The Club of Rome report "The Limits to Growth" [1] was in 1972 among the first studies of modelling alternative models of world development, which drew attention to the problem of economic growth. In 2004, the study was continued with "Limits to Growth: The 30-Year Update" [5], where the authors developed new scenarios and tested how the models worked that were proposed by them. Another important contribution to the issue of scenario modelling were the Global Scenario Group (GSG) scenarios formulated in the report "Great Transition: The Promise and Lure of the Times Ahead" (2002) [2]. Six scenarios were proposed, grouped into three categories: Conventional Worlds, Barbarization, Great Transition (Eco-Communalism and New Sustainability Paradigm).

For near-term assessments (about 5–20 years), many organizations conduct scenario analysis, integrating economic, social, technological and geopolitical factors. The series of reports "Global Trends" The National Intelligence Council (NIC) is particularly influential [6]. The World Economic Forum (WEF) has published a scenario forecast to 2030 with a focus on the performance of economies globally [7].

In the context of our study, this approach is important from the point of view of the causal relationships of considering global economic progress, since it arises as a result of institutional interaction between states, corporations and societies. The author's theoretical concept of global economic progress reflects the development of the world economy as a result of the interaction of four alternative, but potentially synergistic scenarios of the global order: managed multipolarity, controlled fragmentation, chaotic deglobalization and neointegration.

Unlike the usual scientific approaches, where globalization and deglobalization are usually presented as two polar and linearly opposite trends, the proposed paradigm considers them as different forms of institutional organization of the world space. These forms are not mutually exclusive; they can modify the trajectories of economic development in different ways. That is why the new geo-economic conditions, which are accompanied by the fragmentation of trade regimes, competition for technological influence, a crisis of confidence in multilateral institutions, and the deepening of regional conflicts, form four structural scenarios that determine the potential trajectories of global progress (Table 1).

Table 1

Basic characteristics of global economic progress scenarios

Scenario	Philosophical foundations	Institutional foundations	Economic foundations	Technological foundations
Managed multipolarity (MM)	Pluralism of centres of power; finding a balance between competition and cooperation; the idea of a "managed order" without a hegemon.	Strengthening multilateral institutions; reforming global governance; networked coalitions of states.	Open markets with limited protectionism; diversification of value chains; emphasis on resilience.	Technological competition between multiple centres; common standards for critical infrastructure; digital interdependence.
Controlled fragmentation (CF)	Conscious acceptance of a block-based world; prioritization of "one's own" communities.	Regional blocks with their own regulatory regimes; a weaker centres of global governance.	Intra-block integration; duplication of infrastructure and production; reduction of global efficiency.	Competing technological ecosystems; differing standards of cybersecurity, data, and related domains.
Chaotic deglobalization (CD)	Dominance of survival logic; pessimism regarding universal norms.	Erosion of international institutions; an increasing role of coalitions; a deficit of legal frameworks..	Supply chain disruptions; a decline in investments; fragmentation of financial markets.	Uncontrolled spread of risks; point-based asymmetric technological progress.
Neointegration/ reglobalization (NI)	Rethinking globalization; emphasis on common goods and mutual vulnerability; idea of "responsible interdependence"	New formats of multi-level governance; a combination of global, regional and local institutions.	Restructuring globalization around inclusive, green and digital growth; stimulating innovation and human capital.	Rapid spread of green and digital technologies; global standards for data, AI, energy.

Source: developed by the authors

We propose to consider the scenarios as alternative vectors of global economic development, each of which has a certain set of characteristics, has certain risks and challenges, but also the potential for global economic progress. One of the most acceptable to today's conditions is multilateral multipolarity, where

major powers jointly manage world processes, but within the framework of law and taking into account the interests of less developed countries.

Assessing the probability of each of the four scenarios, we note that neointegration is the most expected and realistic scenario in the long term, but there are too few resources to implement it in the short term. Among the main reasons is the growing level of global distrust, and not only towards global institutions, but between countries and blocs of countries, which actually block the reform of these institutions and the formation of a new world order. Such a scenario is possible under the condition of relative homogeneity of political structures and a common understanding of the basic principles of economic development, adherence to security principles, technological compatibility, etc.

In addition, the existing political polarization creates additional pressure to reformat the global architecture, because modern political cycles are quite short for change – as a rule, 4-5 years, but in totalitarian and hybrid regimes they continue, as we see in many African countries. On the other hand, frequent changes of power in these countries can disrupt political stability, especially when it comes to coups [8]. At the same time, the traditional category of "coup" no longer covers the full range of threats that modern democracies face.

