

## SUSTAINABLE DEVELOPMENT TRANSFORMATION OF THE REPUBLIC OF ARMENIA: CONTEXT AND PERCEPTION

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**Abstract:** The article reveals the need for and methodology of the transformation of the sustainable development index. The idea of transforming the index made up of the indicators established by the UN's Sustainable Development Agenda was proposed due to the most acute manifestations of certain regional problems. As for the Republic of Armenia, those issues also include security and overcoming the constitutional deficit in addition to socio-economic and ecological problems. Methodologically, this approach allowed us to elaborate a new set of sustainable development indicators.

Due to the introduced set of indicators, the sustainable development index (SDG Index Score -Y) is linked with variables such as the capital and labor - K, L, the ecological component (Ecology - E), the level of constitutionalism (Constitutional Compliance - U), security (Security - S), and time - T. In the proposed concept, the optimal operation of sustainable development (OOSD) derives from the goals and limitations determined by the specifics of development. By virtue of the indicators given above, we will have the sustainable development index modified as follows:  $Y=(K,L,E,U,S,T)$ .

The schematic diagram of the concept includes indicators of sustainable development that relate to the responsible institutions of management, and indicate the respective norm required by the Constitution. The optimal management model is formulated based on the developed conceptual basis, where is required to select such a management that move the object from one state of stability to another, where the objective function takes the optimal value specified for the limitations of sustainable development indicators.

**Key words:** *sustainable development, transformation, optimal management problem, security, constitutionalism*

**Introduction:** From a methodological standpoint, the relational (paradigmatic) approach to the **sustainable development** of countries should be anchored on the **concept** defined by the principles and pillars of sustainable (human) development.

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From the viewpoint of this concept, we unwittingly face various perceptions and definitions of the notion. As a starting point, the sustainable development in question was considered, which guarantees the current and future generations the most possible equal and proper initial conditions to demonstrate their abilities and meet vital needs.

Sustainable development is based on an economy that combines the principles of ecological, security, and social justice in a democratic society that protects human rights. The following interrelated aspects are distinguished:

**1.** Ecological; **2.** Socio-economic; **3.** Political; **4.** Demographic, and **5.** Spiritual-psychological aspects [Sargsyan, 2004].

According to another definition, **sustainable development** is considered the interrelated and balanced development of the three sectors of human activity (economic, social, and ecological), which meets the needs of the present generation without depriving future generations of the opportunity to meet those needs (Danilov et al., 2014, 45 ]. The given definition made it possible to build and test the multi-criteria optimal management model for identifying sustainable development scenarios. The construction and approbation of such a model is among the difficult but solvable tasks.

Whatever variables and parameters the sustainable development coordinate system is represented by, it should be implemented with a systemic approach, using its entire arsenal of instrumentation and methods. At the same time, no matter how much the concept of sustainable development undergoes unification, i.e. unified in terms of including the essential aspects of the phenomenon, **the abstraction from its features will be highly destructive.**

**As a peculiarity, the underlying issues of ensuring security, inclusive economic growth, and raising the level of constitutionalism in the country are primarily distinguished for the Republic of Armenia, which are aimed at sustainable development and regional peaceful coexistence.**

Indicators of safety and inclusion listed in the above-mentioned domains are widely covered in economic studies. As for constitutionalism, the indicators thereof can be grouped as follows: the rule of law norms, and sustainable development norms. These two generalized components allow assessing the level of constitutionalism in a specific country.

The consequences of the failure to consider the characteristics of the countries in the development concept do not stand aside, and this is often manifested by intolerance of the societies towards the globalization processes. A striking example is the struggle against the tendencies of pushing out national identities that have been actively emerging in recent decades. It is indisputable that these tendencies have underlying causes. At one time, in the former USSR, an attempt was made to create a personality of the so-called “Soviet man”. Such phenomena tending to stereotype public life will make the world uninteresting, and people rightly revolt against it.

Neglecting the features of countries’ development in the above-mentioned concepts, in particular, the inadmissibility of depriving nations of their fundamental right to self-determination, leads to negative manifestations. These manifestations are aggravated by the insufficient struggle of international institutions and countries, and the discriminatory treatment and tolerance to such phenomena that lead to *wars, violence, hunger, attempted genocide, migration, and other disasters.*

Therefore, the **optimal operation of sustainable development (OOSD)** in a specific country should be based on the objectives and limitations determined by the specifics of development. *Objectives* are the outcomes that a specific country strives for due to its structural

and institutional framework. *Limitations* are the operation conditions and regulations that are manifested by the structures of implementing laws, and formal and informal institutions.

Within the framework of the principle scheme for OOSD (given in Figure 1 below), the correct selection and implementation of assumptions, formal models, applied instrumentation and methods are emphasized. Such an approach enables to assess, diagnose and manage the quality of sustainable development, namely, the quantitative certainty of existence caused by objects and relationships. The integration of built-in informal institutions in the given environment of system creation will not be of secondary importance.

Together with the combination of the conditions of interaction of the indicators and institutions, the OOSD implies developing guarantees with the maximum consideration of the geopolitical and resource potential of the Republic of Armenia, which will be aimed at:

- Long-term sustainable social and economic development;
- Meeting environmental and livelihood normative conditions;
- Improving and ensuring the country's security situation, and
- Increasing the level of constitutionalism in the country.

The phase coordinates and control parameters of the optimal control problem of sustainable development can also be characterized by the set forming the OOSD.

Thus, as an **initial definition**, sustainable development is considered as an interrelated and balanced development of human activity indicators and institutions, which meets the needs of the present generation without depriving future generations of the opportunity to meet those needs.

Figure 1

**Principle scheme for optimal operation of sustainable development (OOSD)**

	Socio-economic, ecological, security and constitutional components											
	1	2	3	4	5	6	7	8	9	10	11	12
<b>Indicators of sustainable development</b>	Food	Energy	Financial	.. <sup>1</sup>	Property right	Social	Cyber security	Ecological (E)	Legal-political	Ethno-cultura	Military (M)	Diplomatic (D)
<b>The responsible institution</b>	Ministry of Economy	Min. Economy, PSRC	CB of Arm., Min. of Finance	...	Ministry of Justice	Min. of Labor and Social Affairs	Legal system and CB of RA	Min. Econ., Min. of Environment	Ministry of Justice Ministry of Foreign Affairs	Ministry of ESCS	MoD of the Republic of Armenia	Ministry of Foreign Affairs
<b>The norm (article) of the Constitution of the</b>			a. 200		a. 10, a. 60	a. 1		a. 12	a. 1, a. 8 <sup>2</sup>	a. 15	a. 14, a. 155	a. 13, a. 19 <sup>3</sup>

<sup>1</sup> Missing indicators are filled in to make the list complete (e.g. capital and labor, inclusion index indicators according to the 4 pillars, share of manufacturing industry, etc.).

