

Anti-crisis Management of Socio-economic Systems Development in the Global Competitive Environment

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Abstract. The article considers anti-crisis management of socio-economic systems in a global competitive environment. A combined methodological approach to strategic anti-crisis management of the socio-economic system of the state through the parameters of an open three-sector model. The criteria for minimizing the threat of outflow of significant resources to other socio-economic systems or reducing the inflow of new resources with a time limit on the level of risk, aimed at preventing and eliminating crises and enhancing long-term (strategic) management is determined. The conditions of quasi-crisis pressure. The method of hierarchical ordering of the dynamics of indicators for assessing the trajectory of the country's development from the standpoint of compliance with the strategy of anti-crisis management in a competitive environment is presented. The priority factors of sensitivity of anti-crisis management of the socio-economic system are substantiated. The connection of incomes from the stage of development of the national economy is determined. The structure of the system of factors at different stages of the development of socio-economic systems of the national level is formed. The index of global competitiveness of the world is analyzed. The rings of the countries-leaders of the international competitiveness on components of the GCI index are defined. The scale of activity of transnational corporations (TNC) is analyzed. The conditions for changing the distribution of investment and labor resources, capital stock and capital investments between sectors of the socio-economic system of Ukraine are analyzed. An optimization balance of resource allocation in the socio-economic system of Ukraine.

Keywords: Investments Resources; Labor Resources; Capital Adequacy; Global Competitiveness; Economic Sectors.

JEL Codes: J01, H12

1. INTRODUCTION

The modern functioning of the economy of any country is characterized by the presence and systemic nature of crisis processes, which are caused by both crisis distortions in the world and the conflicting economic interests of various economic entities. The high dynamism of the information society era objectively highlights the problems of adaptation of the socio-economic system of the country to unpredictable changes, due to the combined action of environmental factors of direct and indirect influence. This allows identifying and updating the causes that lead to crises, and, accordingly, to the need for anti-crisis measures in the economy and to leveling of unprofessional management (wrong decisions,

lack of professionals, conflicts), as well as to risky development of industries (lack or poor strategy and tactics of implementation of actions on unfair competition, which leads to predictability of the situation in the component of socio-political policy).

Given the multifaceted problems in the global space of socio-economic systems of different countries, it is important to use anti-crisis management measures under fundamentally different conditions, which allow cleaning the market from weak competitors and developing a stable economy. Countries with weakened economies face the urgent need to develop a holistic organizational and economic mechanism of the structural socio-economic system, which would operate based on mutually agreed and complementary principles, covering a wide range of regulatory tools to influence sectoral relations in the country. This requires a radical revision of approaches to programming restructuring, i.e. economic management through the transition to a single methodology

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for setting standards focused on achieving competitive results, hierarchical consistency and consistency of target guidelines, integration of research and production activities, introduction of a system for monitoring compliance with program goals, a combination of strategic, medium-term and indicative planning mechanisms.

Despite the fact that the priority areas of anti-crisis management of socio-economic systems in developing countries are in the new regulatory framework, but these issues, with increasing competition, exacerbate the crisis and increase the unpredictable consequences. From the standpoint of globalization of economic relations, they cause an increase in the dynamics of the external and internal environment, reviving competition, acquiring new forms, properties and qualities. This increases the uncertainty of future conditions, determines the likelihood of a crisis at different levels of socio-economic systems, which objectively requires a change in the principles of management, of enterprises, regions, countries, bringing to the fore its anti-crisis aspect. In addition, the realities of the economies of developing countries indicate the imperfection of anti-crisis management both at the level of enterprises and at the level of regions and the country in general. Many companies are in a crisis, a number of export-oriented industries are experiencing an economic downturn, with the slightest changes in global commodity and financial markets, problems arise in the financial sector.

Such scientists as G. Friedman (2008), A. Hermann (2015), S. Hunt (2000), G. Jayachadran, J. Gimeno, P. Varadarajan (1999), G. Pacheco-de-Almeida (2010), S. Parise, J. Henderson (2001) dealt with the issues of anti-crisis management at the macroeconomic level. A significant contribution in the study of the peculiarities of the functioning and trends of socio-economic systems in the context of globalization at the present stage was made by J. Rosenau (1994), J. Shiller (2008), S. Raisch, J. Birkinshaw (2008), R. Solow (Solow et al., 1956), M. Storper (1997), A. Witteloostuijn, A. Wegberg (1992). The peculiarities of the global competitive environment are covered by such scientists as Z. Kholod, A. Shtanhret (2002), O. Khytrova (2013), T. Shepel (2009), L. Shtymer (2011), V. Shyshkin, T. Ablitsova (2009). However, the impact of the global competitive environment on the nature and specificity of crisis phenomena in socio-economic systems and the relationship between these phenomena at the micro-, meso- and macroeconomic levels has not been sufficiently studied. This requires the development of a new methodological basis for anti-crisis management of socio-economic systems based on the integration of systemic, situational, competence, process, functional, behavioral, project and strategic approaches, taking into account crisis avoidance (mitigation) tools and implementation of anti-crisis strategy under the adverse influence of the global competitive environment.

The priority of our study is to develop a combined methodological approach to strategic anti-crisis management of the socio-economic system of the state through the parameters of an open three-sector model that takes into account the cyclical stages of the impact of “quasi-crisis pressure” on target indicators (availability of capital funding by sectors, productivity, competitiveness) in a global competitive environment, thus minimizing the threat of outflow of significant resources

to other socio-economic systems or reducing the inflow of new resources with a time limit on the level of risk, aimed at preventing and eliminating crises and enhancing long-term (strategic) management.

2. MATERIALS AND METHODS

One of the criteria for assessing the impact on the functioning of the socio-economic system is the degree of coverage of the main components of the system. The crises phenomena that accompany crises are usually interrelated. The crisis state of the enterprise is characterized by a certain sequence, a kind of chain of economic phenomena associated with causation (Slaviuk, 2012). During the crisis of socio-economic systems of higher levels, the list of these phenomena includes not only economic, but also socio-economic and psychological ones. Thus, the economic crisis will worsen both the possibilities of logistics and the state of financial support; it will cause psychological and social crises. The emergence of crisis phenomena in one of the spheres of functioning of the socio-economic system causes the emergence or deepening of crisis phenomena in another one. On the contrary, it is possible to establish the reverse sequence, i.e. crisis phenomena in the defining spheres of functioning of socio-economic systems increase cyclically. There is a kind of “crisis cycle” (Dubynska, 2010), or the so-called ripple effect: a crisis, which is compared with the effect of waves from falling stones into the water (Khit, 2002), can cause and exacerbate a number of other crisis situations. The “ripple effect” causes a “chain reaction” (Korotkova, 2003), the essence of which is to spread the local crisis (crisis in one part of the system) to the entire system, and in some cases to other socio-economic systems.

The intensification of competition in the context of globalization presupposes the existence of a constant struggle for the inflow of resources needed for the development of the socio-economic system. The most important among them in modern conditions are financial (investment) and intellectual (human resources) capital. At the same time, a significant amount of financial and intellectual capital has not yet found application in a particular socio-economic system, but it is becoming increasingly difficult to attract it, as this is sought by different socio-economic systems. The system that succeeds in this is directed by international flows of investment or intellectual capital, bypassing countries or enterprises. To avoid other “blocking” of the inflow of resources, socio-economic systems are forced to continuously spend certain resources to maintain the appropriate level of investment attractiveness. However, to ensure their development is not enough – it is necessary to create conditions for the receipt of additional amounts of these resources. This requires certain costs. Therefore, because of such a “quasi-crisis” continuous influence of the global economic environment there is a certain deformation of socio-economic relations within the system (enterprise, region, national economy).