Researchers call this process "constitutional backsliding", when there is a gradual weakening of democratic institutions and norms, formal democratic institutions continue to exist, but their real ability to restrain power gradually decreases. In her study, Bermeo Nancy concludes that these processes are not one-time; they are gradual in nature and are not always accompanied by a violent seizure of power [9]. Another restraining factor in the context of the raised problem is the issue of the legitimacy of those who come to power and their recognition by international/regional organizations [10].

Managed multipolarity is a state of the world system in which there are several centres of power (economic, technological, financial), but their interaction is institutionally regulated. That is, there is no single hegemon, but there are common rules of the game: reform of international organizations, new formats of coordination (G20+, regional alliances, global climate and digital regimes); conflicts exist, but are resolved through institutions, and not through a complete break in ties. As for the economic content of the model, economic progress is focused in global centres and regional hubs, where innovation and technology play an important role.

In a polycentric world, economic progress is not limited to large poles. Among the positive features, it is worth noting the diversification of global value chains, which ensures the relative stability of global networks, reduces the risks of disruption of transport and logistics networks, and redistributes risks between regions. However, growing competition (and sometimes competitive cooperation, when technological leadership requires achieving coordination and minimal network interoperability) between centres of power often turns into strategic confrontation.

At the theoretical level, the scenario of managed multipolarity may exist, but as a complete and stable model it has certain systemic limitations: the lack of an institutional mechanism to maintain the balance of power between countries, because, as practice shows, it is disrupted due to non-fulfilment of agreements made by countries and the absence of an effective system for resolving conflicts between them; deep structural disparities between the development models of countries that form different poles, and coordination between them is not successful due to differences in the economic priorities of the countries. On the other hand, modern challenges and crises are so systemic and polycentric that countries cannot solve global problems on their own, but, at the same time, there is no clearly coordinated policy for responding to crises.

Controlled fragmentation reflects the global architecture through interconnected, but relatively autonomous economic blocks, each of which forms its own architecture of trade, technological standards, energy policy and mechanisms of financial interaction. Unlike chaotic fragmentation, the described scenario is of a controlled nature: it involves the construction and selection of a model of economic interaction that would meet the strategic interests and security priorities of states, integration associations and corporations. The key drivers of the formation of controlled fragmentation are the crisis of universal rules and the stratification of global regulation; regionalization of production; competition for strategic resources and logistical routes; reduction of critical dependence on individual countries/suppliers; expansion of sanctions practices; strengthening of technological demarcation in the digital sphere, etc.

For example, in 2022–2023, the United States introduced a federal regime restricting the use of TikTok on government devices [11]. China has developed its own digital ecosystem, separate from Western platforms, effectively replacing a significant part of global services for users [12]. Within individual blocs, economic growth is increasingly based on domestic innovation ecosystems.

The chaotic deglobalization scenario reflects the state of the global economy, when the processes of interdependence collapse in a sudden and asynchronous manner. Its key characteristic is the absence of any coordinated mechanism for coordinating the behaviour of states, transnational corporations, or international organizations. The destruction of the global order occurs fragmentarily, under the pressure of crisis, conflict, and structural factors that mutually reinforce destabilizing effects. This scenario fundamentally differs from controlled fragmentation in that chaotic deglobalization is devoid of systemic frameworks – from

economic to technological and security. At the current stage, we are already observing the manifestations of individual elements of this scenario, for example, after the pandemic. The following elements are a decrease in trust in multilateral institutions; unpredictable application of sanctions and acceleration of sanction wars; technological fragmentation and growth of barriers in cross-border data exchange, etc.

As for global economic progress in this model, it is absent at the global level, but there are its localized manifestations, therefore it is fragmentary: it is achieved by countries that have strong institutions and technological potential; individual countries, against the background of constant shocks, develop their own production and invest in innovations in the energy sector, agricultural technologies, defense technologies, and cybersecurity; countries that form new forms of cooperation, mostly in the form of functional alliances.

The analysis shows that from the point of view of the structural logic of the global system, economic interdependence and institutional dynamics, the most realistic scenario is managed multipolarity, supplemented by elements of controlled fragmentation in strategic areas (technology, security, critical infrastructure). This is the only model that is already consistent with the actual distribution of forces; does not require full trust between leading countries; preserves existing integration mechanisms; provides the minimum necessary conditions for global progress. The hybrid model ensures global economic progress due to three key factors:

1. Structural innovation: more centres of power → more centres of knowledge → faster diffusion of technologies.

2. Resilience of the global economy: diversification of chains → less vulnerability → more stable growth.

3. Inclusive development. Middle-income countries are integrated into value chains → a broader base for global growth is formed → global inequality is reduced.

Global economic progress in different scenarios demonstrates an asymmetric nature, which indicates a growing gap between quantitative growth indicators and qualitative parameters of the world economy. A comparative assessment of the impact of key components of global economic progress in different scenarios (Table 2) confirms the hypothesis that the “Neointegration/reglobalization” scenario is optimal in the long term, and the hybrid scenario is the most realistic in the medium term.