<sup>2</sup> Legal and political (equal legal opportunities for activities are guaranteed for the parties, etc.).

<sup>3</sup> Negotiation processes, relations with the Armenian diaspora, etc.

### The OOSD system as a pillar of the new conceptualization of sustainable development

The initial definition of sustainable development that we propose requires a transition from the classical production function of development  $Y=(K,L,T)$  to the following sustainable development function:

$$Y=(K,L,E,U,S,T), \quad (1)$$

where  $K$  is the capital,  $L$  is the raw labor,  $E$  is the ecological component, including the natural resource potential,  $U$  is the integral level of constitutionalism (Harutyunyan et al. 2017, 2018),  $S$  is the security assessment indicator (Sargsyan et al. 2023), and  $T$  is the time factor.

Limitation of the activities of destructive and polluting sectors of the economy, and promotion of processing production, final product, creation of infrastructure, as well as efficient use of natural resources will lead to a reduction of the argument  $E$  in the  $Y$  sustainable development function. At the same time, the sum of effective natural use and ecological protection measures will contribute to the increase of  $K$  and  $L$  factors, thus contributing to the increase of the added value of the products created as a result of processing production and the synergistic effect on the overall economy.

In the sustainable development function (1), the integral level of constitutionalism  $U_i$  is calculated as follows:

$$U_i = \sum_{j=1}^m \left( \frac{X_{ij} - X_j^k}{\sigma(X_j)} \prod_{\beta=1, \beta \neq j}^m (1 - \gamma_{\beta j}) \right),$$

where

$X_{ij}$  is the indicator characteristic of country (group)  $i$ ;

$X_j^k$  is the characteristic of the benchmark (average value, median, etc.);

$\gamma_{\beta j}$  is the pairwise correlation coefficient, and

$\sigma(X_j)$  is the variation of  $X_j$  coefficient.

It should be noted that the selection of sustainable development variables, which was conducted using the diffuse mode of “flashlight” illumination, also required certain econometric studies - similarly with the radiation mode of flashlight, which should be performed later also in terms of other indicators.

The security variable  $S$  of the sustainable development function can be considered as a combination of “military security” –  $M$  and “diplomacy” –  $D$  components, which is calculated as follows:

$$S(t)=f((M(t), D(t))).$$

In a variety of situations, the variables  $M(t)$  and  $D(t)$  can act as mutually complementary and mutually substituting factors. Note that in the OOSD system, expedient implementation is obviously applicable for the “military security” –  $M$  and “diplomacy” –  $D$  components. In terms of  $M$ , it presumes the strengthening of the army and boosting the military capabilities (education, weapons, etc.), and in terms of  $D$  - the improvements in the negotiation processes in the aspect of representing the Republic of Armenia and demonstrating the attractiveness thereof. According to the results of a detailed and accurate account of the two components of the OOSD indicators (Figure 1: columns 11 and 12), yet unbalanced actions are highly undesirable and dangerous. They can lead to the aggravation of the conflict between the parties that strike an explosive

situation, namely, the resurgence of the fighting in the Republic of Armenia, in which case the search for a sustainable development vision will become meaningless. In the uncertainties of alternative developments, security problems and their solution mechanisms are discussed (Ghevondyan et al. 2023, 113-124).

### **Brief description of the socio-economic situation of the Republic of Armenia during the new independence period**

The transition to a market economy in the new independent Armenia was quite indiscriminate. The former USSR collapsed, economic ties were severed, which had a significant impact on Armenia's economy. The depth of the impact was due to the nodal structure of the economy closely tied within the unified socio-economic complex of the Soviet Union, with a level of internal cooperation of only 5-7 percent, and accompanied by predatory exploitation of the subsoil.

Only in 2005, the Republic of Armenia was able to restore the starting positions of the GDP, and in the following years the economy recorded double-digit economic growth. Unfortunately, we had no alternative for significant progress, while flexibility and a good knowledge of the economic multiplication table would allow ensuring smooth economic growth with investments and effective institutional reforms.

Bold steps were needed to create and implement export potential. Until 1993, we sent about 80-100 different products to 60-70 countries of the world, which was only one percent of the product (80-100 million rubles). So, we definitely fell behind, and it was necessary to solve a number of tasks. The first task was the identification of export potential not only in the existing export sector. We should not be limited to the export of precious stones, mining and metallurgical products, i.e. the concentrate, and beverages, which today exceeds 2/3 of the export volume. That potential was much more comprehensive, including financial, programming, educational, health and other services, high-tech and equipment exports, and finally maximizing the potential of traditional capabilities, namely the land, water, and human resources.

The introduction of elementary order (IEO) would be the next impulse of the economic multiplication table. It was not considered to be the new economic policy, but the financial and economic discipline, and the creation of a competitive business environment, since the necessary conditions had to be provided for both investments and exports.

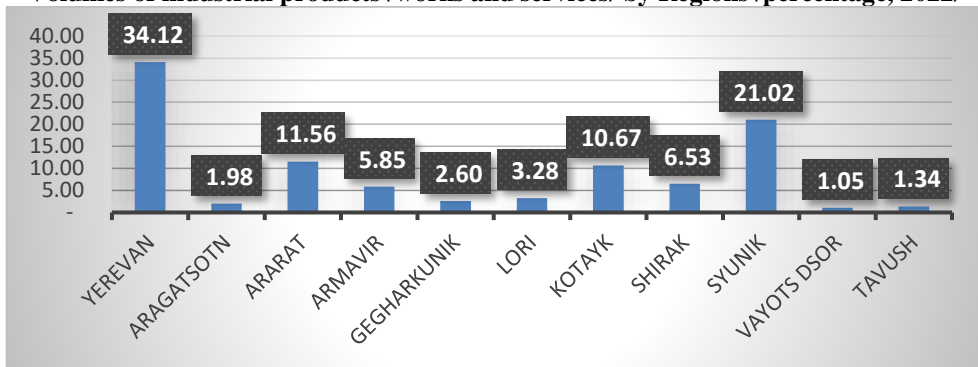
The attempt to assess the availability of a stable economy due to the implemented economic policy would indicate that the test analysis allows concluding that the overall results are not yet conducive to the formation of a stable economy. The average annual economic growth in the initial years was about 3%, since 1995 - about 6%. The Gini coefficient used for income polarization rose from 0.25 to 0.59. Incidentally, let us note that the decrease of inequality by 1 percentage point, according to some estimates, was equivalent to 5.5% economic growth for Armenia, 1.2% for Korea, and 4% for Thailand, which were characterized by 0.26 and 0.44 Gini coefficients, respectively.