To ensure a dynamic balance, i.e. minor changes in the parameters of the socio-economic system due to the interaction of internal factors and external pressure, it is necessary to quickly mobilize internal factors (Medvedeva, 2010). Threats that in a global competitive environment put quasi-crisis pressure on socio-economic systems at the level of the

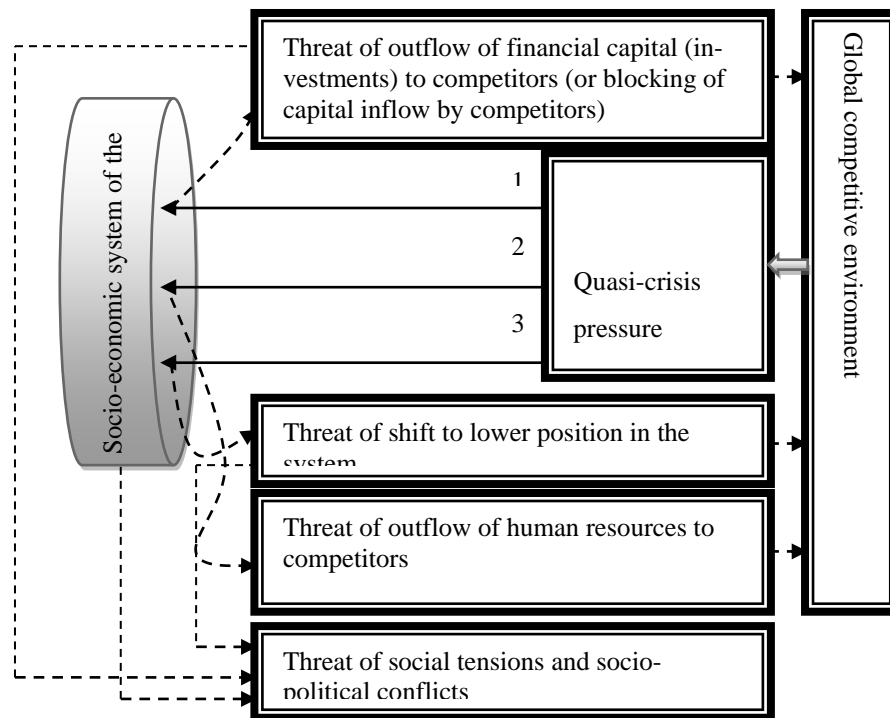


Fig. (1). Quasi-crisis pressure in conditions of global competition.
Source: developed by the authors.

national economy are divided into three blocks by the nature of competition: 1) financial capital; 2) intellectual capital; 3) ranking positions in the system of profit redistribution in the global market (Fig. 1).

Human resources, financial and intellectual capital are mobile resources. Blocking their inflow by competitors, means creating conditions that significantly affect the redistribution of global capital flows and labor in their favor (preferential taxation of foreign direct investment (FDI), special programs to attract highly skilled workers). Because of such redistribution, part of the resources, if competitors level such measures, goes to other countries.

To counteract the anti-crisis pressure, two interrelated concepts are distinguished: the concept of needs, in particular the urgent needs of the poorest sections of the population; the concept of the constraints imposed by the state of technology and the social organization of society on the ability of the environment to meet current and future needs (Halchynskyi, 2009).

The first concept embodies the support of a certain “quality” of life, in particular, in the economic aspect to ensure development, without which the crisis develops in the social sphere, which violates the stability of the entire socio-economic system. The second concept – in counteracting quasi-crisis pressure, takes into account the limited resources available to the socio-economic system, including natural resources. Very few countries in the world fully meet their needs for natural resources through domestic sources. Therefore, in order to prevent the development of crises related to the lack of natural resources, it is necessary to take into account the possible threats posed by the external environment. Thus, quasi-crisis pressure combines an approach to compe-

tion as a competition for a ranked position in the system of redistribution of resources and managing the development of the system from the standpoint of preventing crisis phenomena. Globalization dialectically affects the frequency and severity of crisis phenomena in socio-economic systems. This impact is due to: 1) strengthening the “chain effect” of the crisis (due to increased interconnectedness of individual economies); 2) the emergence and formation of a socio-economic system of the highest rank – the world economy, for which the crisis is an objectively determined stage of evolutionary development; 3) increasing quasi-crisis pressure (due to changes in competition under the influence of globalization). Moreover, the constant threat of reducing the resources required for the functioning of the system, brings to the fore a long-term (strategic) management horizon, focused on ensuring a minimum amount of resources to counter the constant quasi-crisis pressure.

Within the theory of competition based on resource advantages (Hunt, 2000) (R-A theory, resource-advantage theory) it is possible to create a new concept of anti-crisis management, which provides high financial results without advantages in the redistribution of resources received by the company operating in the market. This approach can be used to justify the need for anti-crisis management as a constant and integrated response to crisis phenomena and the factors that give rise to them. R-A theory in any market system represents a set of ranked positions $\alpha, \beta, \gamma \dots \omega$, each of which is characterized by its own set of access to resources, consumers, intermediaries, financial, information and other institutions. Collectively, such a set determines the share of total resources (including financial income) that can be obtained by a subject of economic relations, operating in a particular market.

Achieving in a competitive environment favorable position of the market system in the redistribution of resources (positions $\alpha, \beta, \gamma \dots \omega$) provides the conditions under which competitors, who lag behind the leader, cease to operate. In addition, they have an unfavorable place in the market system of redistribution of resources (for example, δ or ω) and participate in competition in a higher-ranking position (for example, α) or compete with other competitors for holding positions. The introduction of a discrete set of ranked positions in the market system simplifies the definition of a competitive position through a method of comparison with other competitors or a standard. It is advisable to introduce a competitive space of the market system, at each point of which, there can be only one subject of economic relations. However, such an approximation can be modeled as a set of ranked positions (for example, a position β allows an enterprise to receive a smaller set of resources than a position α , but a larger one than a position γ). Accordingly, competition between socio-economic systems can be defined as competition for the share of resources redistributed through the markets of a higher-ranking system. Thus, competition between enterprises is a competition for the share of resources (money, material, human), which are redistributed through the relevant markets of the country or through global markets.

In the global space, the socio-economic system due to competition is not high enough in the system of redistribution of resources, i.e. receives less resources than needed to counter quasi-crisis pressure. In this case, the crisis occurs constantly. Moreover, hyper competition, as a multi-market system (Hermann, 2015), by geographical section, affects companies in promoting products (Jayachadran et al., 1999; Subbotyn, 2006). Therefore, if you translate multi-market competition in terms of ranking positions $\alpha, \beta, \gamma \dots \omega$, it will mean that each position is determined by a set of lower-order positions (coordinates) in each aspect of competition. Thus, the competitive space becomes multidimensional, which complicates the set of trajectories along which the ranking competitive positions change.

All this determines the importance of assessing the effectiveness of anti-crisis actions of the state, which is to counteract quasi-crisis pressure in the current and future periods. To assess such compliance, the most suitable is a methodological approach, called the “dynamic standard method” (The Global..., 2019) which allows any socio-economic system to move in the trajectory of the development (ideal or normative) from the standpoint of the subject of management. The real trajectory of the system can be more or less similar to the ideal. Accordingly, the effectiveness of the selected development strategies is assessed by the degree of similarity: the closer the development of the system to the ideal trajectory, the higher the effectiveness of the strategy, and vice versa. To assess the trajectory of economic development from the standpoint of compliance with the strategy of anti-crisis development, in conditions of global competition, it is advisable to use a set of five indicators (Table 1).

The quantitative value of the compliance of the socio-economic system development to the anti-crisis management strategy is calculated as the normalized degree of similarity between the matrices S (Syiroezhin, 1980) in Equation (1):

$$S = \left(1 - \frac{\sum_{i=1}^m \sum_{j=1}^m |F_{ij} - N_{ij}|}{2 \times R} \right) \times 100, \tag{1}$$

where, F_{ij}, N_{ij} – the elements of the actual and reference matrices, respectively; m – the total number of indicators selected for evaluation; R – the number of elements of the reference matrix, the value of which is non-zero.

Table 1. Hierarchically Organized Dynamics of Indicators for Assessing the Trajectory of the Development of the Country from the Standpoint of Compliance with the Strategy of anti-Crisis Management in a Global Competitive Environment.

The Level of the Hierarchy of the Indicator	Indicator	Correlation	Interpretation of Ratios of Dynamics of Indicators
1	Export of products (X1)	$D(X_1) \geq D(X_2)$	The country's share in the redistribution of global market resources is growing
2	GDP, (X2)	$D(X_2) \geq D(X_3)$	Productivity of use of production capacities, human capital and involved resources increases
3	Capital Investments, (X3)	$D(X_3) \geq D(X_4)$	Increases labor capital, attracted financial resources are aimed at expanding the material and production base of the country
4	The amount of FDI, (X4)	$D(X_4) \geq 1$	The country attracts more financial resources from the global market
5	The share of people employed in the economy (from the population over 15 years old), (X5)	$D(X_5) \geq 1$	Employment growth, increase in human capital

Note: $D(X1)$ – the growth rates of indicators, % to the previous period

Source: developed by the authors

If $S = 100\%$, then the development of the socio-economic system (national economy or system of another rank) corresponds to the strategy of crisis management. Otherwise, ($S = 0\%$) the dynamics of the system does not fully comply with the strategy of anti-crisis management.

