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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
Indicators of sustainable development		Food	Energy	Financial	...[1]	Property right	Social	Cyber security	Ecological (E)	Legal-political	Ethno-cultura	Military (M)	Diplomatic (D)
The responsible institution		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
The norm (article) of the Consti-tution of the				a. 200		a. 10, a. 60	a. 1		a. 12	a. 1, a. 8[2]	a. 15	a. 14, a. 155	a. 13, a. 19[3]

[1] 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.).

[2] Legal and political (equal legal opportunities for activities are guaranteed for the parties, etc.).

[3] 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 Xj 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.

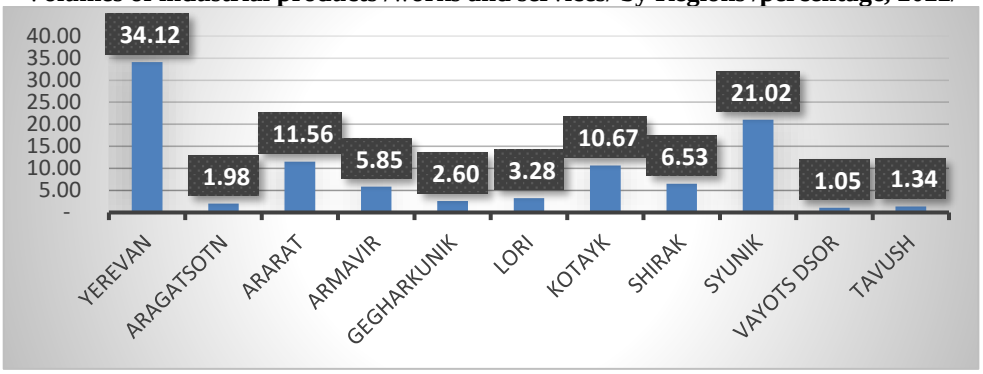
The attempt to assess the availability of a stable economy due to the implemented economic policy would indicate that the test analysis allows concluding that the overall results are not yet conducive to the formation of a stable economy. The average annual economic growth in the initial years was about 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/

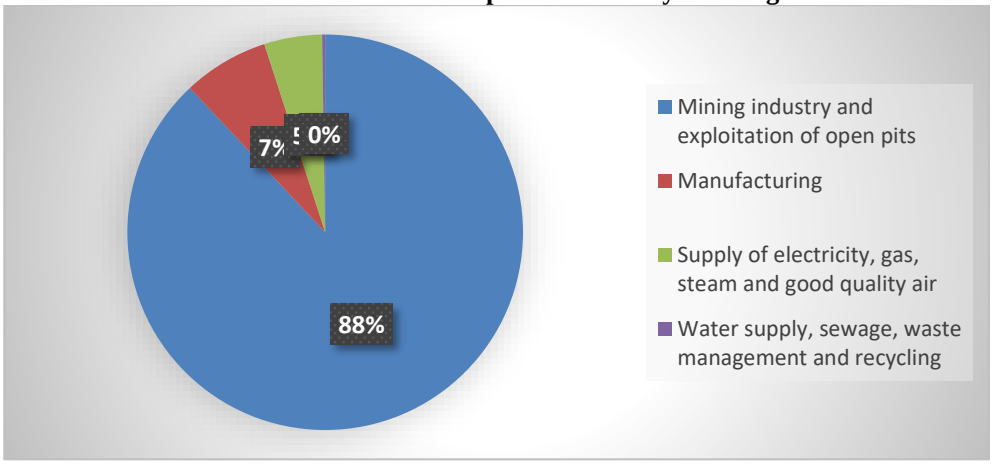


Source: calculations of authors based on the data provided in the statistical bulletin.

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 m3, which is quite low for countries with a semi-arid climate[4]. 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^3. However, considering that the access to thr 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^3), 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

[4] The European Union for Environment in Eastern Partnership countries – Water Resources and Environmental Data, Draft Report, 2023.

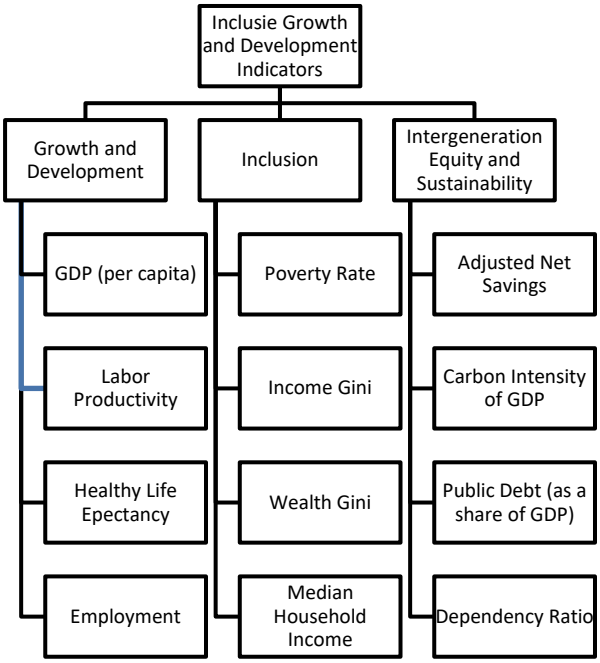
inventory of export potential, and implement market research and other tasks.

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

Inclusive Development Index by Components

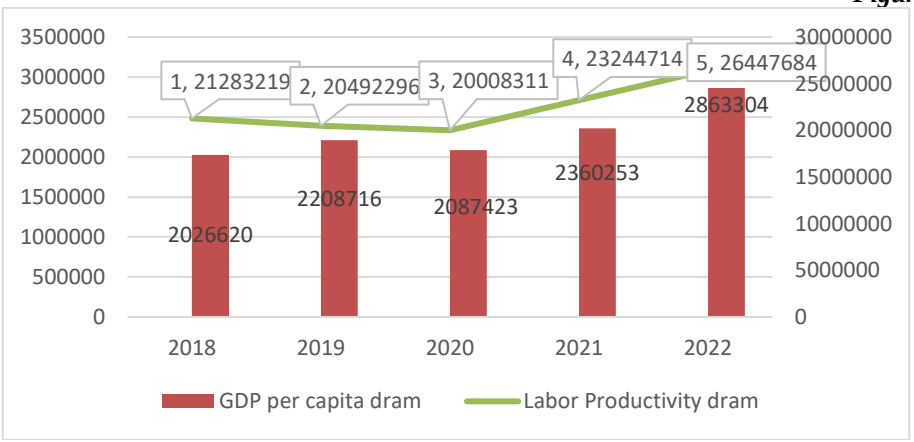


Source: The Inclusive Development Index, 2018 Summary and Data Highlights, http://www3.weforum.org/docs/WEF_Forum_IncGrwth_2018.pdf.