Table 2

Comparative assessment of the impact of key components of global economic progress in different scenarios

Components of global economic progress	Scenarios				
	Managed multipolarity	Controlled fragmentation	Chaotic deglobalization	Neointegration/ reglobalization	Hybrid scenario (1+2)
1	2	3	4	5	6
Human Development (Education, Health, Mobility) (HD)	Moderately positive, but uneven across regions ++	Differentiated: high within blocks, limited across blocks +	Negative due to reduced resources and mobility --	Consistently positive, globally inclusive +++	Moderately positive with regional asymmetries ++
Technological Progress (TP)	Competitive, with duplication of innovation ++	Block-oriented, with parallel technological trajectories +	Fragmented and slow --	Cumulative, based on global knowledge exchange +++	Selective: cooperation in “safe” areas ++
Knowledge and Diffusion of Innovation (KDI)	Limited but stable circulation +	Mostly intra-block -	Disruption of scientific networks --	Rapid global diffusion +++	Partial openness ++
Productivity and Efficiency (PE)	Increases unevenly, depends on institutions ++	Increases locally, but decreases globally 0	Systemic productivity decline --	Maximizing economies of scale +++	Medium level, with losses at block joints +
Global Value Chains (GVC)	Restructuring without destruction ++	Regionalized and duplicated -	Destroyed --	Optimized and diversified +++	Modular, with limited globality +
Investment Dynamics (ID)	Stable but geopolitically selective ++	High within blocks, low between them 0	Sharp decline --	High global capital mobility +++	Focused on strategic sectors ++

continued table 2

1	2	3	4	5	6
Financial Stability (FS)	Relatively stable, with regional risks +	Locally stable, but globally vulnerable +	Chronic instability --	High systemic stability ++	Dependent on coordination of blocks +
Institutional Coherence (IC)	Partial, due to competing centres of power +	Low between blocks, different rules between blocks -	Minimal, destruction of international institutions --	Universal rules of the game +++	Partial compatibility of regimes ++
Inclusive Development (IDv)	Limited geographically +	Limited by block boundaries 0	Sharply reduced, deepening inequality --	Maximum ++	Selective +
Resilience to Global Shocks (RGS)	Diversified centres ++	High within blocks, low globally +	High vulnerability -	Collective response mechanisms, expanding participation of developing countries +	Combined resilience ++
Environmental Sustainability and Green Transition (ESGT)	Competition of Green Strategies +	Different Eco-Standards +	Survival Prioritization over Ecology --	Global Climate Coordination ++	Green Alliances in the Core ++
Geo-economic Security (GeS)	Balance of Deterrence +	Security within blocks ++	High vulnerability to sanctions --	Dependence on global stability +	Risk diversification ++
Long-term potential growth of global GDP (LtG-GDP)	Moderately stable ++	Limited by fragmentation 0	Low or negative --	Maximizing global economies of scale +++	Moderately high +

Source: developed by the authors

To evaluate the proposed scenarios based on expert assessments, we will calculate the integral index of global economic progress. To ensure comparability, we will translate qualitative assessments into quantitative ones (Table 3).

Table 3

Rating scale

Symbol	Impact		Numerical value, v_{ij}
+++	strong		3
++	medium		2
+	weak		1
0	no impact		0
-	weak negative		-1
--	strong negative		-2

Source: developed by the authors

In our case, we have: n – the number of components of global economic progress, n=13; m – the number of scenarios, m=5; x_{ij} – the numerical estimate of the impact of the *i*-th component on the *j*-th scenario. Thus, for each scenario, we form a vector of estimates:

$$x_j = (x_{1j}, x_{2j}, \dots, x_{nj}), \quad (1)$$

whose ends belong to the interval:

$$x_{ij} \in [-2\,;3] \quad (2)$$

For each scenario, the sum of the scores is calculated as the arithmetic sum of the numerical scores for all components of global economic progress. The sum of the scores S_j reflects the overall cumulative effect of the scenario:

$$S_j = \sum_{i=1}^{n} x_{ij}, i = \overline{1,13}, j = \overline{1,5} \quad (3)$$

We use the average score to eliminate the dependence on the number of components, which is in a fixed interval [-2; 3]; it reflects the average effectiveness of the impact of the components on the scenario:

$$\bar{A}_j = \frac{1}{n}\sum_{i=1}^{n} x_{ij} \quad (4)$$

Since the values of $\bar{A}_j$ can be both positive and negative, to improve the interpretation, we apply linear normalization to the interval [0; 100]:

$$I_j = \frac{\bar{A}_j + max|v|}{h} \times 100 \quad (5)$$

where I_j– integral index of impact on the scenario *j*;

0 – theoretically a completely destructive scenario;

100 – the most favourable scenario for global economic development;

$max|v|$ – maximum negative evaluation module, $max|v|$=2;

h – width of the evaluation interval, *h*=5.