Certainly, the fulfillment of these preconditions should not be overestimated, bearing in mind that the role of policy "economization" was not yet decisive, which is characteristic of countries providing long-term and stable economic growth, and it would remain relevant in the region in the foreseeable future. Contrary to that, the politicization of the economy still continues to voice itself, namely, investments in clan sectors, repayment of loans with non-regulated guarantees, etc. In other words, the pointer of

targeted investments has not yet been directed towards scientific-educational and military-industrial systems, venture companies, and specific areas subject to adjustment. According to the data of 2000, about half of the industrial output accounted for Yerevan, namely, more than 60% of exports, more than 70% of imports, and more than half of capital investments. Gegharkunik Region, Syunik Region, Vayots Dzor Region, and Tavush Region that occupy half of the territory of the Republic of Armenia, accounted for up to 10%. In the current economy, in terms of the structure indicated according to the data of 2022, the situation is as follows:

Figure 2

Volumes of industrial products /works and services/ by Regions /percentage, 2022/

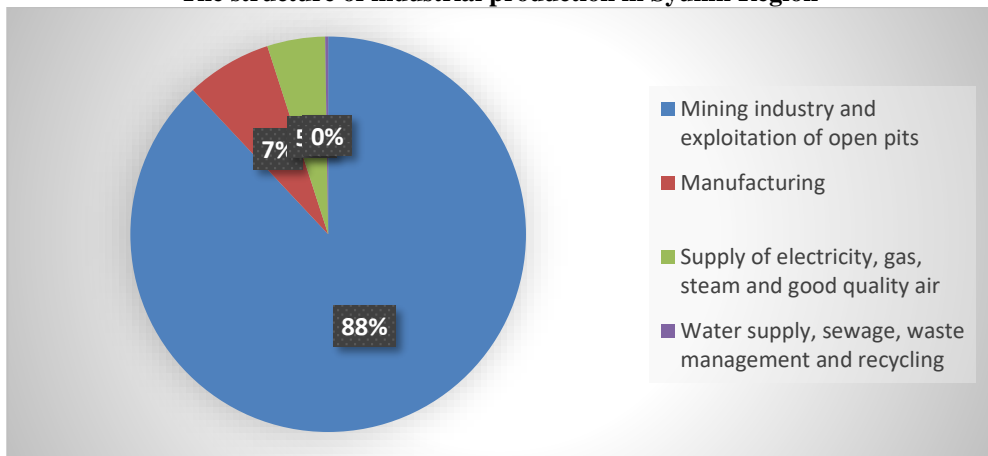


Source: calculations of authors based on the data provided in the statistical bulletin.

Meanwhile, 26% of the industrial output is produced in Gegharkunik Region, Syunik Region, Vayots Dzor Region, and Tavush Region, and 80% of the output is provided by the Syunik Region, where 88% of the production is made up of mining industry.

Figure 3

The structure of industrial production in Syunik Region



Source: calculations of authors based on the data provided in the statistical bulletin.

The effective use of the resource potential of the Republic of Armenia required the development and implementation of long-term exchange programs that provide sustainable development. Moreover, the realities of war should not justify the absence of such programs. Moreover, in retrospect, we can see that based on our geographical position, namely, that our country stands at a crossroads, initially the activities of the destructive and polluting sectors of the economy should have been limited, and the creation of infrastructures for processing production and the efficient use of natural resources should have been promoted, as well as ambitious projects should have been put forward that would be anchored on leapfrogging and sustainable development (Sargsyan, 2020, 3-15).

Back in 1992, in Rio de Janeiro, the first president of the Republic of Armenia emphasized the importance of Armenia in terms of water resources at the international level. However, more than thirty years later, comprehensive management of water resources and the sector in general remains inefficient and full of challenges. In the Republic of Armenia, agriculture accounts for about 11% of GDP and provides about 25% of employment, and the net income from irrigated land is greater. About 80% of crops are grown in irrigated areas, the volume of water storage per capita accounts for 465 m<sup>3</sup>, which is quite low for countries with a semi-arid climate<sup>4</sup>. For comparison, let's note that this indicator is close to the similar indicator of our neighboring country Iran, it is 60% lower than the indicator of Georgia, and more than 4-5 times lower than the indicators of Azerbaijan and Turkey. More than 80 reservoirs inherited from the Soviet period do not provide the necessary water storage capabilities, and in the background of global climate changes, we have underlying issues of general management despite 25 years of reforms, namely, 73% water loss in drinking water supply sector, and up to 67% water loss at different stages of irrigation water supply.

For the purpose of alleviating the problems in the water sector, according to the 2021-2026 Action Plan of the Government of the Republic of Armenia, it is planned to build reservoirs with a capacity of about 200 million m<sup>3</sup>. However, considering that the access to the sources of some rivers in the region has changed as a result of the war, and in view of Turkey's intensive reservoir construction projects in the Araks river basin (about 1.5 billion m<sup>3</sup>), as a result of which, according to various estimates, a reduction of more than 50% of the annual flow of the Araks River is predicted, as well as taking into account an increase in the demand for irrigation water, the issue of drinking, mineral, and irrigation water resources may become a serious security problem in the not-too-distant future. Each meter of Lake Sevan rase, and the usage of such waters for non-irrigation purposes could be an important factor in the economic life of the Republic of Armenia, becoming one of the prospective and ambitious projects of the Government. In the field of water use, the increase in the export of drinking water occupies a special place. Abroad, 1 liter of drinking water is sold at a retail price of 0.37 dollars. It was predicted that in 2011-2021, the global volume of bottled water will reach 440 billion liters. In case the export of drinking water from Armenia reaches 10 billion liters (which in monetary terms will amount to \$3.7 billion), today it will be 3.3% of the world market demand. In order to sharply increase the volume of drinking water export, it is necessary to conduct an

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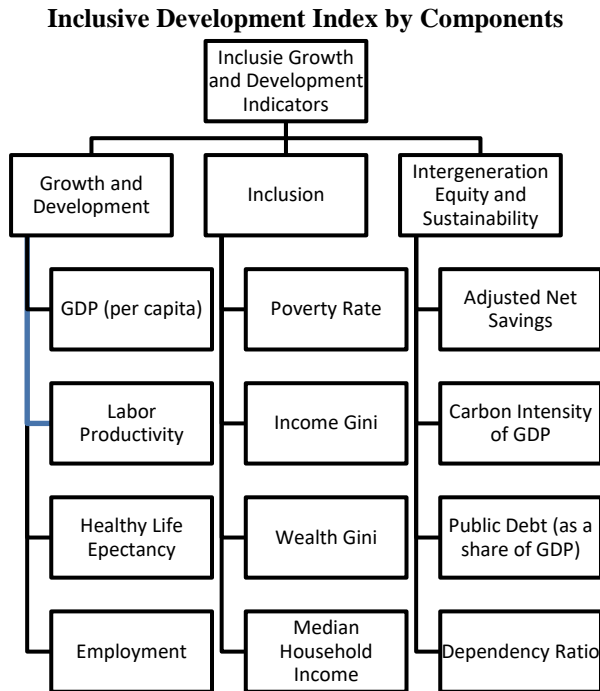
<sup>4</sup> The European Union for Environment in Eastern Partnership countries – Water Resources and Environmental Data, Draft Report, 2023.

inventory of export potential, and implement market research and other tasks.