In the conditions of global competition, counteraction to crisis phenomena should be aimed not only at avoiding or overcoming negative phenomena or crises, but also at counteracting quasi-crisis pressure. The emergence of negative trends or phenomena is an objective consequence of hyper

competition, and therefore it is impossible to avoid them. Instead, the subjects of management of socio-economic systems should realize that the support of the functioning and development of management facilities requires such a constant response to quasi-crisis pressure, which needs a certain amount of resources and efficient use of allocated resources. Failure to ensure a sufficiently high position in the market of redistribution of resources in the enterprise or in the country leads to the lack of resources to counter quasi-crisis pressure from the competitive environment.

A combined methodological approach to the strategic anti-crisis management of the socio-economic system is proposed, in order to determine the optimal parameters of an open three-sector model that takes into account the adequacy of resources in the fixed assets sector. Insufficient development of this sector is one of the determining factors of the sensitivity of enterprises, regions and countries to global quasi-crisis pressure. According to this model, from the standpoint of sector development, the economy is divided into:

material (zero) – production of objects of labor (raw materials, energy resources, semifinished products, other consumables in the production process);

fund-forming (first) – production of fixed assets (buildings, constructions, machinery, equipment, power devices, other industrial investment goods);

consumer (second) – production of consumer goods.

In this case, the technological component is considered invariant with the help of linear-homogeneous neoclassical functions (sectors) (Kolemaev, 2008):

$$X_i = F_i(K_i, L_i), i = 0, 1, 2, \tag{2}$$

where, X_i , K_i , L_i – output in comparable prices, physical capital and the number of employees in the i -th sector.

As for the basic parameters of the model we take similar functions (1) (Kolemaev, 2008), then we must assume that time changes continuously, the lag of investment is zero, the coefficients of depreciation of physical capital in the sectors and the growth rate of the employed working population are constant quantities. In addition, we assume that the coefficients of depreciation are the same, and the coefficient of quotas on imports of investment goods and the ratio of world prices for materials and investment goods are constant.

We introduce the following symbols: v – the growth rate of the employed working population (i.e. according to the model (Solow, 1956), $(L = L(t) = L(0)e^{vt})$; $\theta_i = \frac{L_i}{L}$ – the share of the i -th sector in the distribution of labor resources; s – the share of the i -th sector in the distribution of investment resources; $k_i = \frac{K_i}{L_i}$ – capital adequacy of the i -th sector; $\frac{X_i}{L_i} = F_i(k_i, 1) = f_i(k_i)$ – sectoral labor productivity of the i -th sector; $y_0 = \frac{Y_0}{L}$ – the share of imports of material resources; $y_1 = \frac{Y_1}{L}$ – the share of imports of investment goods;

$y_2 = \frac{Y_2}{L}$ – the share of imports of consumer goods; Y_0 – coefficient of quotas of material resources; Y_1 – import quotas of investment goods; Y_2 – coefficient of import quotas of consumer goods; z_0 – share of exports of materials (raw materials); q_0 – world price of exported goods; q_1^+, q_2^+ – world prices of imported investment and consumer goods; a – direct costs of materials per unit of output of the i -th sector; μ – coefficient of depreciation of physical capital (the same for all sectors); $\lambda = \mu + v$ – coefficient of reduction of capital adequacy due to depreciation of physical capital and increase in the number of employees.

We introduce the share of economic sectors as (Solow, 1956):

$$x_i = \frac{X_i}{1} = \theta_i f_i(k_i), i = 0, 1, 2, \tag{3}$$

where, x_i – labor productivity of the i -th sector.

The dynamics of capital funding of sectors of the economy is determined by the differentiated equation (Solow, 1956):

$$\frac{dk_i}{dt} = -\lambda k_i + \frac{s_i}{\theta_i} (x_i + y_i), k_i(0) = k_i^0, i = 0, 1, 2. \tag{4}$$

Accordingly, the equation of balance for sectors of the economy will look like this for:

balance of labor resources:

$$\theta_0 + \theta_1 + \theta_2 = 1, 0 \leq \theta_i \leq 1 \tag{5}$$

balance of investment resources:

$$s_0 + s_1 + s_2 = 1, 0 \leq s_i \leq 1 \tag{6}$$

material balance (balance of production):

$$(1 - a_0)x_0 = a_1x_1 + a_2x_2 + z_0 \tag{7}$$

foreign trade balance:

$$q_0z_0 + q_1^+z_1 + q_2^+z_2 = q_0y_0 + q_1^+y_1 + q_2^+y_2 \tag{8}$$

conditional material and resource security:

$$Y_0 \leq Y_0X_0 \tag{9}$$

conditional technological security:

$$Y_1 \leq Y_1X_1 \tag{10}$$

conditional consumer security:

$$Y_2 \leq Y_2X_2. \tag{11}$$

Thus, modern socio-economic systems depend on a competitive environment. At the same time, no less important is the anti-crisis in the projection for the future, which allows the system to prepare for negative impacts, taking into account the strategic aspect. As the system is constantly under quasi-crisis pressure both internally (due to internal contradictions) and externally (from competitors), strategic anti-crisis management is designed to determine the sources of resources to counteract this pressure, if similar problems are solved by competitors. Any modern management is necessarily strate-

Table 2. Relation of Incomes from the Stage of the Development of the National Economy.

Stage of Development	A Key Factor in International Competitiveness	GDP Per Capita, USD
Stage 1	Availability of natural resources	< 2000
The transition from stage 1 to stage 2		2000-2999
Stage 2	Efficiency of natural resources use	3000-8999
The transition from Stage 2 to Stage 3		9000-17000
Stage 3	Innovations	> 17000

Source: calculated by the authors according to data (The Global..., 2019; The Global..., 2020)

Table 3. The Structure of the System of Factors at Different Stages of the Development of Socio-economic Systems at the National Level, %

Groups of Factors	Stages of Development				
	Stage 1: Development Depends on the Availability of Resources	The transition from Stage 1 to Stage 2	Stage 2: Development Depends on Resource Efficiency	The transition from Stage 2 to Stage 3	Stage 3: Development Depends on Innovation
Basic requirements	60	40-60	40	20-40	20
Efficiency factors	35	35-50	50	50	50
Factors of innovative development	5	5-10	10	10-30	30

Source: calculated by the authors according to data (The Global..., 2019; The Global...,2020).

gic and anti-crisis, because crisis phenomena take the system out of control, and therefore, they are incompatible with the achievement of any strategic guidelines for the development. In addition, strategic anti-crisis management must take into account the presence of competition, as a limited amount of resources is distributed among all systems of competitors, the number of which in the globalization of the modern world is significantly increasing.

3. RESULTS AND DISCUSSION

The world socio-economic system forms a certain amount of resources, which are distributed through market mechanisms, primarily investment and human, as they serve as a basis for economic development. For their share in the total amount of resource redistribution, countries enter into a competitive struggle. Accordingly, in the system of global competitive relations, the lowest ranking positions are occupied by economies the development of which depends on resources, the highest – economies the development of which depends on innovation. Economies, the development of which depends on resource efficiency occupy an intermediate position. This division corresponds to the shift of competition from the price factor to the qualitative characteristics of goods and services, which is recognized as one of the features of competition at the present stage of the development of the world economic system. Resource-dependent economies build their development on the export of raw materials and supplies, with a small share of resources redistributed in global markets. This is due to the low value of GDP per capita (Table 2).

The place of socio-economic systems in the global system of redistribution of resources is actually recognized as the basic

requirements for the activities of enterprises (availability and quality of institutions, infrastructure, macroeconomic stability, development of health care systems and basic education). The creation of such a basis allows occupying only low-ranking positions in the international system of competitive relations, i.e. to ensure that the economy is at Stage 1.

At other stages, which provide higher-ranking positions in the international system of competitive relations, the basic conditions remain, but their role in economic development decreases (Table 3).

Thus, the share of basic requirements for the functioning of the socio-economic system at the national level is the largest at the stage of dependence on resources – it is 60%. However, to move to higher positions in the global system of competitive relations, it is necessary, without reducing the influence of all basic factors, to ensure an increase in other group factors: efficiency and innovation. At Stage 3 (dependence of the development on innovation) the share of basic requirements is only 20%, and the share of factors of resource efficiency (50%) and innovation (30%) – increases. However, an important aspect of the ability of the socio-economic system to develop is social. Without social stability, any economy will remain vulnerable to the development of crises.