The results of the integral index calculations and its analytical interpretation are given in Table 4.

Table 4

Results of calculations of the integral index of global economic progress under different scenarios

Scenario	Total points	Average score	Integral index
Neointegration / reglobalization	32.0	2.46	89.23
Hybrid scenario	21.0	1.62	72.31
Managed multipolarity	20	1.54	70.77
Controlled fragmentation	4	0.31	46.15
Chaotic deglobalization	−24.0	−1.85	3.08
Value of the integral index (I_j)	Analytical interpretation		
0–25	A scenario of systemic degradation of global economic progress (destruction of institutions. decline in productivity, long-term reduction in growth potential)		
25–40	Structurally weak development scenario (partial stabilization of individual components without restoration of holistic global dynamics)		
40–60	Limited/contradictory development scenario (coexistence of positive and negative trends, lack of cumulative effect)		
60–74	Moderately sustainable development scenario (mostly positive dynamics. but with institutional or regional constraints)		
75–100	A scenario of sustainable long-term global growth (high institutional coherence, innovation diffusion, inclusiveness, environmental and financial sustainability)		

Source: developed by the authors

The results of the calculations revealed the peculiarities of the implementation of each of the scenarios in accordance with the proposed assessment scale. The highest level is demonstrated by the "Neointegration/reglobalization" scenario with an integral index value of 89.23. This position is due to the cumulative positive effect of most components. This scenario not only maximizes short- and medium-term benefits, but also forms a stable foundation for long-term growth of world GDP. The hybrid scenario (index value 72.31) also falls within the zone of sustainable long-term global growth, but occupies a lower position compared to neointegration. This reflects the compromise nature of the model: a combination of limited global coordination with a block-structured logic of development**.**

"Managed multipolarity" is at the lower limit of the sustainable development zone with an index value of 70.77, which is fundamentally important from an analytical point of view. Although the scenario demonstrates an overall positive balance, its outcome is less stable and more dependent on political coordination between centres of power. The "Managed fragmentation" scenario with an index value of 46.15 falls into the zone of limited/contradictory development (40–60). The index value reflects the lack of a cumulative effect of global progress, despite the presence of local zones of stability. Analytically, this means that economic growth is maintained only within individual blocks, while the global system loses efficiency due to duplication of value chains, technologies and regulatory regimes. "Chaotic deglobalization" (index 3.08) demonstrates a critically low index value, which clearly classifies it as a scenario of systemic degradation of global economic progress (0–25).

Let us differentiate the components of global economic progress according to their degree of fundamentality and system-forming impact on long-term global dynamics. We propose to rank the identified components of global economic progress according to the level of priority, which is formed not as their short-

term contribution, but as a structural ability to form, support or limit cumulative global progress. In this study, priority is determined from the standpoint of long-term global economic progress, and not the growth rates of individual macroeconomic indicators.

A normalized priority scale was applied in the interval [0;1] for each component, where: 0.9–1.0 – maximum system-forming role; 0.76–0.89 – high structural priority; 0.51–0.75 – medium, supporting influence; ≤ 0.5 – conditional or derived influence on global progress. The obtained values are not statistical weights. The results of the priority of the components of global economic progress are given in Table 5.

Table 5

Priority of components of global economic progress in the interval [0;1]

Priorities	Components of global economic progress
1	Human development (education, health, mobility)
0.9	Knowledge and diffusion of innovation
0.9	Institutional coherence
0.85	Technological progress
0.8	Productivity and efficiency
0.8	Global value chains
0.75	Investment dynamics
0.7	Inclusive development
0.6	Financial stability
0.6	Resilience to global shocks
0.5	Geo-economic security
0.4	Environmental sustainability and the "green" transition
0.4	Long-term growth potential of world GDP

Source: developed by the authors

Human development (1.0) is defined as a basic component, since it is it that forms the carrier of knowledge, innovation, institutional quality and productivity. Knowledge and diffusion of innovations (0.9) and institutional coherence (0.9) are attributed to high-priority factors, since they ensure the transformation of local achievements into a global effect of scale. Innovations without diffusion and institutional compatibility remain fragmented and do not form progress at the global level. Technological progress (0.85) and productivity (0.8) are of a high, but partly derivative nature: their implementation depends on human capital, institutions and channels of knowledge dissemination.