One of the key goals of the economic policy is to ensure not only economic growth, but also sustainable development, which is possible under the conditions of optimal management, particularly, in terms of inclusion of development.

As an indicator of sustainable development of the economy, let’s consider the Inclusive Development Index (IDI), which reveals the qualitative aspects of the country’s economic development with three pillars: “Growth and Development”, “Inclusion”, and “Intergeneration Equity and Sustainability”, each of which is evaluated by certain indicators.

Figure 4



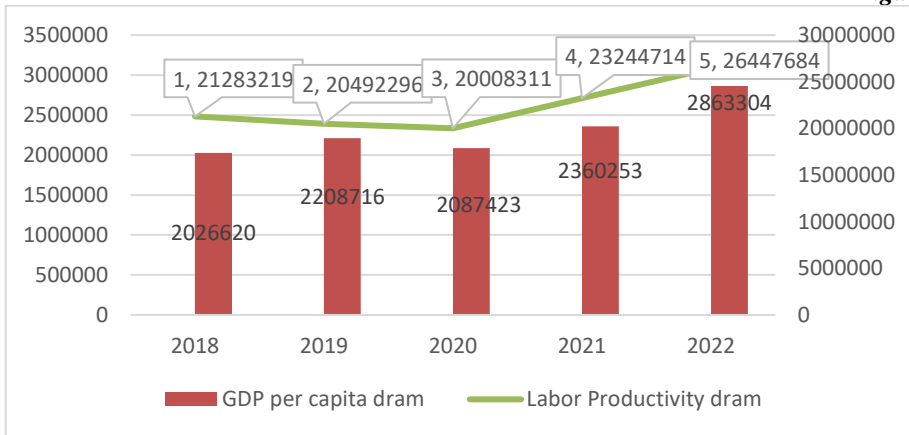
**Source:** The Inclusive Development Index, 2018 Summary and Data Highlights, [http://www3.weforum.org/docs/WEF\\_Forum\\_IncGrwth\\_2018.pdf](http://www3.weforum.org/docs/WEF_Forum_IncGrwth_2018.pdf).

In 2018-2022, the dynamic change of the indicators “GDP (per capita)” and “Labor Productivity” of sub-index “Growth and Development” is as follows:

However, if we consider the GDP structure according to the type of economic activity, it should be noted that the economic growth during the mentioned period was largely determined by the growth of “non-exportable” sectors. In particular, the economic growth was registered mainly through trade and services, which indicates that the economic growth of the Republic of Armenia continues to be mainly determined by domestic demand. Industry and construction also contributed to the growth to some extent, and in the agricultural sector, a downward trend was even marked.



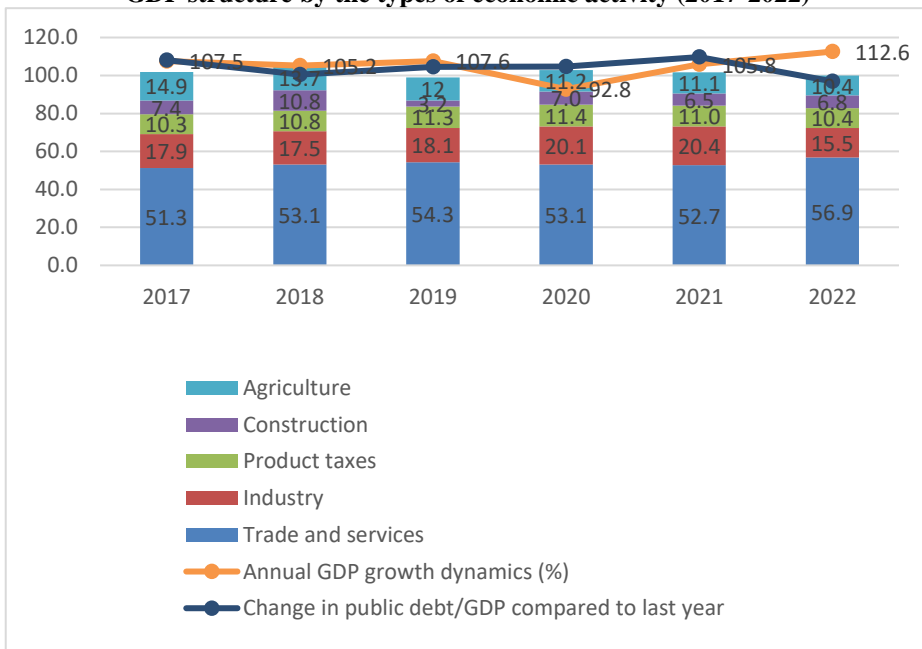
Figure 5



Source: The main indicators of industrial organizations according to the two-digit classification of economic activity, Statistical bulletins of respective years for Regions and Yerevan.

Figure 6

GDP structure by the types of economic activity (2017-2022)



Source: Compiled and calculated by authors based on the data from the statistical bulletins of the respective year

In addition, as a result of cash inflow, in comparison to 2021, in 2022 the Armenian dram rose by over 24% against the US dollar, which is also an obstacle to the growth and development of the “exportable” sector of the economy. Meanwhile, if the economic growth was mostly determined by, for instance, the growth of industry and agriculture,

the dependence on external financial resources would be weaker, and the economic growth would be more stable in the long run.

In 2018-2022, the “Healthy Life Expectancy” indicator of the “Inclusive Development Index” decreased from 75.9 to 72.4 years, and the “Employment” indicator increased from 47.7 percent to 51.1 percent. Compared to neighboring countries, it can be noted that according to the results of 2021, by the “Healthy Life Expectancy” indicator of 72 years, Armenia shares the third position with Georgia, behind Turkey - 76 years, and Iran - 74 years. The indicator of the same year in Azerbaijan is 69 years.