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" sectros. 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.

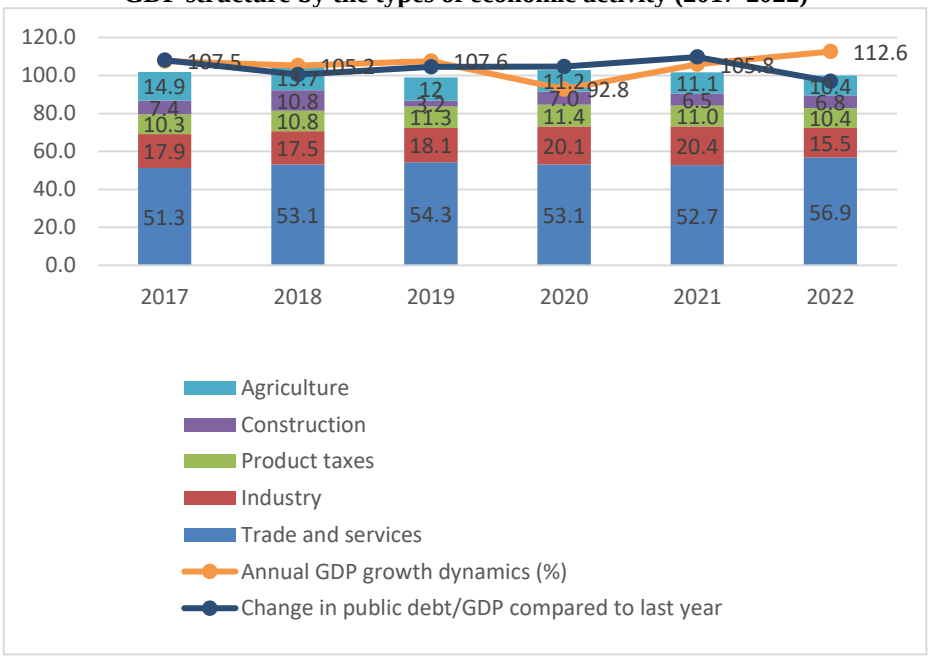
Figure 5



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

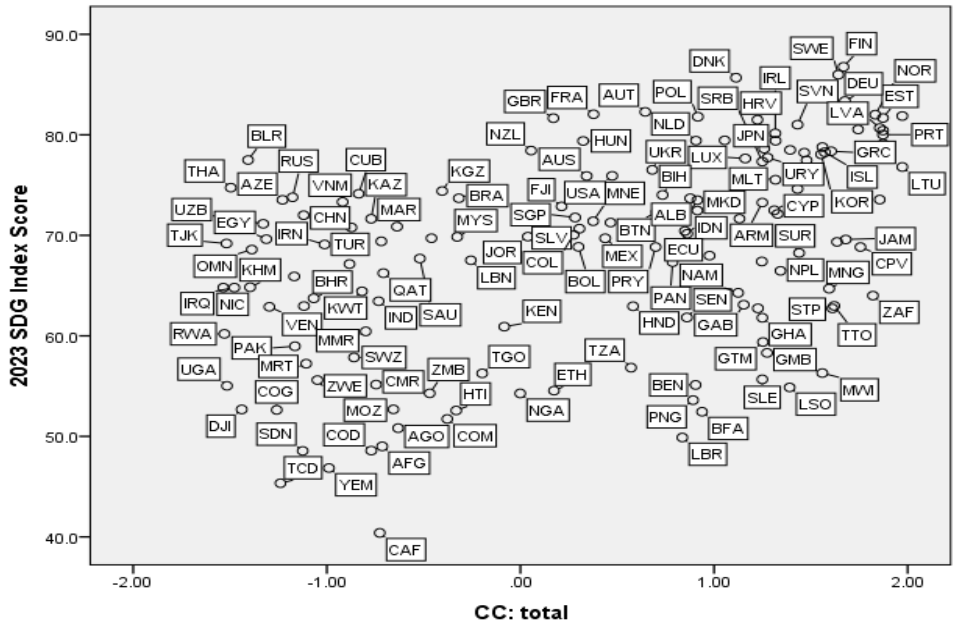
The research also includes a generalized index characterizing the sustainable development built on the basis of indicators characterizing the above goals.

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

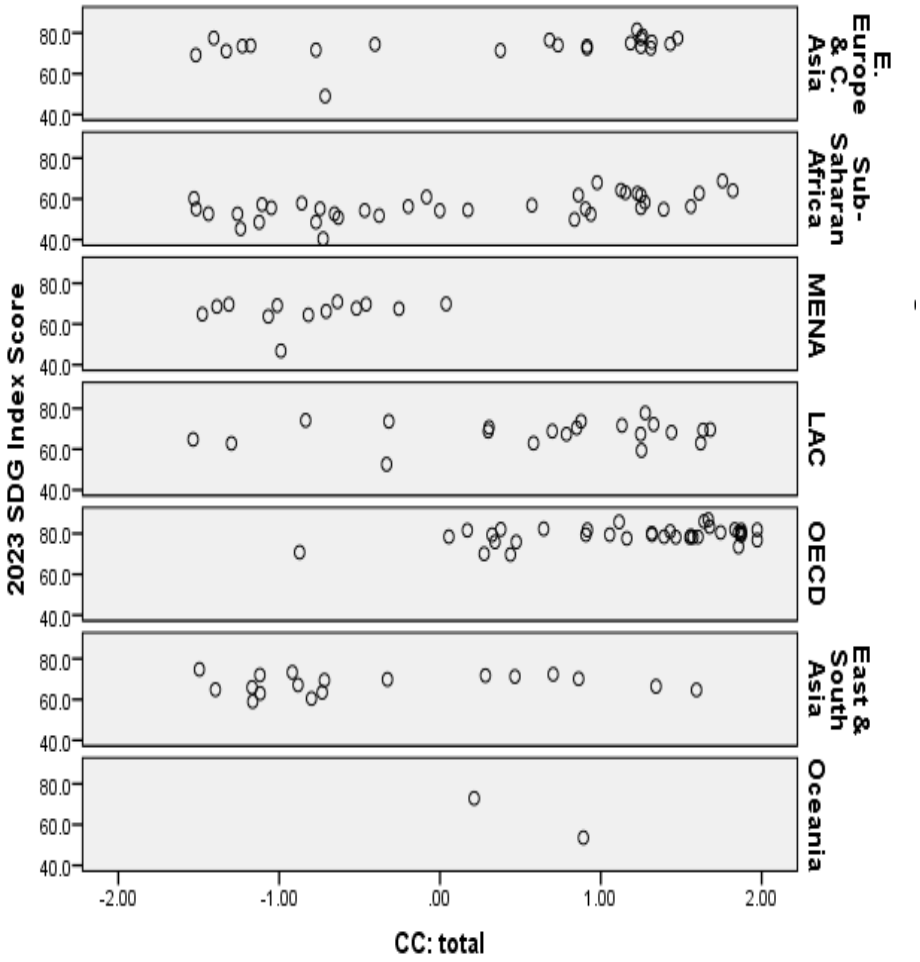


Diagram 2 indicates that the link between these indicators at regional levels is a little more pronounced than in the general case.