Global value chains (0.8) and investment dynamics (0.75) are considered as mechanisms for scaling progress, rather than its primary sources. Financial stability (0.6) and resilience to global shocks (0.6) have a supporting function: they determine the limits of maintaining progress. Ecological sustainability (0.4) and geo-economic security (0.5) in this model are interpreted as limiting and corrective factors, the importance of which increases sharply in crisis or transition scenarios. The long-term growth potential of world GDP (0.4) is deliberately given a lower priority, since in the study it is considered as a result of the interaction of other components, and not as an independent driver of global progress.

Let's calculate the integral index based on the already proposed formulas, taking into account the priority of the components p_i in the formation of each scenario, for which we multiply the numerical value of the assessment by the priority value and obtain the following expression for the assessment of the *i*-th component in the *j*–th, therefore the scenarios $x_{ij} = v_{ij}p_{ij}$.

The calculation results are shown in Fig. 2.

However, in each of the above scenarios there are vulnerable points where progress stops, slows down or turns into regression. In foreign sources they are called "stress points" – stress or "pain" points. The term "pain points" is based on the concepts of *stress points/weak points/bottlenecks* in global scenarios and systemic analysis in foreign studies or analytical reports [13–16].

Let us analyse how changes in each component of global economic progress describe the stress points of the proposed scenarios. By "stress points" we mean such components of global economic progress that, despite their high priority, demonstrate a zero or negative contribution to the integral index and form potential stress points for transitions to less favourable scenario configurations. To do this, we distinguish stress points into "hard" and "soft". Hard stress points are components for which the weighted contribution to the integral index is negative. They form zones of actual regression. Soft stress points are components with a zero or weakly positive contribution, which at the same time significantly lag behind the reference (most favourable) scenario in terms of the magnitude of the integral effect. They reflect areas of hidden potential losses.

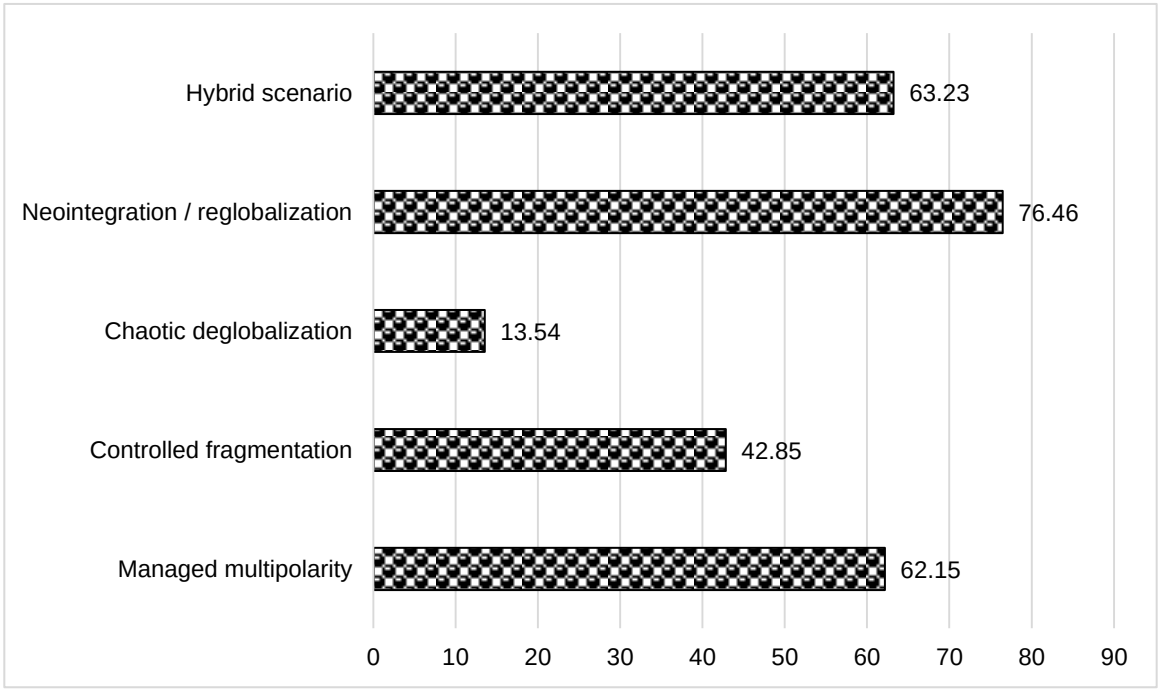

Fig. 2. Integral index of global economic progress for different scenarios taking into account the priority of its components

Source: calculated by the authors

The contribution of each component, taking into account its priority in the scenario, is determined as follows:

$$C_{ij} = v_{ij} \times p_i \quad (6)$$

We consider only the negative contribution of a component to the scenario as a painful hard point. Components with high priorities are especially dangerous:

$$Pain_{ij}^{(hard)} = max(0, -C_{ij}) \quad (7)$$

Bottleneck where progress is weaker compared to the best-case scenario:

$$Gap_{ij} = \max(C_{ij}) - C_{ij} \quad (8)$$

A large Gap_{ij} with a high priority value p_i – is the place, where the scenario loses its potential. At the same time, regression is formally absent. The results of the calculations are given in Table 6.