Compared to 2018, the indicator “Gini coefficient” of sub-index “Inclusion” decreased from 0.36 to 0.25 in 2022, which means that a reduction in income inequality was indicated.

In 2018-2022, the public debt/GDP ratio of sub-index “Intergeneration Equity and Sustainability” of the “Inclusive Development Index” increased from 51.2% to 60.3%. Although in 2022, compared to the previous year, the debt/GDP ratio decreased, but it should be noted that in terms of stability, more concern is the decrease of the exportable share in the structure of GDP, in particular the output of industry and agriculture (Figure 6).

### **Constitutionalism and sustainable development: ties and conjunctions**

In addition to the indicators that make up the UN’s Sustainable Development Agenda 2030, the modified index of sustainable development enables considering the situation of countries from the perspective of constitutionalism and security indicators. With this new approach, we have tried to show that, as indicators of institutional development (constitutionalism) and inclusive growth (sustainable development), the indicators characterizing the sustainable development of the country will more appropriately represent the subject and the object of the research.

To carry out the research, in particular, we used two databases as follows:

- Comparative Constitutional Compliance Database v2.0 (Gutmann, Jerg, Szaniawska, Voigt, 2023).

The indicators used from this database and the description thereof are presented in Annex 1.

- Online database for the Sustainable Development Report 2023 (Sachs, Lafortune, Fuller, Drumm, 2023).

We also use the indicators characterizing the 17 Sustainable Development Goals of the United Nations, which are as follows:

1. No Poverty
2. Zero Hunger
3. Good Health and Well-Being
4. Quality Education
5. Gender Equality
6. Clean Water and Sanitation
7. Affordable and Clean Energy
8. Decent Work and Economic Growth
9. Industry, Innovation, and Infrastructure
10. Reduced Inequalities
11. Sustainable Cities and Communities
12. Responsible Consumption and Production

- 13. Climate Action
- 14. Life Below Water
- 15. Life on Land
- 16. Peace, Justice, and Strong Institutions
- 17. Partnership for the Goals

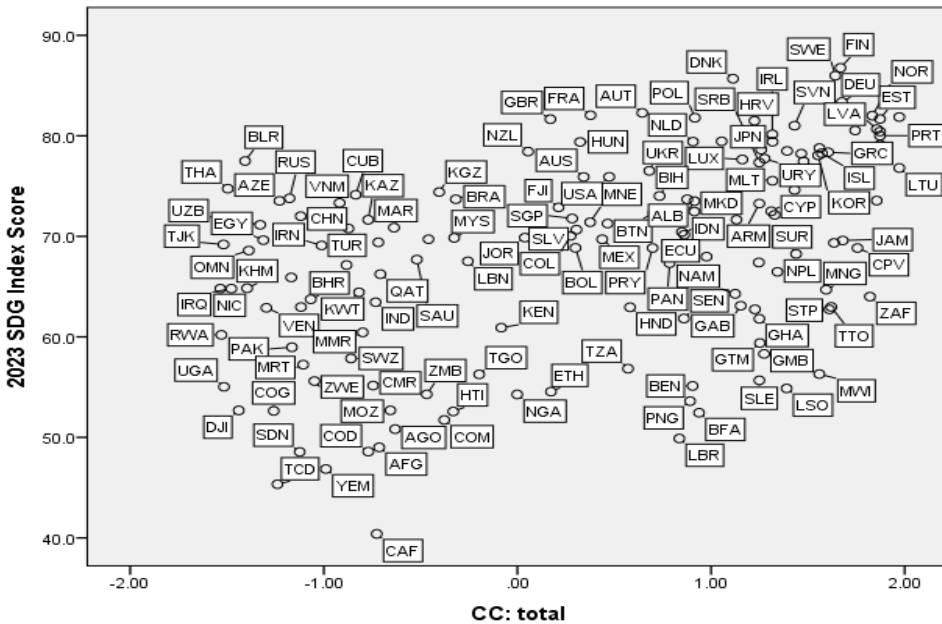
The research also includes a generalized index characterizing the sustainable development built on the basis of indicators characterizing the above goals.

The combination of these two databases resulted in a common database, which includes data on 151 countries.

The diagram below shows the relationship between the sustainable development and constitutionalism indexes for the mentioned countries.

*Diagram 1*

**Link between sustainable development and constitutionalism indexes**



The diagram indicates that there are weak links between these indexes, which on the one hand points to the existence of a link between institutional development and inclusive growth, and on the other hand, they include a variety of information characterizing the countries. Due to this circumstance, the implementation of cluster analysis becomes necessary.

In the next diagram, the link between the above-mentioned indicators is observed at regional levels.

Diagram 2

Links between sustainable development and constitutionalism indexes at regional levels