Assessment of the impact of the social sphere on the ability of the economy to develop is based on three groups of indicators. The first group contains indicators of access to basic physical needs: access to sanitation, quality drinking water, medical services and food security (Hermann, 1963; Dubynska, 2010; Medvedeva, 2010; Mykhailovska, 2012). The second group of indicators of social stability is related to the concept of economic security and includes the following indicators: the share of vulnerable workers in the total num-

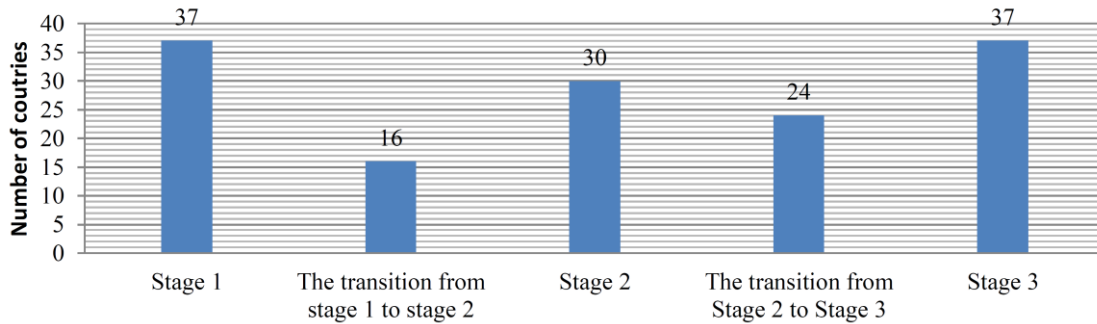


Fig. (2). The number of countries by stage of development of their economies in 2020. Source: built by the authors according to data (The Global..., 2019; The Global...,2020).

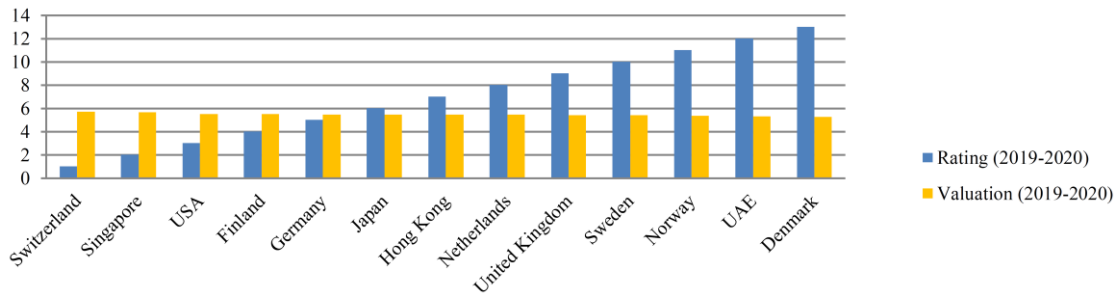


Fig. (3). Countries with the highest values of the global competitiveness index Source: built by the authors according to data (The Global..., 2019; The Global..., 2020).

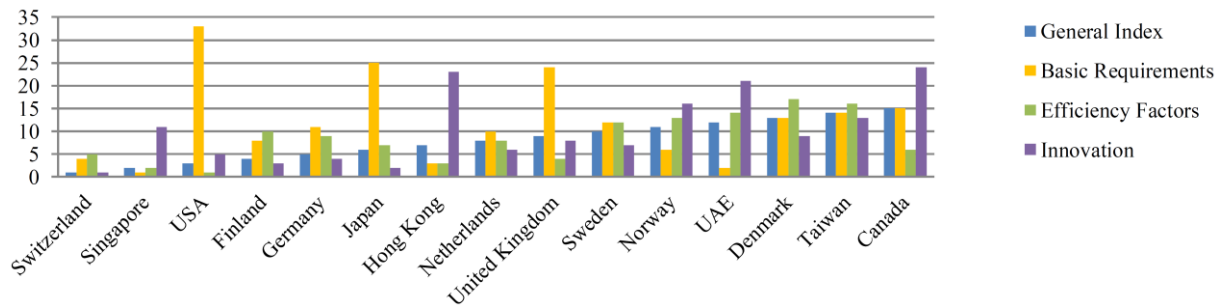


Fig. (4). Ranks of leading countries in international competitiveness according to the components of the GCI index in 2019-2020 Source: built by the authors according to (The Global..., 2019; The Global..., 2020)

ber of workers, the share of the informal economy and the total cost of social protection. The third category of indicators of social stability is grouped by the following indicators: Gini index by income, index of social mobility and youth unemployment. The Gini index indicates how effective the system of income redistribution within the socio-economic system is. Based on these three groups of indicators, the index of global competitiveness is determined, which takes into account the social stability in the country (Fig. 2), which shows that most countries are in the stage of development dependent on the availability of resources. Relatively few countries have switched to innovative development.

Instead, the economies of a large group of countries is at the stage of development dependent on natural resources (37 countries) and at the stage of transition from Stage 1 (dependence of development on resources) to Stage 2 (dependence of development on resource efficiency).

The ranking of countries according to the Global Competitiveness Index (GCI) according to the TOP-15 is presented in Fig. (3).

Various groups of factors provide high-ranking positions in the economies of the leading countries of international competitiveness. Thus, innovative factors significantly determine the leadership positions of Switzerland, Japan, Finland, Sweden and the Netherlands. High-ranking positions in the global system of redistribution of resources of most countries (Fig. 4) ensure their effective use, thus complementing the relatively high level of the development of basic factors and factors of innovation. This group includes countries with little natural resources (Hong Kong, Taiwan, Japan), as well as the United Kingdom, the United States and Canada. The development of basic factors is expected to be based on the high competitiveness of Norway (11th rank) and Qatar (6th rank), which have a sufficient supply of fuel and energy resources (Fig. 4).

In the countries with the most positive dynamics of the rank of the GCI index, a group of factors has been identified that positively influenced the change in the disposition of the global system of competitive relations (Fig. 5).

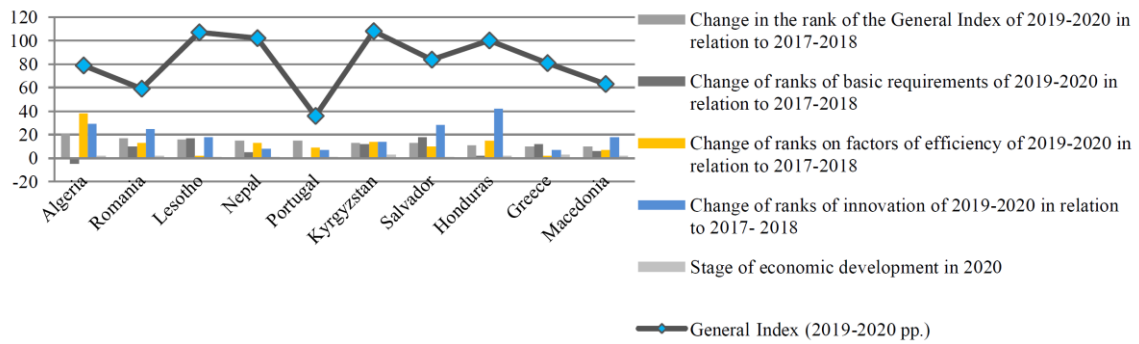


Fig. (5). Countries with the greatest positive dynamics of international competitiveness in 2019-2020. Source: built by the authors according to data (The Global..., 2019; The Global..., 2020).