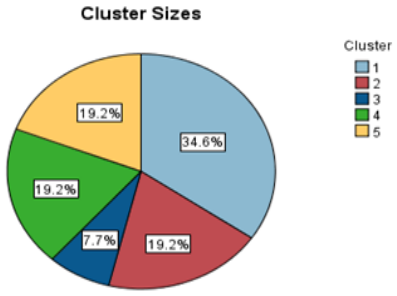
Cluster analysis: On the basis of data on 26 countries in transition, a cluster analysis was performed in terms of constitutionalism and sustainable development indicators. The list of those countries is presented in Annex 2.

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



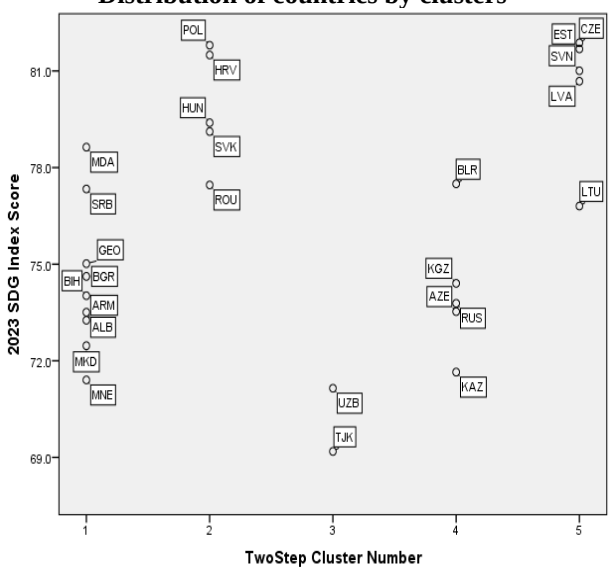
Size of Smallest Cluster	2 (7.7%)
Size of Largest Cluster	9 (34.6%)
Ratio of Sizes: Largest Cluster to Smallest Cluster	4.50

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

Distribution of countries by clusters



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

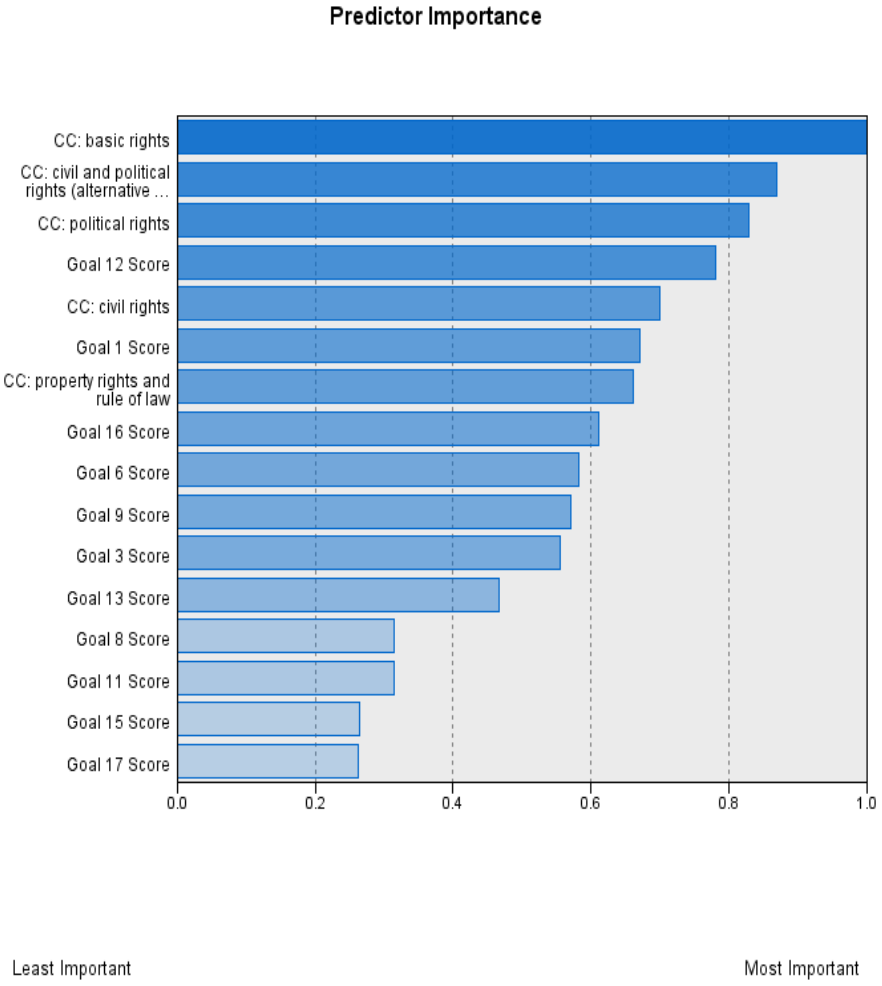
Cluster	1	2	4	5	3
Label					
Description					
Size	34.6% (9)	19.2% (5)	19.2% (5)	19.2% (5)	7.7% (2)
Inputs	CC: basic rights 1.47	CC: basic rights 1.44	CC: basic rights -0.47	CC: basic rights 1.52	CC: basic rights -1.08
	CC: civil and political rights (alternative indicator)	CC: civil and political rights (alternative indicator)	CC: civil and political rights (alternative indicator)	CC: civil and political rights (alternative indicator)	CC: civil and political rights (alternative indicator)
	CC: political rights 0.88	CC: political rights 0.79	CC: political rights -0.95	CC: political rights 1.53	CC: political rights -1.41
	Goal 12 Score 80.57	Goal 12 Score 73.42	Goal 12 Score 81.67	Goal 12 Score 55.03	Goal 12 Score 93.35
	CC: civil rights 0.68	CC: civil rights 0.89	CC: civil rights -1.06	CC: civil rights 1.30	CC: civil rights -1.67
	Goal 1 Score 97.40	Goal 1 Score 99.14	Goal 1 Score 97.73	Goal 1 Score 99.85	Goal 1 Score 72.26
	CC: property rights and rule of law	CC: property rights and rule of law	CC: property rights and rule of law	CC: property rights and rule of law	CC: property rights and rule of law
	Goal 16 Score 70.18	Goal 16 Score 73.97	Goal 16 Score 58.78	Goal 16 Score 84.53	Goal 16 Score 63.93
	Goal 6 Score 71.30	Goal 6 Score 83.07	Goal 6 Score 72.70	Goal 6 Score 84.56	Goal 6 Score 59.16
	Goal 9 Score 53.04	Goal 9 Score 75.64	Goal 9 Score 51.74	Goal 9 Score 80.09	Goal 9 Score 28.54
	Goal 3 Score 77.98	Goal 3 Score 84.71	Goal 3 Score 78.33	Goal 3 Score 88.48	Goal 3 Score 72.23
	Goal 13 Score 89.84	Goal 13 Score 78.90	Goal 13 Score 74.61	Goal 13 Score 66.58	Goal 13 Score 95.02
	Goal 8 Score 73.56	Goal 8 Score 83.78	Goal 8 Score 73.68	Goal 8 Score 84.13	Goal 8 Score 74.26
	Goal 11 Score 76.21	Goal 11 Score 85.41	Goal 11 Score 85.14	Goal 11 Score 88.03	Goal 11 Score 83.47
	Goal 15 Score 74.66	Goal 15 Score 87.25	Goal 15 Score 71.91	Goal 15 Score 93.06	Goal 15 Score 62.86
	Goal 17 Score 75.13	Goal 17 Score 59.27	Goal 17 Score 70.90	Goal 17 Score 63.59	Goal 17 Score 56.98
	Goal 2 Score 61.51	Goal 2 Score 71.47	Goal 2 Score 59.84	Goal 2 Score 63.14	Goal 2 Score 66.39
	Goal 4 Score 82.45	Goal 4 Score 90.48	Goal 4 Score 91.70	Goal 4 Score 96.30	Goal 4 Score 79.32
	Goal 5 Score 63.05	Goal 5 Score 67.97	Goal 5 Score 67.70	Goal 5 Score 76.31	Goal 5 Score 70.79
	Goal 7 Score 75.62	Goal 7 Score 76.40	Goal 7 Score 68.48	Goal 7 Score 78.58	Goal 7 Score 74.97
	Goal 10 Score 79.79	Goal 10 Score 91.50	Goal 10 Score 93.09	Goal 10 Score 86.53	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