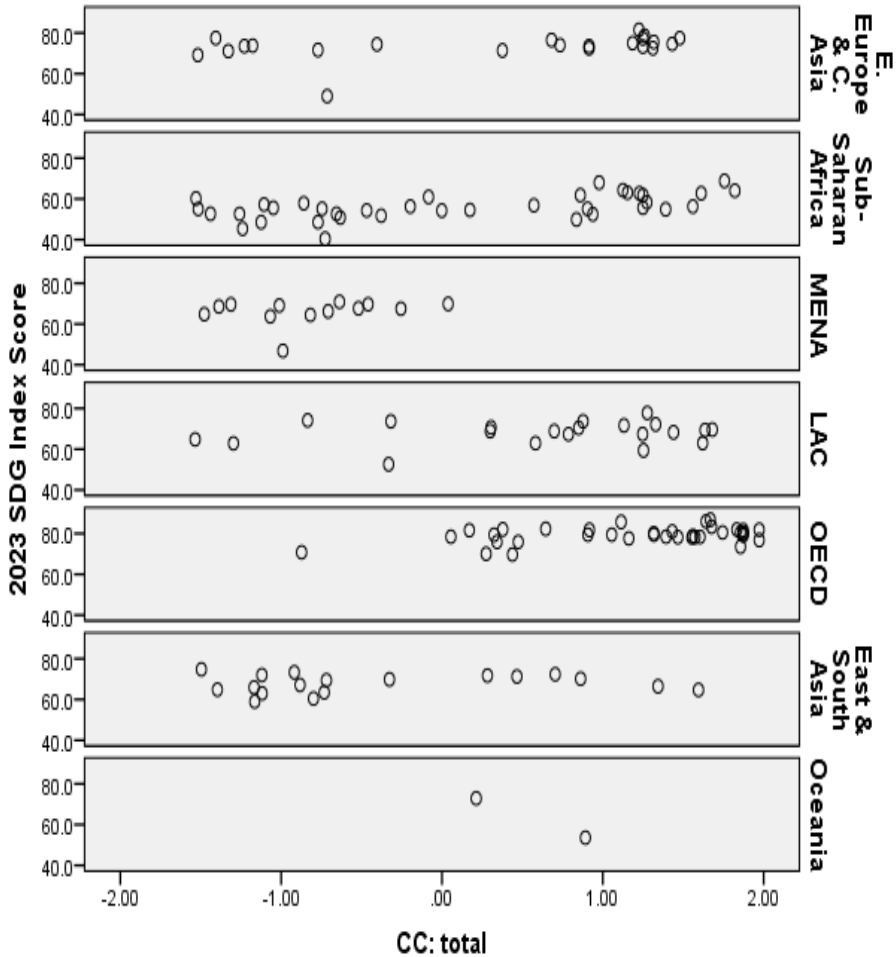


Diagram 2 indicates that the link between these indicators at regional levels is a little more pronounced than in the general case.

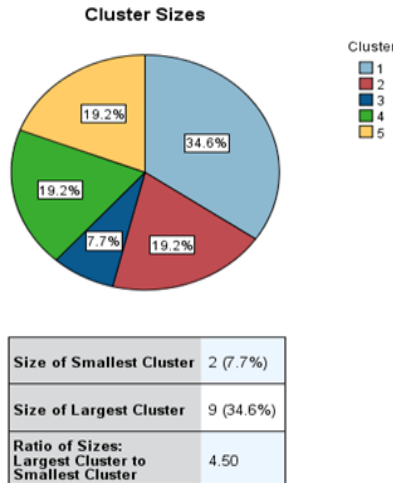
**Cluster analysis:** On the basis of data on 26 countries in transition, a cluster analysis was performed in terms of constitutionalism and sustainable development indicators. The list of those countries is presented in Annex 2.

The analyzes were performed with the SPSS software package using the two-step cluster analysis algorithm. While conducting the analysis, we used all the components of constitutionalism and sustainable development, the characteristics whereof are given in the data description section.

The cluster analysis algorithm selected the optimal number of clusters, which is equal to 5. The obtained results are indicated in the next diagram.

Diagram 3

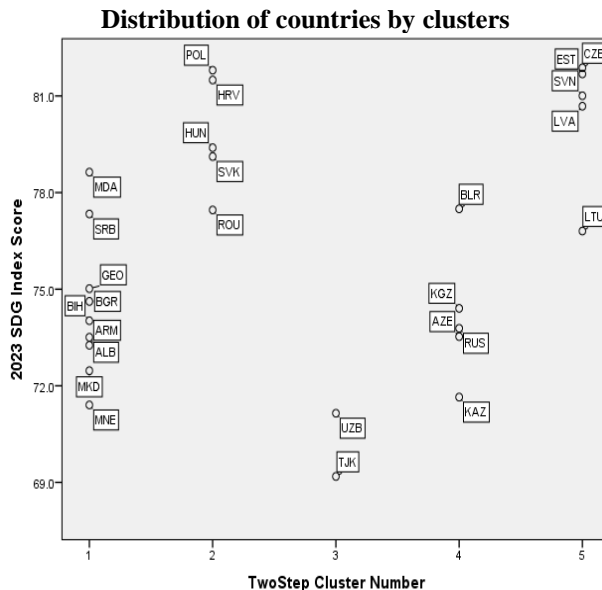
Results of the cluster analysis



As indicated above, 9 countries appeared in the largest cluster, and 2 countries in the smallest cluster.

The next diagram shows the distribution of countries by clusters, where the sustainable development index is shown on the ordinate axis.

Diagram 4



As can be seen from the diagram, Armenia is in the largest cluster. The following diagram shows the indicators used for the construction of clusters, and their average values by clusters.