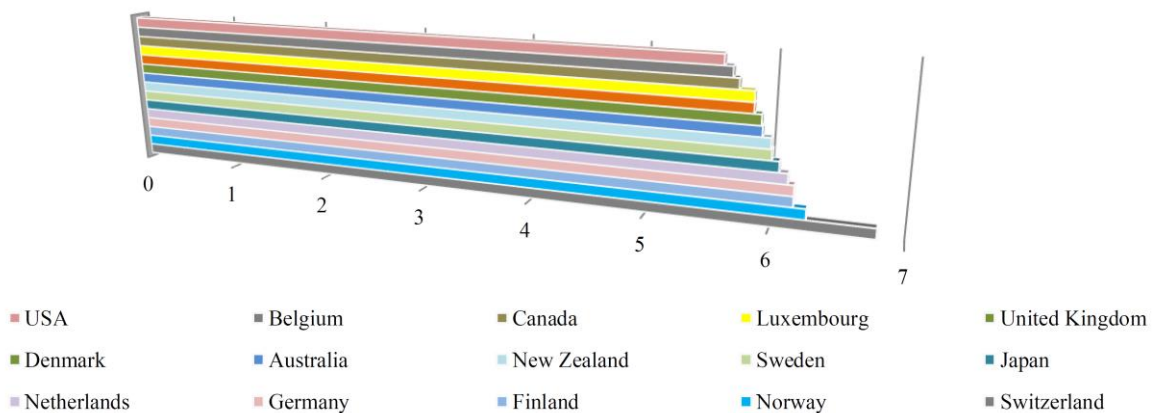


Fig. (6). Leaders of global competitiveness taking into account social stability in 2019-2020. Source: calculated by the authors according to data (The Global..., 2019; The Global..., 2020).

We should note that the greatest positive dynamics did not lead to the transition of countries to Stage 3 (Fig. 6). The three countries with the most positive GCI rankings (Algeria, Romania and Lesotho) have moved to higher rankings due to the same positive shifts in efficiency and innovation.

However, even after positive changes in the innovation of the economy, they are beyond 100 in the ranking. The relatively high ranking positions of these countries are provided by efficiency factors and basic requirements. However, none of the displaced countries (except Portugal) is characterized by a high level of economic innovation. This indicates the limited potential for growth of their competitiveness in the future.

At the same time, the social aspect of ensuring the development of global competitiveness does not fundamentally change the rating of the world (Fig. 6). Among the leaders are developed European countries, as well as the countries with a high level of social protection, which provide access to basic goods: Japan, New Zealand, Canada, USA, and UAE.

Considering the global competitive environment, we must note its peculiarity – the transition to a new level of competitive relations between business structures, associated with the extremely intensive development of TNC. Business entities, competing with TNC affiliates, find themselves in unequal conditions. Although each branch is a socio-economic

system of the same rank with a separate enterprise, but it is part of the system of higher rank. Branches of TNC can always receive financial, intellectual, informational, technological or any other support from the parent company, while separate enterprises do not have such an opportunity. Accordingly, while transforming, all levels of competitive relations enter the socio-economic systems of higher rank, i.e. TNC (Fig. 7).

As we can see, in the last two decades the scale of activity of new subjects of competitive relations has increased. In particular, the value of total assets of foreign branches of TNC in 2020 is more than 20 times higher than their value compared to 2000. In addition, in 2020 the volume of international production of TNC grew steadily due to the flow of foreign direct investment (FDI), and, despite their reduction, supplemented the amount of accumulated FDI. The accumulated volume of FDI increased in 2020 by 11.6%, reaching 26 trillion USD. Foreign branches of TNC sold products worth 34 trillion USD (of which 7.7 trillion USD – for export), which is 3.2% more than in 2019. Almost 71 million people work in foreign branches of TNCs.

In 2020, the performance of foreign branches of TNC exceeded the average level of redistribution of resources in the global market. These structures lead to increased anti-crisis pressure by limiting the share of global market resources available to other members in competition. Their activities are focused on the domestic markets of the host countries.

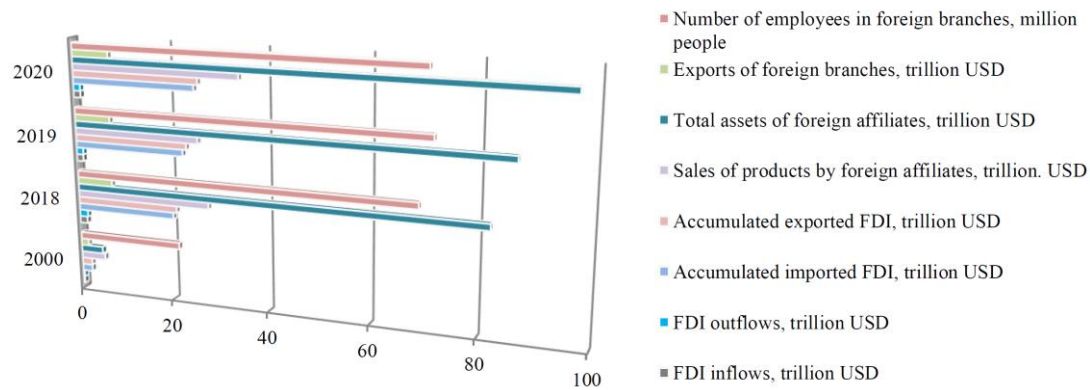


Fig. (7). The scale of transnational corporations (TNC) in 2000-2020.
 Source: calculated by the authors according to data (World Investment..., 2013; World Investment..., 2020)

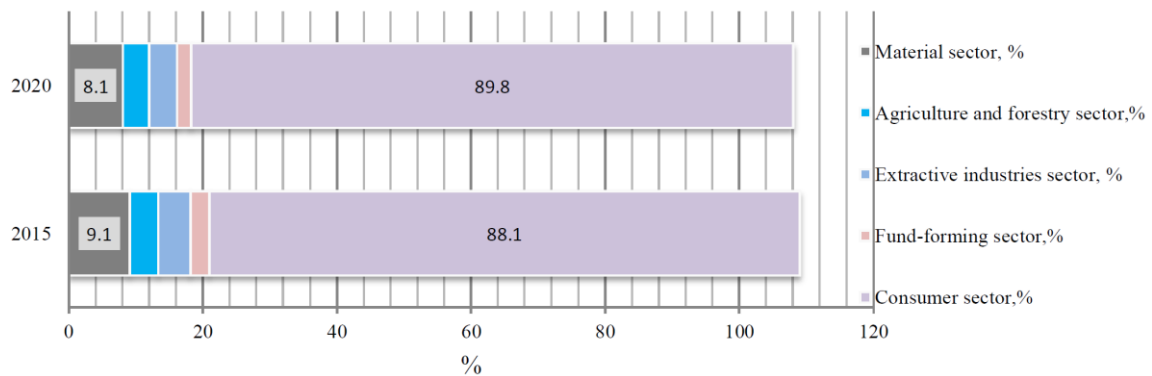


Fig. (8). Change in the distribution of investment resources between sectors of the socio-economic system of Ukraine for 2015-2020 (residual value of fixed assets).
 Source: calculated by the authors according to data (Statistical Publication..., 2021)

Despite the growth of sales for 2000-2020 in more than 5 times, almost 3/4 its volume is invariably directed to domestic markets. Moreover, the share of exports of foreign branches decreased slightly. Thus, TNC through a wide network of foreign branches enter the domestic markets, creating additional competition for local producers. Under such circumstances, local enterprises are forced to compete not with similar socio-economic systems of the same rank, but with elements of socio-economic structures of higher rank, which creates an asymmetry of competitive relations, as TNC branches have the support of parent structures. TNC branches gain additional advantages in competition with local enterprises and displace them from such industries as banking, insurance, engineering, chemical industry (observed in Southeast Europe, Mexico, Argentina) (Subbotyn, 2006). Thus, the transformation of competitive relations at the micro level due to the widespread development of TNC is manifested in the asymmetry of ranks of competing socio-economic systems in the national economy, causing increasing quasi-crisis pressure on local enterprises focused on both domestic market and exports. At the same time, investment flows are formed exclusively by the interests of TNC, which may not coincide with the interests of the state (regarding the development of priority industries, sectors, regions).

Thus, about 60% of world trade, which amounts to more than 20 trillion USD, accounts for trade in intermediate goods or services used at various stages of the production

process for the needs of consumers. In developing countries, the share of trade within the global production system (GPS) is on average almost 30% of GDP, in developed countries – 18%. There is a certain positive correlation between participation in GPS and GDP dynamics (World Investment..., 2020). GPS directly affects benefit, employment and profit. For developing countries, they can also be an important mechanism for building production capacity, in particular through the spread of technology and employee training, which creates the preconditions for long-term modernization of industry. However, the contribution of GPS to GDP may be limited if countries retain only a small part of the benefit created in the chain. In addition, the spread of technology, training and modernization do not happen automatically. Developing countries will not be able to master production with relatively high benefit.

High mobility of investments of TNC in many countries is carried out in relatively capital efficient production, which in case of deterioration of the situation is reduced, and investments are withdrawn from the country. This situation has long been observed in the small island countries of the Asia-Pacific region and has manifested itself in the region's more powerful economies (Malaysia, Singapore, Vietnam, Indonesia, etc.) (World Investment..., 2020).