Table 6

Hard stress points in global economic progress scenarios

Components (Table 2)	Managed multipolarity	Controlled fragmentation	Chaotic deglobalization	Neointegration/ reglobalization	Hybrid scenario
HD	2	1	-2	3	2
TP	1.7	0.85	-1.7	2.55	1.7
KDI	0.9	-0.9	-1.8	2.7	1.8
PE	1.6	0	-1.6	2.4	0.8
GVC	1.6	-0.8	-1.6	2.4	0.8
ID	1.5	0	-1.5	2.25	1.5
FS	0.6	0.6	-1.2	1.2	0.6
IC	0.9	-0.9	-1.8	2.7	1.8
IDv	0.7	0	-1.4	1.4	0.7
RGS	1.2	0.6	0	0.6	1.2
ESGT	0.4	0.4	-0.8	0.8	0.8
GeS	0.5	1	-1	0.5	1
LtG-GDP	0.8	0	-0.8	1.2	0.4

Source: calculated by the authors

Based on the calculation results, it has been established that for the scenarios "Managed Multipolarity," "Neo-integration/Re-globalization," and the hybrid scenario (1+2), all weighted assessments of the components are non-negative. This means that there are no hard stress points in the sense defined by us: the system may be imperfect or less efficient, but none of its elements operates against global progress.

Clearly defined hard stress points appear in the scenario "Controlled Fragmentation" in contrast to the above scenarios, the values of which are less than 0. Therefore, it reflects a state in which most components have not yet entered the regression mode, but the basic elements of globalization are already having a negative impact. This allows us to interpret the transition to this scenario as the first critical "break" in the configuration of the global economic order. The "Chaotic Deglobalization" scenario is even more radical, as most key components take on negative values, with the exception of resilience to global shocks, which has a zero value.

Based on the analysis of the obtained calculations, we will determine possible critical transitions between scenarios taking into account stress points. First, the transition from stress-free scenarios – neointegration, hybrid scenario or managed multipolarity – to controlled fragmentation occurs when three components (knowledge and diffusion of innovations, institutional coherence and global value chains) change sign from non-negative to negative.

In stress-free scenarios, the three components have high positive values, under the influence of fragmentation processes the global system enters a state in which these three components acquire negative values, and a critical transition to the scenario of controlled fragmentation occurs. The content of this transition is that innovation and institutional processes, as well as the organization of value chains, cease to be drivers of development and turn into sources of losses: knowledge circulates mainly within blocks, institutional regimes diverge, and global chains are duplicated and fragmented.

Second, the next threshold of critical deterioration is the transition from controlled fragmentation to chaotic deglobalization. At the point of controlled fragmentation, the system already has three structural minuses, but the other components are either neutral or positive. The transition to chaotic deglobalization means that negative trends extend far beyond the defined triad of components, and cover the areas of human development, technological progress, productivity, investment activity, inclusiveness, financial stability, environmental sustainability, geo-economic security and long-term growth potential. That is, the configuration in which only three components have negative values changes to a state where almost all priority components become hard stress points.

As for non-critical transitions, the following are possible:

NI → GS: weakening of global institutional coherence, partial rollback towards bloc-likeness, increase of political risks in global value chains.

GS → MM: decrease of coordination between blocs, but preservation of relative controllability of the system.

MM → CF: deterioration of institutional coherence, narrowing of knowledge diffusion, stronger regionalization of global value chains.

Upward, conversely, critical transitions are described through the gradual "switching off" of hard stress points. The transition from chaotic deglobalization to controlled fragmentation means that most indicators that had negative values return to at least the neutral level (0.0), and localized negativity persists only in three components – knowledge and diffusion of innovations, institutional coherence and global value chains. That is, the system exits the state of full-scale degradation and returns to the mode of block, but still controlled fragmentation.

The transition from controlled fragmentation to any of the scenarios without hard stress points (managed multipolarity, hybrid scenario, neointegration) occurs when these three key negatives are eliminated. As soon as the weighted estimates of knowledge, institutional coherence and global value chains become integral, the system returns to scenarios, where all components are either neutral or support progress, and the differences between the scenarios themselves are no longer determined by the presence or absence of stress, but by the different strength of the positive effect.

The soft stress point for a particular component is interpreted as the difference between the maximum value of this component among all scenarios and its value in a specific scenario (Table 7). Thus, zero values mean achieving the best level for a given indicator, while positive values reflect a lag and, accordingly, a potential area for improvement without going into a state of regression.