Diagram 5

Characteristics of clusters

Clusters

Input (Predictor) Importance  
 ■ 1.0 ■ 0.8 ■ 0.6 ■ 0.4 ■ 0.2 ■ 0.0

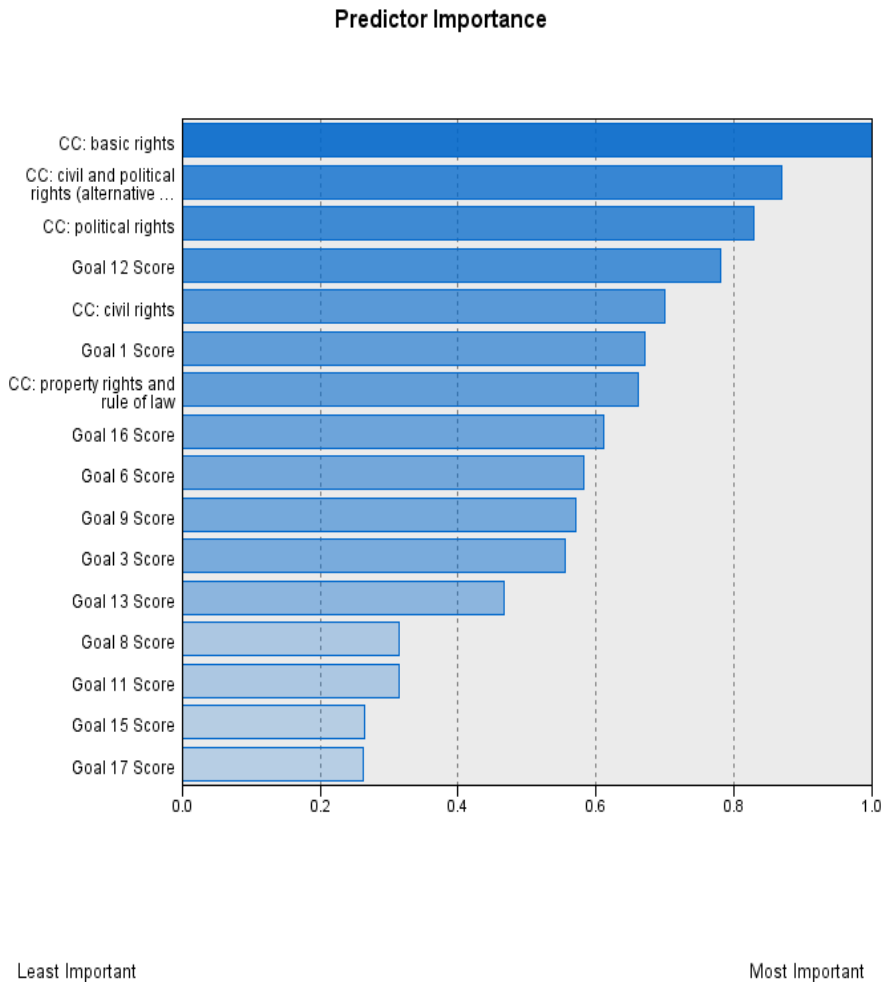
Cluster Label	1	2	4	5	3
Description					
Size	34.6% (9)	19.2% (5)	19.2% (5)	19.2% (5)	7.7% (2)
Inputs	CC: basic rights 1.47 CC: civil and political rights (alternative indicator) 0.88 CC: political rights 0.88 Goal 12 Score 80.57 CC: civil rights 0.68 Goal 1 Score 97.40 CC: property rights and rule of law 70.18 Goal 16 Score 70.18 Goal 6 Score 71.30 Goal 9 Score 53.04 Goal 3 Score 77.98 Goal 13 Score 89.84 Goal 8 Score 73.56 Goal 11 Score 76.21 Goal 15 Score 74.66 Goal 17 Score 75.13 Goal 2 Score 61.51 Goal 4 Score 82.45 Goal 5 Score 63.05 Goal 7 Score 75.62 Goal 10 Score 79.79	CC: basic rights 1.44 CC: civil and political rights (alternative indicator) 0.79 CC: political rights 0.79 Goal 12 Score 73.42 CC: civil rights 0.89 Goal 1 Score 99.14 CC: property rights and rule of law 73.97 Goal 16 Score 73.97 Goal 6 Score 83.07 Goal 9 Score 75.64 Goal 3 Score 84.71 Goal 13 Score 78.90 Goal 8 Score 83.78 Goal 11 Score 85.41 Goal 15 Score 87.25 Goal 17 Score 59.27 Goal 2 Score 71.47 Goal 4 Score 90.48 Goal 5 Score 67.97 Goal 7 Score 76.40 Goal 10 Score 91.50	CC: basic rights -0.47 CC: civil and political rights (alternative indicator) -0.95 CC: political rights -0.95 Goal 12 Score 81.67 CC: civil rights -1.06 Goal 1 Score 97.73 CC: property rights and rule of law 58.78 Goal 16 Score 58.78 Goal 6 Score 72.70 Goal 9 Score 51.74 Goal 3 Score 78.33 Goal 13 Score 74.61 Goal 8 Score 73.68 Goal 11 Score 85.14 Goal 15 Score 71.91 Goal 17 Score 70.90 Goal 2 Score 59.84 Goal 4 Score 91.70 Goal 5 Score 67.70 Goal 7 Score 68.48 Goal 10 Score 93.09	CC: basic rights 1.52 CC: civil and political rights (alternative indicator) 1.53 CC: political rights 1.53 Goal 12 Score 55.03 CC: civil rights 1.30 Goal 1 Score 99.85 CC: property rights and rule of law 84.53 Goal 16 Score 84.53 Goal 6 Score 84.56 Goal 9 Score 80.09 Goal 3 Score 88.48 Goal 13 Score 66.58 Goal 8 Score 84.13 Goal 11 Score 88.03 Goal 15 Score 93.06 Goal 17 Score 63.59 Goal 2 Score 63.14 Goal 4 Score 96.30 Goal 5 Score 76.31 Goal 7 Score 78.58 Goal 10 Score 86.53	CC: basic rights -1.05 CC: civil and political rights (alternative indicator) -1.41 CC: political rights -1.41 Goal 12 Score 93.35 CC: civil rights -1.67 Goal 1 Score 72.26 CC: property rights and rule of law 63.93 Goal 16 Score 63.93 Goal 6 Score 59.16 Goal 9 Score 26.54 Goal 3 Score 72.23 Goal 13 Score 95.02 Goal 8 Score 74.26 Goal 11 Score 83.47 Goal 15 Score 62.86 Goal 17 Score 56.98 Goal 2 Score 66.39 Goal 4 Score 73.32 Goal 5 Score 70.79 Goal 7 Score 74.97 Goal 10 Score 73.99

As can be seen from the diagram, the cluster in which Armenia is located, is characterized by a fairly high index of fundamental rights, i.e. 1.47.

The next diagram shows the importance of the indicators.

**Diagram 6**

**Importance of the indicators**

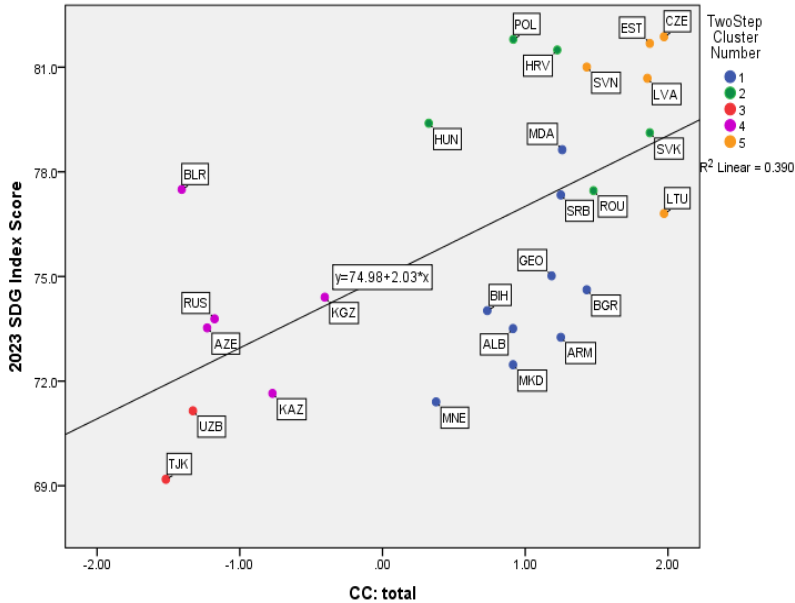


Notably, in terms of dividing clusters, the characteristics of fundamental rights are the most important indicators, and the indicator characterizing the 12th goal is the most important indicator of sustainable development.

The following is the link between sustainable development and constitutionalism by clusters for the countries in transition.

Diagram 7

### Link between sustainable development and constitutionalism by clusters for the countries in transition



Above we can see the weak dependence between these index scores, as well as the arrangement of countries in different clusters with respect to the curve, which can serve as grounds for a qualitative analysis based on the set of selected index scores.

### Modified model of optimal management in the context of sustainable development

Below is presented the modified model of optimal management from the perspective of the new conceptualization of sustainable development.

Firstly, let's state that sustainable development is a manageable process, and the implementation of the entire arsenal of effective management whereof is aimed at ensuring its structure, namely, for the purpose of having a stable economy by virtue of creating the prerequisites for a favorable social and ecological situation, ensuring long-term investments, institutional organization, and the implementation of other impact measures.