The change in the distribution of resources between sectors of the socio-economic system of Ukraine is presented in Fig. (8).

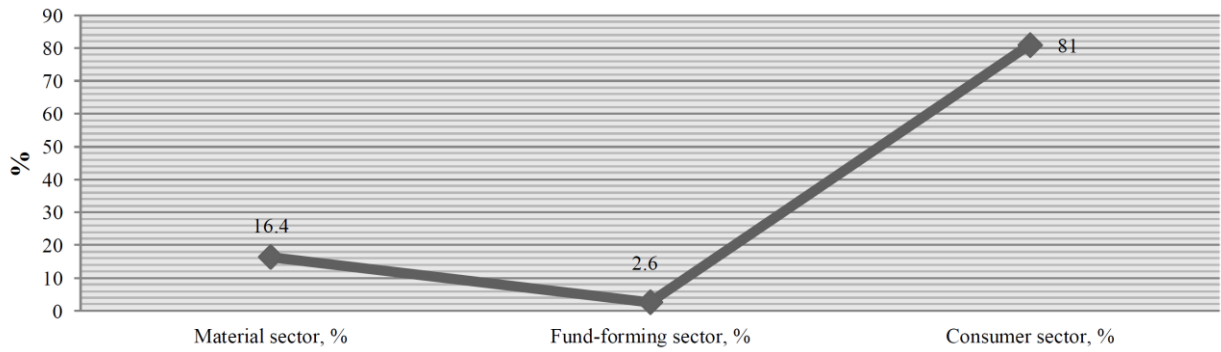


Fig. (9). Distribution of capital investments between sectors of the socio-economic system of Ukraine for January-June 2021. Source: calculated by the authors according to data (Capital Investments..., 2021).

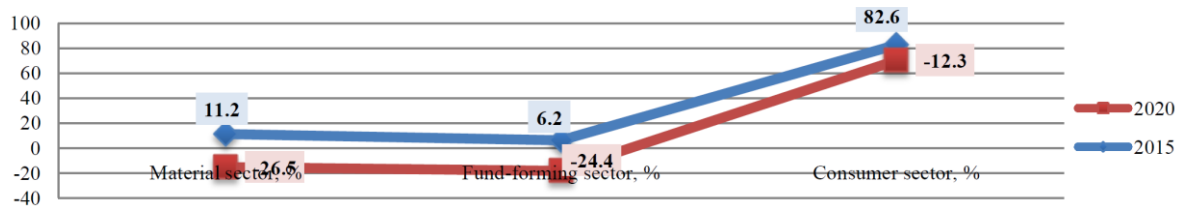


Fig. (10). Distribution of labor resources between sectors of the socio-economic system of Ukraine for 2015-2021. Source: calculated by the authors according to data (Capital Investments..., 2021).

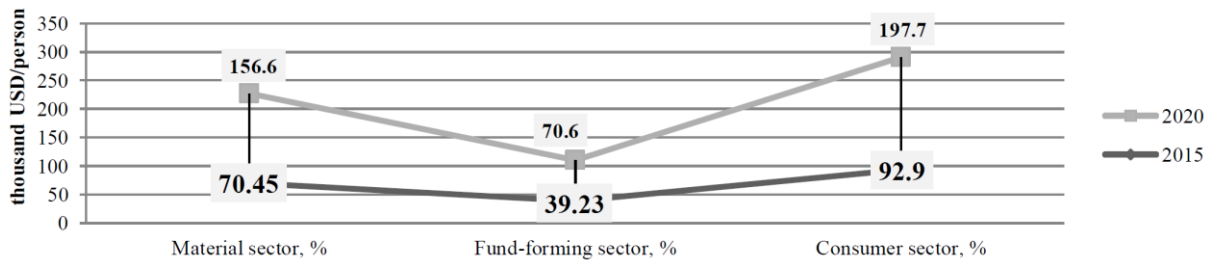


Fig. (11). Capital funding by sectors of the socio-economic system of Ukraine, 2015-2021. Source: calculated by the authors according to data (Capital Investments..., 2021).

The main investment resources among the sectors of the socio-economic system of Ukraine are concentrated in the consumer segment. As a result, the technological base of this sector is formed due to the import of technologies and equipment, new for the Ukrainian market, but not new on a global scale. The latest technologies are mostly owned by TNC, which provide them with competitive advantages in world markets. Therefore, such technologies do not become objects of purchase and sale on the world market. The deficit of inflows of investment resources into the fund-forming sector is evidenced by the structure of capital investments by sectors of the socio-economic system of Ukraine in 2020 (Fig. 9).

The largest share of investment resources goes to the consumer sector, while their inflow into the fund-forming sector remains approximately proportional to its share in accumulated investments. The main differences between the distribution of accumulated investments and their inflow into the sectors of the socio-economic system of Ukraine in 2021 are related to the increase of their share in the material segment due to the decrease of the share of the consumer sector.

The share of the distribution of labor resources in the socio-economic system of Ukraine is presented in Fig. (10).

Labor resources in the socio-economic system of Ukraine are distributed similarly to investments. The fund-forming sector is insufficiently provided with labor resources, the share of which in this segment in 2015-2020 decreased by 30.4% (Fig. 11).

As a result, the material sector (production of fixed assets) is characterized by the lowest of all sectors of capital funding.

All anti-crisis measures have a common strategic goal – to increase the amount of resources that socio-economic systems of different levels (from enterprises to national economies) receive from outside the market mechanism, i.e. outside competitive relations, especially with economic entities of other countries. In order to determine the effectiveness of the strategy of anti-crisis management of the socio-economic system of the national level, which is used in the context of increasing global quasi-crisis pressure, a reference matrix is constructed, which corresponds to the graph presented in Fig. (12).

In this case, the symbol $D(X_i) \rightarrow D(X_j)$ corresponds to $E_{ij} = 1$. Otherwise $E_{ij} = 0$. If the relationship between $D(X_i)$ and $D(X_j)$ is not set in the graph given in Fig. (9), then, $E_{ij} = 0$. The reference matrix of the hierarchy of dynamics of indica-

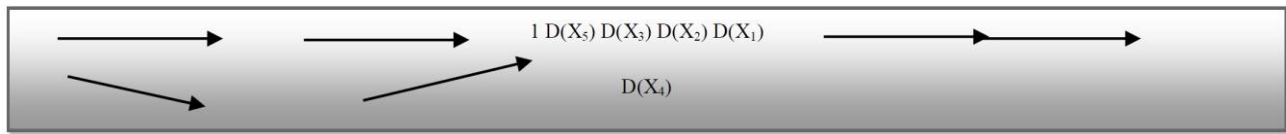


Fig. (12). Graph of assessing the compliance of the development of the socio-economic system of the national level and the strategy of anti-crisis management in a global competitive environment: $D(X_i) \leftarrow D(X_k)$ is marked by inequality $D(X_i) \geq D(X_k)$
 Source: developed by the authors.

tors corresponding to the graph (Fig. 9) is shown in the matrix (Table 4).

The application of this method is illustrated by the example of Switzerland and a matrix of its actual hierarchy of indicators in the dynamics of indicators of the state of the national socio-economic system (Table 5).

Subtracting the matrix of the hierarchy of actual indicators of dynamics (Fig. 9) from the reference (Table 5), we obtain the number of differences $\sum_{i=1}^m \sum_{j=1}^m |F_{ij} - N_{ij}| = 20$. The number of non-zero elements in the reference matrix $R = 28$.

Table 4. Reference Matrix for Assessing the Effectiveness of the Strategy of anti-crisis Management of the National socio-Economic System in the Context of Global Competition (Indicators).

Indicators	D(X1)	D(X2)	D(X3)	D(X4)	D(X5)	“1”
D(X1)	0	1	1	1	1	1
D(X2)	-1	0	1	1	1	1
D(X3)	-1	-1	0	-1	1	1
D(X4)	-1	-1	1	0	0	1
D(X5)	-1	-1	-1	0	0	1
“1”	-1	-1	-1	-1	-1	0

Source: developed by the authors.

Table 5. The Matrix of the Actual Hierarchy of Indicators of the Dynamics of Indicators of the Socio-Economic System of Switzerland for 2015-2020.