In the "Managed Multipolarity" scenario, significant soft stress points are observed for most components, which indicate that this is a scenario of moderately positive dynamics, which, however, significantly underuses the opportunities for deepening institutional interaction, global circulation of knowledge, and realizing economies of scale in productivity, investment, and value chains. The "Managed Fragmentation" scenario combines both hard and soft stress points. In this context, this scenario is an unstable intermediate configuration that, depending on the vector of changes, can evolve either towards deepening deglobalization trends or towards restoring integration parameters.

Table 7

Soft stress points in global economic progress scenarios

Components (Table 2)	Managed multipolarity	Controlled fragmentation	Chaotic deglobalization	Neointegration/ reglobalization	Hybrid scenario
HD	1			0	1
TP	0.85	1.7		0	0.85
KDI	1.8			0	0.9
PE	0.8			0	1.6
GVC	0.8			0	1.6
ID	0.75			0	0.75
FS	0.6	0.6		0	0.6
IC	1.8			0	0.9
IDv	0.7			0	0.7
RGS	0	0.6		0.6	0
ESGT	0.4	0.4		0	0
GeS	0.5	0		0.5	0
LtG-GDP	0.4			0	0.8

Source: calculated by the authors

In the “Chaotic Deglobalization” scenario, the structure of soft stress points is practically not manifested, since negative (hardly negative) values are observed for most of the priority components. The “Neointegration/Reglobalization” scenario is often considered a benchmark. According to the model, it does not have any hard stress points and demonstrates the maximum possible values for most of the components.

However, the table of soft stress points indicates an important nuance: in terms of resistance to global shocks (0.6) and geo-economic security (0.5), neointegration is inferior to certain alternative configurations (managed multipolarity, hybrid scenario and controlled fragmentation). This means that the globally integrated scenario is not absolutely ideal, since the sensitivity to global shocks and geo-economic risks is high.

In the hybrid scenario, soft stress points are significant, but in terms of resilience to global shocks and environmental sustainability, the hybrid scenario achieves the best values (there are no soft stress points). This provides grounds for interpreting the hybrid scenario as a compromise configuration that combines elements of integration and block-based organization, without generating rigid regression, yet still possessing significant unrealized potential in terms of scale effects, institutional depth, and innovative dynamics.

Conclusions from the conducted research. The conducted research confirms a shift in focus in achieving global economic progress from economic growth to qualitative development indicators. From the perspective of the priority of the components of global economic progress in terms of their fundamental rather than derivative impact, the greatest weight is assigned to human development, institutional coherence, and knowledge diffusion, as it is precisely these factors that shape the long-term capacity of the global economy for self-sustaining development.

Macroeconomic results, in particular, the growth of world GDP, as well as environmental parameters, are considered as endogenous consequences of the functioning of this system, and not as its primary drivers. Under such conditions, scenario modelling allows: to separate structural trends from fluctuations, to identify the interaction between political, technological, institutional, and social determinants of global economic progress, to assess the potential for economic progress under the implementation of the probable scenarios proposed in the study.

Summarizing the results of the conducted analysis of hard and soft stress points and possible transitions between scenarios of global economic progress, it can be argued that the constructed model allows us to consider the scenarios not only as static alternatives, but as dynamic states of a single system, between which both evolutionary and crisis transitions are possible. The proposed system of indicators and the calculated integral index of global economic progress allow us not only to compare scenarios by the level of achieved development, but also to identify structural vulnerabilities and potential trajectories of change.

The assessment results confirm the importance of the hybrid scenario in the near-term perspective. The importance of the hybrid scenario lies in the fact that it creates an optimal balance between excessive integration (vulnerable to shocks) and excessive fragmentation (destructive for progress). That is why it opens up opportunities for a new form of global economic development, in which stability is achieved not through centralization, but through distributed coordination. As a result, a new form of global economic order

is formed, in which: progress is no longer based on maximum integration; fragmentation no longer means degradation; competition does not exclude cooperation; the global economy becomes more resilient than ever in the era of hyperglobalization.

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ТЕОРЕТИЧНА КОНЦЕПТУАЛІЗАЦІЯ ТА ОЦІНКА СЦЕНАРІЇВ ГЛОБАЛЬНОГО ЕКОНОМІЧНОГО ПРОГРЕСУ

Мета. Теоретичне обґрунтування сценарного підходу до глобального економічного прогресу та розробка ймовірних сценаріїв з наступним оцінюванням інтегрального індексу глобального економічного прогресу для кожного з них.