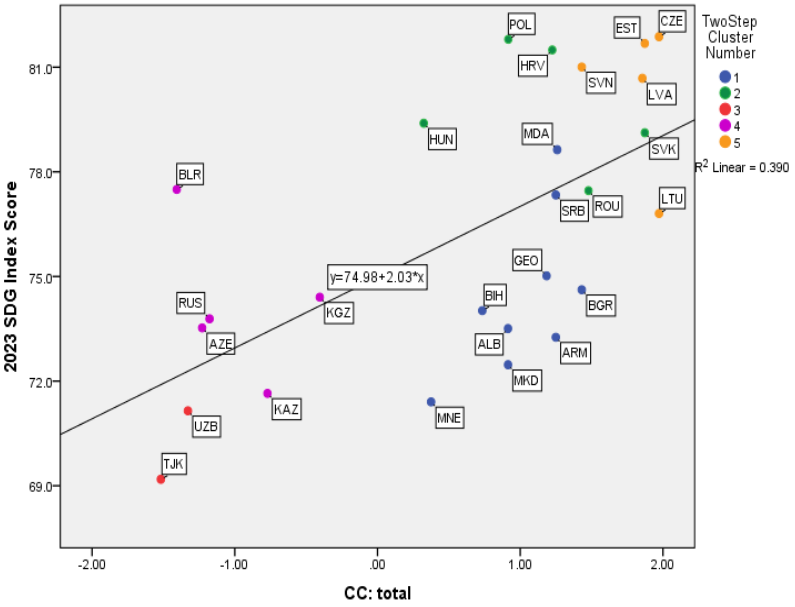


Notably, in terms of dividing clusters, the characteristics of fundamental rights are the most important indicators, and the indicator characterizing the 12th goal is the most important indicator of sustainable development.

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 $\bar{x}(t) = (x_1(t), x_2(t),..., x_5(t))$ 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 $(t_0 \le t \le t_1)$, are characterized by r real numbers $y_1(t), y_2(t),..., y_r(t)$, which are called managing parameters. An r-dimensional vector consisting of managing parameters is called a control vector $\bar{y}(t) = (y_1(t), y_2(t),..., y_r(t))$.

Commonly, $y_1(t), y_2(t),..., y_r(t)$ 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 $(y_1(t),..., y_r(t)) \in Y$ (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 $J = \int_{t_1}^{t_x} F(x, y, t)dt$ takes the largest (or smallest) value, subject to the following restrictions:

$$\begin{cases} x_j(t) = f_j(x_j(t-1), y_1(t),..., y_r(t)) & (1) \\ t = t_1..t_s, \quad j = 1,...5, & \\ x_j(t_0) = x_j^0, & (2) \\ x_j(t_s) = x_j^* & (3) \\ y_k(t) \in Y_k^t, \ k = 1,..., r & (4) \end{cases}$$

$$F_i(x^0, y_1,...y_r) \to \max(\min) \qquad (5)$$

$$i = 1,...,m$$

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

system at the t moment of time, the vector $\bar{y}(t) = (y_1(t), y_2(t),..., y_r(t))$ 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 $F_i(x^0, y_1,...y_r)$ 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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GREEN MANAGEMENT INTERPRETATION WITHIN ENTREPRENEURSHIP FRAMEWORK

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Abstract: Currently, organizations are trying to organize green business along with traditional entrepreneurship. Organizing a green business improves the organization's competitive position in the market, but at the same time requires the existence of a balanced ecosystem, that promotes sustainable development. In this regard, it is important to assess the functioning of the green entrepreneurship ecosystem at the micro-level of the economy. The article clarifies the scope of the green entrepreneurship ecosystem of organizations and makes recommendations for the performance evaluation of its activities.