Indicators	D(X1)	D(X2)	D(X3)	D(X4)	D(X5)	“1”
D(X1)	0	-1	-1	1	1	1
D(X2)	1	0	-1	1	1	1
D(X3)	1	1	0	1	1	1
D(X4)	-1	-1	-1	0	0	-1
D(X5)	-1	-1	-1	0	0	1
“1”	-1	-1	-1	-1	-1	0

Source: developed by the authors

The normalized degree of dynamics of the development of Switzerland, according to formula (1) is equal to 64.3%, which corresponds to the “ideal” strategy of anti-crisis management of the socio-economic system in the country. Similarly, the share of similarity in the dynamics of socio-

economic systems of the world in accordance with the strategy of crisis management is calculated. The modal value of this indicator is 64.3% for 46 countries and has the appropriate dynamics of socio-economic development with the trajectory of predicting the strategy of anti-crisis management; medial (criterion) – 60.4%. If the degree of similarity of the dynamics of socio-economic development of the country exceeds the criterion of the trajectory of the anti-crisis management strategy (i.e. 60.4%), then the chosen development strategy is effective for counteracting quasi-crisis pressure in the future.

It should be noted that the indicator of compliance with the socio-economic development of Ukraine does not cross the ideal trajectory of the anti-crisis management strategy and is lower than the criterion (57.1%). However, the factors that caused the positive dynamics of Ukraine's global competitiveness index in 2019-2020 are due to the dynamics of basic requirements and efficiency. However, as noted, the positive impact of such groups of factors does not fully enable the stable development of the socio-economic system and is limited in counteracting global quasi-crisis pressure; innovations have a greater impact.

Indicators of the dynamics of socio-economic development of world leaders exceed the criterion value (64.3%) or slightly lower (57.1%). This indicates the difficulty of ensuring effective response to global quasi-crisis pressure, even in developed countries (Finland, Sweden, the Netherlands, the United Kingdom, Hong Kong), which have sufficient resources to do so. The economic development of the three countries (Qatar, Canada and Norway) is characterized by the compliance of the trajectory of their anti-crisis management strategy. The competitiveness of these countries is formed mainly by the factors of basic requirements and efficiency, which to some extent correlates with a high availability of resources. However, the resources that form the basis of economic development, even in combination with increasing the efficiency of their use, do not provide a sufficient trajectory of the development, provided effective response to quasi-crisis pressure.

In the group of countries that actively apply anti-crisis measures within the strategy to increase resources to domestic producers outside the market mechanism, they correspond to the macroeconomic dynamics of the trajectory of anti-crisis management, which is higher 62.5%, than the average in countries where measures within this strategy are not large-scale.

To establish the optimal parameters of the structure of the socio-economic system, we adapt it to an open three-sector model (Korotkova, 2003). In this model, a simplification is accepted: of the three foreign trade balances of the respective sectors (8), the most important is the material sector (9),

without taking into account the internal balances of each sector. Simplification of the model of optimal balanced growth of the open economy will allow establishing the main parameters of the anti-crisis management strategy in the context of increasing global quasi-crisis pressure due to changes in imports of consumer goods over time, as optimization restrictions are introduced under the condition of consumer security (9).

Optimal balanced growth of the socio-economic system means an increase in capital funding of all sectors, which is balanced in terms of labor, investment and material resources, taking into account constraints (8) and (9), and optimized by the criterion of “maximum discounted specific consumption”. The mathematical expression by phases of variables for the maximum of the discounted specific consumption has the form (12) (Kolemaev, 2008):

$$\delta \int_0^\infty e^{-\delta t} c(t) dt \rightarrow \max. \tag{12}$$

Since $c(t) = x_2(t) + y_2$, under the condition $y_2 = \text{const}$ (12) is reduced to maximizing the discounted specific output of the consumer sector (Kolemaev, 2008):

$$\delta \int_0^\infty e^{-\delta t} x_2(t) dt \rightarrow \max, \tag{13}$$

where, δ is a parameter that changes.

The phase variables are the capital funding of the sectors, and the equation of motion is the equation (3) for the capital funding of the sectors. The determining parameters are the share of sectors in the distribution of labor and investment resources between sectors $\theta_0, \theta_1, \theta_2, S_0, S_1, S_2$. Authors are writing the equations for phase variables, taking into account formula (Kolemaev, 2008):

$$\frac{dk_0}{dk} = -\lambda k_0 + \frac{S_0}{\theta_0} (1 + \gamma_1) \times \theta_1 f(k_1), \quad k_0(0) = k_0^0 \tag{14}$$

$$\frac{dk_1}{dk} = -\lambda k_1 + S_1 (1 + \gamma_1) \times f(k_1), \quad k_1(0) = k_1^0 \tag{15}$$

$$\frac{dk_2}{dk} = -\lambda k_2 + S_2 (1 + \gamma_2) \times f(k_2), \quad k_2(0) = k_2^0. \tag{16}$$

To find the maximum (13) taking into account the equations for phase variables, we construct a Hamiltonian (Khytrova, 2013):

$$H = \delta e^{-\delta t} \theta_2 f_2(k_2) + \psi_0 \left(-\lambda k_0 + \frac{S_0}{\theta_0} (1 + \gamma_1) \times \theta_1 f(k_1) \right) + \psi_1 (-\lambda k_1 + S_1 (1 + \gamma_1) f(k_1) + \psi_2 (-\lambda k_2 + S_2 (1 + \gamma_2) f(k_2))), \tag{17}$$

Equations for conjugate variables have the following form (Khytrova, 2013):

$$\frac{d\psi_0}{dk} = \frac{\partial H}{\partial k_0}, \quad \frac{d\psi_1}{dk} = \frac{\partial H}{\partial k_1}, \quad \frac{d\psi_2}{dk} = \frac{\partial H}{\partial k_2}. \tag{18}$$

To simplify the task of finding the maximum functional (13), we analyze the features of the distribution of labor and investment resources between sectors of the socio-economic system of Ukraine. As an indicator of the latter, we will use fixed assets (FA), because the investments are “embodied” in them.

Indicators of the Ukrainian socio-economic system, taking into account the data of Figs. 10 and 12, on the trajectory of optimal economic growth, which corresponds to the strategy of anti-crisis management in the space of management parameters (θ, S) , should be equal to adjusted fields of sectors in the allocation of resources (Khytrova, 2013):

$$\frac{S_{ij}/a_{ij}}{\theta_0/(1-a_0)} = \frac{S_1/a_1}{\theta_1/(1-a_1)} = \frac{S_2/a_2}{\theta_2/(1-a_2)}. \tag{19}$$

Where, the adjusted share of the resource means the ratio of this share to the elasticity of the resource.

For 2015-2020 (in 2020 prices), the production functions of the sectors are calculated $(f_i(k_i) = A_i K_i^{\alpha_i})$:
 $X_0 = 5.14 K_0^{0.66} L_0^{0.42}, \quad f_0(k_0) = 5.14 K_0^{0.36},$
 $X_1 = 1.12 K_1^{0.71} L_1^{0.29}, \quad f_1(k_1) = 1.12 K_1^{0.71},$
 $X_2 = 2.14 K_2^{0.65} L_2^{0.43}, \quad f_2(k_2) = 2.14 K_2^{0.35}$

By aggregating intersect oral balances for 2015-2020, the coefficients of direct material costs by sectors of the socio-economic system of Ukraine (materials per 1 USD of products of the relevant sector at 2020 prices) are determined: $a_0 = 0.15; a_1 = 0.22; a_2 = 0.28$

In fact, the values of the capital adequacy of the sectors in 2020 were as follows (thousand USD / person, at 2020 prices): $k_0^0 = 74.4; k_1^0 = 40; k_2^0 = 88.9$

In 2020, the socio-economic system of Ukraine was characterized by the following actual shares of labor and investment resources distributed between sectors: $\theta_0^0 = 0.097; \theta_1^0 = 0.055; \theta_2^0 = 0.848;$
 $S_0^0 = 0.081; S_1^0 = 0.021; S_2^0 = 0.898$

Using the production functions of expression (19), we find the numerical values of sectoral productivity of the sectors of the socio-economic system of Ukraine: $(f_i(k_i^0) = A_i (k_i^0)^{\alpha_i})$:
 $f_0(k_0^0) = 42.0(46.2); f_1(k_1^0) = 22.4(25.2); f_2(k_2^0) = 12.3(11.8)$

(in parentheses, there are the actual values of productivity by sectors of the socio-economic system of Ukraine in 2020). Thus, the estimated labor productivity of the material and capital-forming sectors of the socio-economic system of the country was slightly lower than the actual, and for the consumer sector - higher than the actual.