Методика дослідження. У дослідженні було використано міждисциплінарний підхід до досягнення поставленої мети, зокрема: для теоретичного обґрунтування сценарного підходу до глобального економічного прогресу – логіко-теоретичний метод та абстрагування; для ідентифікації та структурування та класифікації сценаріїв глобального економічного прогресу – метод сценарного аналізу; для порівняння сценаріїв – компаративний метод; для виокремлення основних складових глобального економічного прогресу – аналізу та синтезу; для оцінювання інтегрального індексу глобального економічного прогресу та виявлення стресових точок у кожному сценарії – економіко-статистичний аналіз.

Результати дослідження. Теоретично обґрунтовано актуальність сценарного аналізу у дослідженні глобального економічного розвитку та проаналізовано окремі сценарні моделі. Запропоновано альтернативні сценарії глобального економічного прогресу та розкрито їх базові характеристики. Обґрунтовано ймовірності настання кожного сценарію. Проведено порівняльну оцінку впливу ключових складових глобального економічного прогресу в різних сценаріях, підтверджено їх асиметричний характер та визначено їх пріоритетність. Запропоновано інтегральний індекс глобального економічного прогресу за різними сценаріями та проведено його оцінювання та аналітичну інтерпретацію. Аргументовано існування стресових точок у кожному сценарії. Ідентифіковано як жорсткі, так і м'які стресові точки, що знижують ефективність сценаріїв.

Підтверджено, що найбільш оптимальним у сучасних умовах є гібридний сценарій, а для довгострокової перспективи – сценарій неоінтеграції.

Наукова новизна результатів дослідження. Теоретично обґрунтовано концептуальний підхід до проведення сценарного аналізу глобального економічного прогресу, який інтегрує структурні складові, враховує їхню пріоритетність та дозволяє ідентифікувати як сценарії розвитку, так і критичні точки регресу сценаріїв. Запропоновано авторську типологію сценаріїв, оцінено інтегральний індекс прогресу та розраховано жорсткі і м'які стресові точки у сценаріях глобального економічного прогресу.

Практична значущість результатів дослідження. Створено інструментарій для стратегічного планування глобального економічного розвитку, що дозволяє оцінювати не лише напрям розвитку глобальної економіки, а й конкретні інституційні, технологічні та соціальні чинники, які визначають глобальний економічний прогрес. Результати дослідження можуть використовуватися у прогнозних дослідженнях, в науковій діяльності та освітньому процесі.

Ключові слова: світовий порядок, глобалізація, глобальний розвиток, глобальний економічний прогрес, сценарне моделювання, мультиполярність, фрагментарність, деглобалізація, неоінтеграція, людський розвиток, інституційна узгодженість, інтегральний індекс, стресові точки.

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THEORETICAL CONCEPTUALIZATION AND ASSESSMENT OF GLOBAL ECONOMIC PROGRESS SCENARIOS

Purpose. The aim of the article is a theoretical substantiation of the scenario approach to global economic progress and development of probable scenarios with subsequent assessment of the integral index of global economic progress for each of them.

Methodology of research. An interdisciplinary approach to achieving the set goal was used in the study, in particular: logical and theoretical method and abstraction were used for the theoretical substantiation of the scenario approach to global economic progress; scenario analysis method – for the identification and structuring and classification of scenarios of global economic progress; comparative method was used for comparison of scenarios; analysis and synthesis – for the isolation of the main components of global economic progress; economic and statistical analysis – for the assessment of the integral index of global economic progress and identification of stress points in each scenario.

Findings. The relevance of scenario analysis in the study of global economic development is theoretically substantiated and individual scenario models are analysed. Alternative scenarios of global economic progress are proposed and their basic characteristics are revealed. The probabilities of each scenario are substantiated. A comparative assessment of the impact of key components of global economic progress in different scenarios is carried out, their asymmetric nature is confirmed and their priority is determined. An integral index of global economic progress is proposed for different scenarios and its evaluation and analytical interpretation are carried out. The existence of stress points in each scenario is argued. Both hard and soft stress points that reduce the effectiveness of scenarios are identified. It is confirmed that the most optimal in modern conditions is the hybrid scenario, and for the long-term perspective, the neointegration scenario.

Originality. Theoretically substantiated is a conceptual approach to conducting scenario analysis of global economic progress, which integrates structural components, takes into account their priority and allows identifying both development scenarios and critical points of regression of scenarios. The author's typology of scenarios is proposed, the integral progress index is estimated and hard and soft stress points in scenarios of global economic progress are calculated.

Practical value. A toolkit for strategic planning of global economic development is created, which allows to assess not only the direction of development of the global economy, but also specific institutional, technological and social factors that determine global economic progress. The research results can be used in forecasting studies, in scientific activities and in the educational process.

Key words: world order, globalization, global development, global economic progress, scenario modelling, multipolarity, fragmentation, deglobalization, neointegration, human development, institutional coherence, integral index, stress points.

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