Key words: *green business ecosystem, sustainable development KPIs, green growth assessment, green management, green entrepreneurship toolkit*

Introduction

"Green management" is aimed at effectively managing eco-system functions. In this case, the business consumes the products of nature and looks for ways of reasonable compensation. If they are limited exclusively to environmental taxes and natural use fees, then "green management" cannot be considered effective, because it is not aimed at ensuring environmental stability and only performs preventive actions for the use of natural resources. In business activities, such resources are used that are not part of the actual activity of the organization, therefore, even after their consumption, they need to be restored by the entrepreneurs themselves (Magon, Renata Bianchini, 2018, 104-17). And if the recovery of consumed resources does not take place in business activity, then the sustainable course of green business is already in doubt in the foreseeable future.

Thus, if the fishing industry develops at the expense of the expansion of fish hunting, then in parallel, it should take measures to restore depleted fish stocks. Otherwise, future generations will not have access to similar resources, and thus the fishing industry will be disrupted and the stability of the food processing sector will be questioned. The same applies to the furniture industry, where forest resources are used, which, when they are used up, place a demand on the enterprise to restore the forest, to carry out tree planting, thereby transferring the necessary timber to future generations. to ensure the uninterrupted process of construction.

Therefore, at present, the problem of responsible consumption of eco-system services

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is raised within the framework of entrepreneurship, which to a certain extent requires "green management" in the context of sustainable development of business. In this regard, a problem arises to analyze the features of green business management in the existing ecosystem (Li, Dayuan, 2018, 462-70).

Results and findings

Studies show that the impact of business on the environment is becoming risky. In recent years, the inefficient use of water resources and the increase in the level of air pollution as a result of business activities have become prominent in the Republic of Armenia (see table). Naturally, in such conditions, the organization of green entrepreneurship management becomes urgent.

Table 1

Key indicators characterizing the impact of economic activities on the environment and use of natural resources in RA

Indicators	2018	2019	2020	2021	2022
Water abstraction from water resources, mln.m3	2 714.4	2 865.4	2 829.8	2 966.5	3 071.8
Waste water discharge, mln. m3	612.1	797.2	777.1	802.6	888.3
Emissions of hazardous substances into atmosphere, 1 000 t of which	263.4	267.9	295.4	308.9	317.4
from stationary sources	114.0	89.7	86.2	93.8	105.7
from vehicles	149.4	178.2	209.2	215.1	211.7

Source: Armenian Statistical Yearbook, 2023, page 251

Moreover, statistics show that as a result of business, the organizations operating in the Republic of Armenia increase the amount of waste in recent years, and at the same time, reduce the disposal of waste. In such a situation, not only a private but also a public demand for the activation of green entrepreneurship management is formed (see table 2).

Table 2

Formation, utilization and detoxication of wastes in organizations (1000 t)

Indicators	2018	2019	2020	2021	2022
Formation	67 146.2	67 418.0	73 389.2	88 248.6	79 088.1
Utilization	1 603.6	722.0	903.1	631.1	704.3
Detoxication	1.7	0.9	0.7	1.5	22.0

Source: Armenian Statistical Yearbook, 2023, page 256

The set of 17 Sustainable Development Goals were set back in 2015 by the United Nations and included integrated environmental, social and governance areas. And the effective implementation of that integration chain largely depends on the organization of proper green management of business. Especially the 12 SDG – “Ensure sustainable consumption and production patterns” is directly connected to green management. And since all the SDGs are interrelated, the implementation of green management has an indirect effect on others.

The stable course of business requires, first of all, the availability of necessary financial and production resources. In the foreseeable future, economic activity cannot provide "green management", if the organization is not provided with necessary productive assets

and financial resources. In particular, declines in the degree of financial stability of business primarily lead to the risks of disrupting the stability of ecosystem functions.

The development of "green management" is also facilitated by the growth of social capital formed in the business environment. Having many partners, entrepreneurs try to operate in a mutually reliable and mutually agreed environment (Chand, Mahesh, 2018,642-59). In this case, creditors are not reluctant to provide financial resources, investors trust the successful course of business and the future vision, buyers are shown mutual trust and softening of receivables, employees of the organization are presented with motivational levers to encourage work, as a result of which an attitude towards the organization's activities is formed.

In other words, the business environment turns into a society where social capital is formed on the basis of mutual trust and mutual benefit, which in turn is a serious incentive for the further development of "green management" in the organization. And if the organizations do not pay attention to the social capital formed in the business environment, and even contribute to its pulverization with their activities, then they create risks for disrupting the process of "green management". The implementation of an effective management system also contributes to the investment of "green management". Today, serious attention is being paid not only to "top-down" but also to "bottom-up" management approaches, when managed groups themselves participate in business decisions, being included in the participatory management system. In this case, administrative decisions are made on the spot, formulated more realistically and stem from emerging situations. Therefore, "green management" becomes addressable and transparent in its end-results, which promotes interest among decision-makers in order to ensure the further development of business.

Consequently, the sustainable development of business, in addition to the traditional resources for ensuring business progress, also requires additional resources in the form of environmental, social, and human capital, which become manageable through purposeful use and green activity.

Based on the objectives of sustainable development, it can already be assumed about a wide range of beneficiaries interested in their access, the boundaries of which can be expanded over time, including new players arising from the requirements of the time.

Thus, the governments of the countries pursue public interests with their departmental bodies and show demands towards business in the directions of rational exploitation of natural resources, protection of the environment, social justice, and provision of access to education. However, public services related to sustainable development can be left out of the sight of state agencies and go to public bodies. They can be solutions aimed at gender issues, mitigating the polarization of wealth, access to decent work. Furthermore, civil society organizations are taking immediate action to combat climate change and its impacts (Li, Dayuan, 2018, 462-70).

Local self-government bodies are also the beneficiaries of the sustainable development of business, because on the one hand, the expansion of entrepreneurial activity opens new jobs, improves the socio-economic condition of the population, but on the other hand, health and contains environmental risks. Local self-government bodies are interested in restoring and promoting the sustainable use of terrestrial ecosystems, ensuring sustainable forest management, combating desertification, preventing land degradation, and halting the loss of biodiversity.

Business partners are als o included in the core group of sustainable development beneficiaries. Today, the attitude of the members of the value chain operating in the business model towards sustainable development is important. Organizations prefer suppliers and buyers, that contribute to sustainable development with their activities. Banks are trying to prevent the provision of such loans, the use of which by business worsens the environmental environment (Hasan, Md Morshadul, 2019, 326-39).

Figure 1

Key components of green entrepreneurship ecosystem

Source: Developed by author

Green entrepreneurship cannot run smoothly without the appropriate ecosystem functioning. Environmentally caring episodic behavioral approaches by organizations may not be considered green entrepreneurship. If the organization participates in city-wide tree planting on Saturdays, or joins one-time power outages aimed at saving electricity, then such situations are characterized only as environmental measures, and not as green entrepreneurship.