The initial values of sectors $(x_i^0 = \theta_i^0 f_i(k_i^0))$ as the arithmetic mean of their actual and estimated productivity in the socio-economic system has the following values: $x_0^0 = 0.31; x_1^0 = 0.08; x_2^0 = 0.61$. The initial values of the share of sectors of the socio-economic system in Ukraine's exports will be as follows: $z_0^0 = 0.52; z_1^0 = 0.37; z_2^0 = 0.1$.

The share of the material sector is the largest in exports of goods. The share of the fund-forming sector is significantly lower than the indicator of the consumer and material seg-

Table 6. Production by Sectors of the Socio-economic System of Ukraine, Taking into Account Labor Resources (Thousand USD / Person at Prices in 2020) and the Share of Sectors in the Distribution of Labor Resources Depending on S_1 .

S_1	$\theta_0(S_1)$	$X_0(S_1)$	$\theta_1(S_1)$	$X_1(S_1)$	$\theta_2(S_1)$	$X_2(S_1)$	$\frac{X_2}{X_0 + X_1}$	$\frac{\Delta X_2}{\Delta X_0 + \Delta X_1}$
0.15	0.372	39.77	0.056	13.42	0.572	65.66	1.23	-
0.17	0.378	45.72	0.066	18.84	0.556	72.52	1.12	0.60
0.19	0.381	50.19	0.076	26.69	0.543	78.31	1.02	0.47
0.21	0.385	55.15	0.099	32.145	0.516	81.12	0.93	0.27
0.34	-	-	-	-	0.383	90.11	-	-

Source: developed by the authors.

Table 7. Optimal Values of Distribution of Labor and Investment Resources in the Socio-economic System of Ukraine within the Strategy of Anti-Crisis Management.

Type of resources	Sectors of Socio-economic System					
	Material		Fund-Forming		Consumer	
	Optimal Condition	Actual Condition	Optimal Condition	Actual Condition	Optimal Condition	Actual Condition
Labor resources	0.083	0.097	0.10	0.55	0.817	0.848
Investment resources	0.12	0.081	0.14	0.021	0.74	0.898

Source: developed by the authors.

ment of the system. It should be noted that the inflow of resources into the socio-economic system of Ukraine due to the ratio between consumer goods and the material component of resource provision is much less than under the conditions of export of investment goods (i.e., fixed assets as a capital-forming sector). The initial specific import of Ukraine is determined, which is as follows: $y_0^0 = 0.38$; $y_1^0 = 0.37$; $y_2^0 = 0.25$. Thus, Ukraine imports the most products of the material and consumer sectors, but the share of products of the fund-forming sector has a larger share in exports. The initial quoting coefficients of the sectors of the socio-economic system of Ukraine in the import of products are determined: $\gamma_0^0 \approx 1.19$; $\gamma_1^0 = 1.7$; $\gamma_2^0 = 0.55$.

Given that the limit value of quota coefficients 0.5, it must be acknowledged that in Ukraine there is a problem of material and technological security. However, during the phase of accelerated growth, the share of the fund-forming sector in the distribution of investment resources will grow slowly. Thus, at this stage, the sector will receive the vast majority of investment resources: ($S_1^*(t) \geq 0.69$).

According to Table 6, the estimated specific output of the consumer sector will increase with the growth of the share of the fund-forming sector in the distribution of investment resources S_1 and will reach a maximum within $S \approx 0.34$. At the same time, the increase in the production of fixed assets by one USD is accompanied by a smaller increase in consumer goods production. If we take the lower limit of the

growth of consumer goods 0.5 USD per one USD of the growth of means of production, then the share of investment resources will be $S_1^* = 0.18$, which is almost the same as the initial value $S_1^0 = 0.12$ (Table 6).

Comparison of the optimal shares of sectors of the socio-economic system in the distribution of investment and labor resources, shows that the largest optimal and actual distribution differs in the capital-forming sector: the share of labor resources in it is 2.0 times less than optimal, investment – in 7.0 times (Table 7, Fig. 13). Such differences suggest that, ideally, at the stage of accelerated growth of the socio-economic system of Ukraine, the strategic anti-crisis guideline of management should be a significant renewal of fixed assets in the engineering industry (Table 7).

Increasing the capital of all sectors of the socio-economic system of Ukraine, and mainly fund-forming, leads to a significant increase in productivity in the optimal condition and growth of the output by sectors per unit of labor resources in the country (Fig. 14).

Thus, the optimal state of the socio-economic system of Ukraine is characterized by only a small predominance of the output of the material sector over the fund-generating, while in fact the first indicator is more than 3 times larger than the second is. Upon reaching the optimal balanced value of the development of sectors of the socio-economic system, GDP in Ukraine will increase approximately 1.7 times. According to the optimal scenario of the strategy of anti-crisis management of the socio-economic system of Ukraine in the conditions of increasing global competition and quasi-crisis pres-

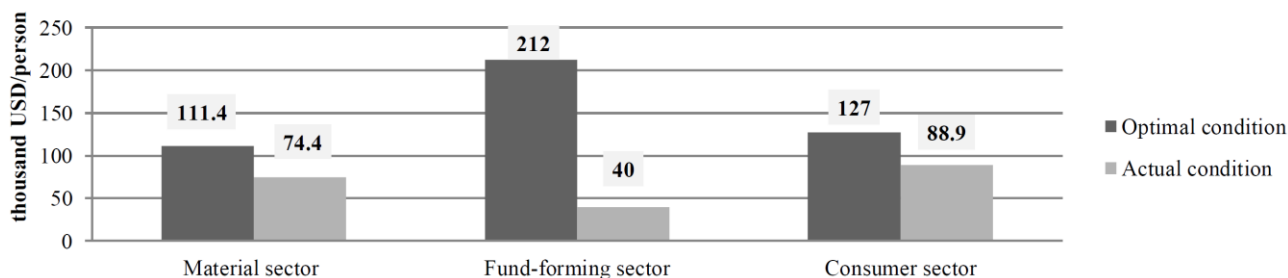


Fig. (13). The optimal state of capital funding by sectors of the socio-economic system of Ukraine.

Source: developed by the authors.

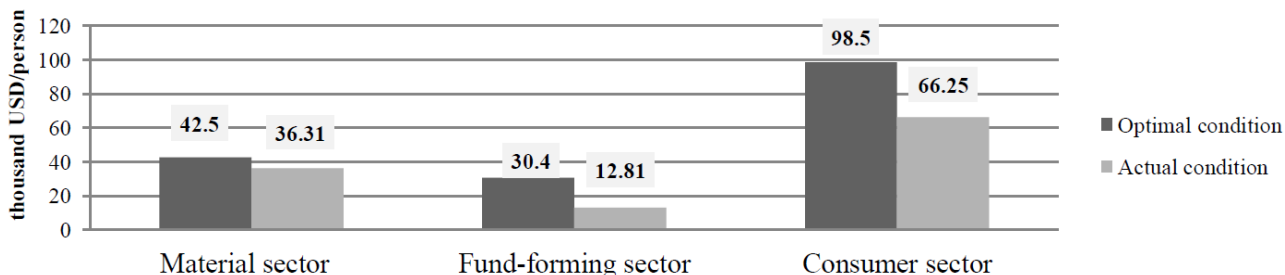


Fig. (14). Optimal output by sectors of the socio-economic system of Ukraine per unit of labor resources in the implementation of anti-crisis management strategy in the conditions of global competition.

Source: developed by the authors.

sure, it is necessary to ensure the inflow 69% of all inflows of the investment resources at the first stage. This can be ensured only by creating favorable conditions for investors.

4. CONCLUSIONS

Thus, the development of the fund-forming sector has a positive impact on other sectors of the socio-economic system of states. Only in this case, the countries will be able to receive an upgrade of the material sector (fixed assets), which will provide high-ranking positions in the system of redistribution of resources in the international market of products and consumer goods. In addition, only the innovative development of the fund-building sector will increase the share of investment goods in exports and reduce its dependence on prices for material resources. The socio-economic system of developing countries needs significant changes, not only in the economic sphere. Any economic changes, including the production and technological basis of the economic system, must be accompanied by the modernization of the state in the social protection system. This should be accompanied by an anti-crisis concept of management of socio-economic processes in the state, taking into account the criteria of the basic concept for the construction of the entire system of public administration.

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