As a multifunctional dynamic process of optimal management, the characteristic of sustainable development requires the fulfillment of certain principles and conditions, and the underlying issue of identifying its scenarios serves as the basis for the formulation of a multidimensional optimal management model.

The following concepts are used for the mathematical formulation of the problem:

- Variables describing time (phase variables);
- Managing parameters;
- Equations characterizing the change of the managed object, and
- Target function.

The impact on a managed object or system enables managing the latter in some sense, or otherwise influencing their behavior. In this case, the production process and the economic system in general can be considered as the managed object.



For the formulation of the model, it is assumed that time is a constant quantity, and that it changes from the initial moment to the final moment. The state of the managed object or system at any moment in time is characterized by five numbers  $x_1(t), x_2(t), x_3(t), x_4(t), x_5(t)$  called phase coordinates, and the vector  $\bar{x}(t) = (x_1(t), x_2(t), \dots, x_5(t))$  composed thereby is called the phase vector. In the sustainable development model, the components of the vector  $x(t)$  characterize the economic, ecological, social, and security situation, and the level of constitutionalism.

The decisions that are made at each time  $t$  ( $t_0 \leq t \leq t_1$ ), are characterized by  $r$  real numbers  $y_1(t), y_2(t), \dots, y_r(t)$ , which are called managing parameters. An  $r$ -dimensional vector consisting of managing parameters is called a control vector  $\bar{y}(t) = (y_1(t), y_2(t), \dots, y_r(t))$ .

Commonly,  $y_1(t), y_2(t), \dots, y_r(t)$  managing parameters cannot take arbitrary values, but are subject to certain restrictions. In the general case, a certain set  $Y$  is specified in the  $r$ -dimensional space, and it is required at a certain time  $t$  ( $y_1(t), \dots, y_r(t) \in Y$  (or  $\bar{y}(t) \in Y$ )  $\forall t, t \in [t_1, t_s]$ ). The set  $Y$  is called the management domain. It should be noted that the managing parameters and the management domain are also determined depending on the components of sustainable development.

Mathematically, the movement of the managed object (change over time) assumes that its coordinates  $x_1, x_2, x_3, x_4, x_5$  change over time, i.e. they are time-dependent functions.

In the context of sustainable development, the optimal management model will appear as follows:

It is required to select such a management from all the admissible managements  $y_k(t)$ , which move the object from the state  $x_0$  to the state  $x_s$  where the quantity

$J = \int_{t_1}^{t_s} F(x, y, t) dt$  takes the largest (or smallest) value, subject to the following restrictions:

$$\begin{cases} x_j(t) = f_j(x_j(t-1), y_1(t), \dots, y_r(t)) & (1) \\ t = t_1 \dots t_s, \quad j = 1, \dots, 5, \end{cases}$$

$$\begin{cases} x_j(t_0) = x_j^0, & (2) \\ x_j(t_s) = x_j^* & (3) \end{cases}$$

$$\begin{cases} y_k(t) \in Y_k^t, \quad k = 1, \dots, r & (4) \end{cases}$$

$$F_i(x^0, y_1, \dots, y_r) \rightarrow \max(\min) \quad (5)$$

$$i = 1, \dots, m$$

Where the vector  $\bar{x}(t) = (x_1(t), x_2(t), \dots, x_5(t))$  describes the state of the economic

system at the  $t$  moment of time, the vector  $\bar{y}(t) = (y_1(t), y_2(t), \dots, y_r(t))$  describes the policy affecting the economic system at the  $t$  moment of time,  $Y_k^t$  are the possible managing parameters, or the admissible set of managing parameters, and  $F_i(x^0, y_1, \dots, y_r)$  is the objective function, namely, the estimate of management objective or the quality thereof.

**Summary:** The radical transformations taking place in the world economy are implemented through deep technological and structural reforms. The comprehensive participation and full engagement of Armenia in those processes can herald the launch of the economic revolution. At the current stage, it is important for both the authorities and the society to realize that the sufficient solutions for the transition to the new path of socio-economic development are not limited by economic components. Complex solutions are perhaps most often anchored on extra-economic components, including political, legal, social, institutional, behavioral, ecological, infrastructural, etc.

Experience shows that the process of changing political elites can proceed very quickly, while economic elites and systems can still remain viable, without undergoing particularly severe changes, adapting to the new political system and, moreover, adapting the same system to their goals over time. In the current situation, this is the main challenge of the reform alternative, and it must be stated that the force methods cannot be considered as the only solutions to the mentioned issue. The main solution is to create the prerequisites for sustainable development with systemic and institutional approaches. The other condition is that the political elite must demonstrate consistent commitment to implement such reforms, and be able to engage in long-term planning. These two conditions are strongly interrelated. The results of institutional reforms can be visible only in the long term. Therefore, the political elite must not only have the political will and commitment, but also a certain vote of confidence.

### Annex 1

#### 1. cc\_alt\_cp

Constitutional compliance in the area of civil and political rights (alternative indicator combining two dimensions). Subindicators: free media, free speech, free movement, religious freedom, freedom of association, freedom of assembly, and the right to form parties.

#### 2. cc\_basic

Constitutional compliance in the area of basic human rights. Subindicators: the right to life, freedom from slavery, and protection from torture.

#### 3. cc\_civil

Constitutional compliance in the area of civil rights. Subindicators: free media, free speech, free movement, and religious freedom.

#### 4. cc\_polit

Constitutional compliance in the area of political rights. Subindicators: freedom of association, freedom of assembly, and the right to form parties.

## 5. cc\_prop

Constitutional compliance in the area of property rights and the rule of law. Subindicators: property rights, judicial independence, equality before the law, and rule of law.

## 6. cc\_total

Constitutional compliance. Subindicators: cc\_basic, cc\_civil, cc\_polit, and cc\_prop.

**Annex 2**

- 1 Albania
- 2 Armenia
- 3 Azerbaijan
- 4 Belarus
- 5 Bosnia and Herzegovina
- 6 Bulgaria
- 7 Croatia
- 8 Czech Republic
- 9 Estonia
- 10 Georgia
- 11 Hungary
- 12 Kazakhstan
- 13 Kyrgyzstan
- 14 Latvia
- 15 Lithuania
- 16 Moldova
- 17 Montenegro
- 18 North Macedonia
- 19 Poland
- 20 Romania
- 21 Russia
- 22 Serbia
- 23 Slovakia
- 24 Slovenia
- 25 Tajikistan
- 26 Uzbekistan

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