Green entrepreneurship is a continuous process that is carried out alongside traditional entrepreneurship when a toolkit for addressing green development needs is in place (see Figure 1). In this case, the trajectory of the entrepreneurial activity is constantly subject to change from the point of view of green development opportunities. At the same time, monitoring reports can be received by both internal (employees, managers, investors) and external stakeholders (buyers, lenders, state bodies, public organizations) of the enterprise. Therefore, the leitmotif of green entrepreneurship is the uninterrupted functioning of the institutional mechanism for meeting the needs of green development, in the absence of which the process of sustainable development entrepreneurship will simply be disrupted and an appropriate ecosystem will not function.

However, green entrepreneurship is not formed only by raising passions, because the latter requires a harmonious partnership, including green purchases and consumption, the search for financing sources for green business, and the establishment of community relations of like-minded people. If the business is not able to gather partners interested in green development around it, then the balance of the green business ecosystem is disturbed and it can simply stop working (Li, Dayuan, 2018, 462-70).

It should also be noted, that the partner community interested in green development must also believe that the organization has the necessary potential for green development, which can promote the sustainable development of sustainable business and support the continuity of the activity of the green business ecosystem. That potential appears not only through the application of the latest environmental technologies, but also through the organization's collection of environmentally competent human resources.

And finally, the most important component of the green business ecosystem is the introduction of the institution of corporate responsibility, when there is transparent accountability in organizations regarding the sustainable development of business. If there is a feedback loop with stakeholders, then as a rule, the foundations of the green development ecosystem are also broken and green entrepreneurship loses its effectiveness (Zhou, Yunyue, 2019, 567-81).

In practice, it is a challenge to measure and evaluate the effectiveness of the business ecosystem from the perspective of green growth.

The economic growth formed as a result of entrepreneurial activity is mainly connected with the increase of the profit of the organization, or the expansion of the managed capital (Hakobyan A., Tshughuryan A., & Martirosyan G., 2023, 169-76). However, when organizations make the transition to "green entrepreneurship", traditional approaches to assessing economic growth are revised, taking into account a number of factors of environmental, social and corporate responsibility (Tshughuryan A, Khachatryan N. 2023, 71-94). In this case, along with the economic growth of the business, the "green growth" related to the result of entrepreneurship is also evaluated. Therefore, one of the important features of the entrepreneurial activity of the transition to the green economy is the necessity of recording "green growth", thus refusing to measure economic growth exclusively by profit.

It should be noted, that at the country level, a "green growth" index is currently calculated, which combines the sustainable development goals approved by the United Nations, as well as the assessments of the determinants of the Paris climate agreement, with the following four pillars (Famiyeh, Samuel, 2018, 607-31):

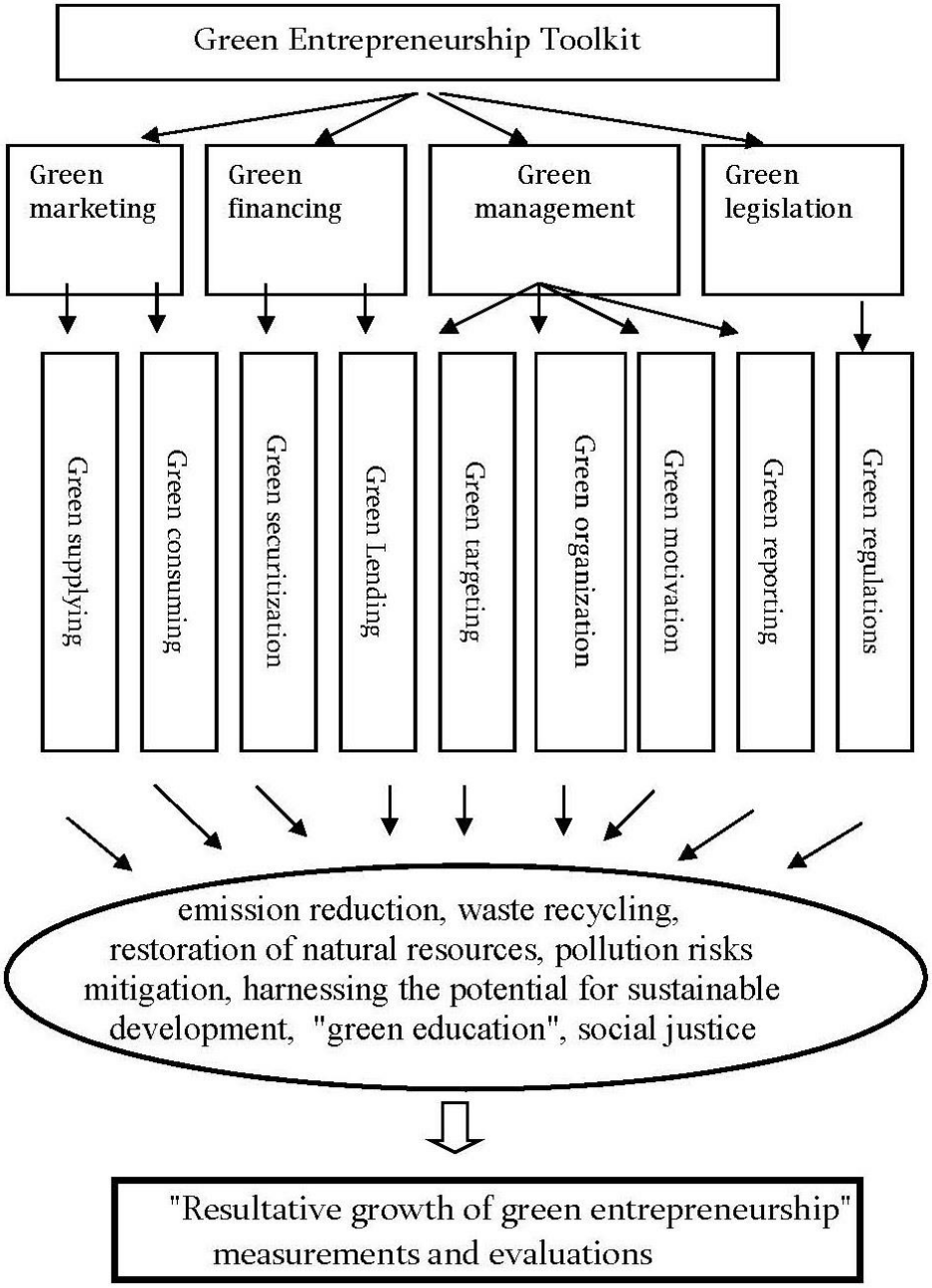
- efficient use of resources,
- protection of natural capital,
- opportunities for green economy development,
- social inclusion.

Moreover, the green growth index for each country is evaluated on the following 100-point scale: 80-100 efficient, 60-80 high, 40-60 moderate and 20-40 low efficiency.

However, evaluations of "green growth" formed as a result of entrepreneurial activity are made with other approaches, relating to the green ecosystem. And the business in green ecosystem requires financing, marketing, managerial, legislative arrangements, which will act in terms of "green activity" (see Figure 2).

Figure 2

"Green growth" assessment in the context of entrepreneurship



Source: Developed by author

Table 3

Annual report of the organization's "green performance" results

#	Indicators	KPI	Factual	Executive (%)
1.	Emissions reduction	300m^3	250m^3	**83,33%**
2.	Waste processing	25 ton	27 ton	**108%**
3.	Use of alternative energy	15 m/vt	13 m/vt	**86,67%**
4.	Pollution risks mitigation progress	8%	6%	**75,75%**
5.	Increasing of sustainable development potential	4%	3%	**75%**
6.	Progress in green education	12%	15%	**125%**
7.	Advancement of social justice	18%	20%	**111,11%**
	"Green growth"	X	X	**94,98%**

Source: Developed by the author, with a conventional example.

It has certain characteristics. Therefore, it is necessary to evaluate "green growth" with an integral indicator, taking into account the above-mentioned factors. In practice, it is easier to apply the evaluation of "green growth" from the point of view of performance, when key performance indicators (KPI) are defined for the functions of sustainable development accompanied by entrepreneurship, assessing the degree of their availability.

Studies show that organizations operating in the Republic of Armenia have been publishing reports related to corporate social responsibility in recent years (Coca-Cola Hellenic, Zangezur Copper-Molybdenum Combine, Ararat Bank, Ardshinbak, etc.), but at the same time, they still do not present quantitative KPIs of green business. In that regard, we propose a "green accountability" format in which organizations use KPIs developed by themselves. The calculation of each quantitative KPI requires a special methodology, which, in our opinion, is not considered the main problem of green management. In this sense, green management emphasizes the performance monitoring of quantitative KPIs and based on this presents appropriate managerial decisions.

Evaluations of KPI indicators derive from the specifics of the sectoral activities of organizations. At the same time, it is more appropriate to evaluate the performance of "green entrepreneurship" with percentage measurement, because the result indicators are presented with different measurement units and their comprehensibility in the integral index is possible through percentage measurements (see table 3). Taking in account, that the each company set up strategic KPIs of green entrepreneurship it is possible to calculate "green growth" in microeconomic level, for analyzing business entities.

The suggested integral index of green growth expressed in percentages, which represents the average calculation of the performance of functions, can be interpreted not only in terms of general factors, but also in terms of individual factors. Thus, in spite of the fact that the green growth of entrepreneurship in the reporting year did not register the perfect 100% level of the established key assessment and was 94.98% (see table 1). Nevertheless, in some directions of green entrepreneurship, it exceeded the established benchmark more growth was recorded (waste recycling, green education, maintaining social justice).

Based on the characteristics of the enterprise, the range of "green growth" evaluation indicators can be expanded, or the definition of key indicators can be revised. However, a

business should always strive for 100% "green growth" performance. Therefore, it is important to measure the "consequential growth of green entrepreneurship" and use a sound methodology of evaluation based on the directions of sustainable entrepreneurship.

Conclusion

Green entrepreneurship cannot function effectively without the existence of an appropriate ecosystem. Therefore, there is a need to evaluate the effectiveness of the green ecosystem around organizations, which can be evaluated with an alternative approach, using KPI indicators for internal use. Moreover, by consolidating the performances of these indicators, it is advisable to apply an integral index, which will give an opinion about the green economy ecosystem operating around the organizations. By applying an integrated indicator of the performance of green entrepreneurship goals, it is possible to compare the achievements of organizations in the direction of sustainable development over time and also to highlight the weak links of the ecosystem of green business framework.

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SOME ISSUES OF BUDGETARY FUNDING OF STATE SERVANTS TRAININGS IN THE REPUBLIC OF ARMENIA

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Abstract The article examines and systematically analyzes the system of state financing of trainings of civil servants of the Republic of Armenia, using the methods of economic and statistical analysis. The source for the creation of the analysis database were the State budget indicators of different years, including planned, adjusted and actual data.
Within the framework of the article, there is studied the best international experience of state support for the organization of trainings (on the example of OECD countries) and the possibilities of its localization in RA. There are analyzed the dynamics and trends of the share of additional education (mainly includes the trainings) in the state budget, problems and gaps in the system of state funding of trainings are revealed according to directions and departments. Based on the analysis, there were made a number of suggestions to improve the system, which will contribute to the qualitative improvement and efficiency of trainings, and the formation of healthy competition among employees. In particular, it is proposed to review the training participation planning system, based on the study of real demand and the implementation of evidence-based policies, which will allow both to save public funds and to organize training according to effective targets.

Key words: *Republic of Armenia, state budjet, training, qualification increase, state servants, civil servants, additional learning, state financing of trainings*

Introduction

In the context of modern global developments, the role and importance of lifelong learning (and therefore- its funding) is increasingly being valued within the framework of state policies of different countries, based on its positive impact not only on labor market indicators, but also on the quality of life.

Studies show that lifelong learning enables people to live more interesting and fulfilling, and therefore happier lives. The research carried out within the framework of the BeLL program showed that, according to the perception of 84% of the respondents, inclusion in adult learning and education programs had a positive effect on their mental and spiritual balance, and 83% had positive changes in terms of their understanding of the meaning of life (Manifesto, Adult Education in the 21st Century, The Power and Joy of Learning. European Association for Education of Adults 2019). Within the framework of lifelong learning, the opportunity to receive education and increase qualifications during work is of particular importance.

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There are many studies that show the positive impact of trainings on employee productivity and performance (Armstrong 2020, Afroz 2018, Garavan, T., McCarthy, A., Carbery, R. 2020, Hughes, A. M., Zajac, S., Woods, A. L., Salas, E. 2019), including and especially in the public and state administration sectors (Ali Ahmed Mohammed, R., Mdyusoff, R., Ismail, F., Ghafoor Kazi, A., 2018, Adamu Saidu, A., Abubakar Ilelah, S., Ali, S. 2019). Therefore, training is in the interest of both the employee and the employer, as it is an important factor in the creation of added value. In this context, investments in the training process and their effective management are highly important from a point of view of budgeting.

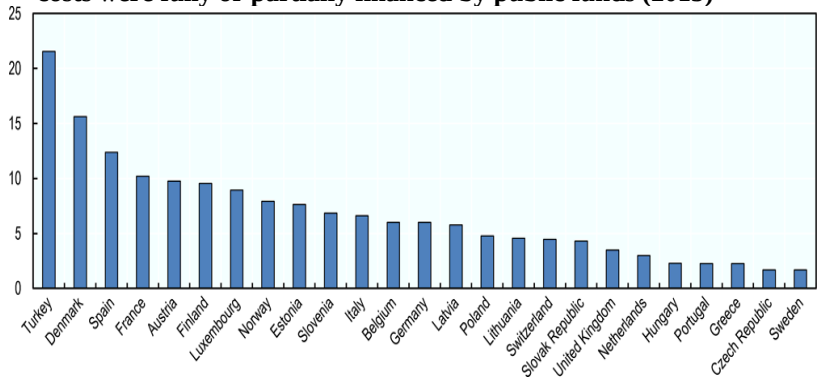
In the state administration system of RA, various trainings of state servants are carried out, which are financed from the state budget and the purpose of which is to increase the efficiency of management of the sector and improve the quality of human capital. The main goal of the research presented in the framework of the article is to highlight the main problems of the organization and management of the process of RA state servants trainings budget funding and to propose certain approaches to their improvement.

The experience of trainings state financing in OECD countries

According to the data of the Organization for Economic Cooperation and Development (hereinafter referred to as OECD) countries in 2015, on average, only 6.8% of the total number of those who received training received state support. In the Netherlands, Hungary, Portugal, Greece, the Czech Republic and Sweden, the figure was below 3%, in Turkey and Denmark it exceeded 15% (Figure 1).

Figure 1

Proportion of individuals involved in formal and informal training whose training costs were fully or partially financed by public funds (2015)



Source: (Getting Skills Right. Future Ready Adult Learning Systems, 2019)

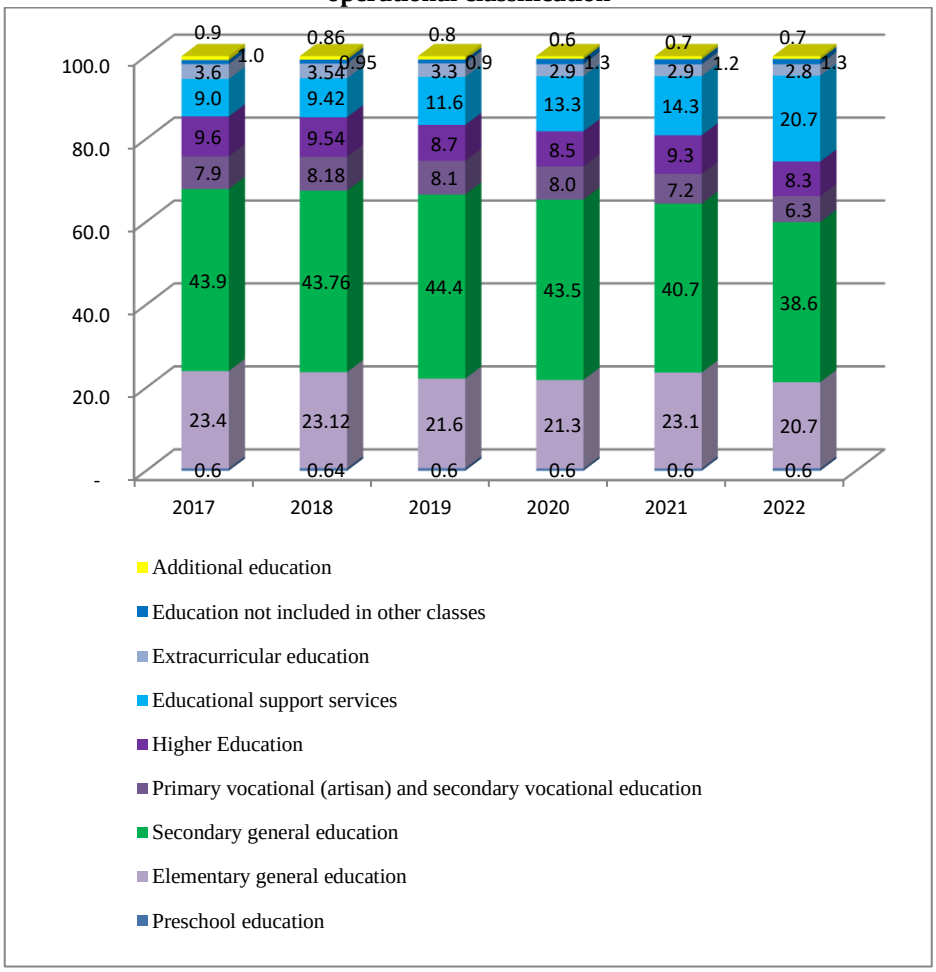
In 2015, only 8.75% of training organizations in the OECD received government support, but the variation between countries is significant. For example, in Spain, 73.6% of training organizations receive state support, in Luxembourg, this figure is 21.3%, and in Sweden, less than 1% (Getting Skills Right. Future Ready Adult Learning Systems, 2019).

Although the total volumes of state funding for training are low compared to other areas of education in OECD countries, there are clearly regulated funding programs and mechanisms (Financial Incentives for Steering Education and Training 2017) in this area,

developed state policy priorities, the implementation of which allows to compensate possible gaps caused by low state funding through the implementation of alternative instruments. Funding from various international programs and foundations, as well as the active policy of promoting the involvement of individuals and organizations in the processes of adult learning and education (preferential loans for financing informal education, subsidies, provision of paid study leave, etc.) make it possible to ensure sustainable and long-term development in this field of education.

Figure 2

The dynamics of the actual expenses of the education sector in 2017-2022 according to operational classification



Source:The chart was made based on the author's calculations according to the Ministry of Finance's information on the annual expenditures of the state budgets (according to the operational classification) of the respective years. (https://minfin.am n.d.)

Financing of state servants' trainings in RA

According to the operational classification of RA state budget expenditures, "Education not classified by levels" (09 section, 05 group) includes out-of-school education and

additional education. Additional education class (09 department, 05 group, 02 class) covers the costs of organization and implementation of professional capacity building training courses for employees of various public sector departments.

According to the operational classification of RA state budget expenditures, "Education not classified by levels" (section 09, group 05) includes "extracurricular education" and "additional education". The "Additional Education" class (section 09, group 05, class 02) includes the costs of organizing and implementing professional capacity building training courses for employees of various public sector departments.

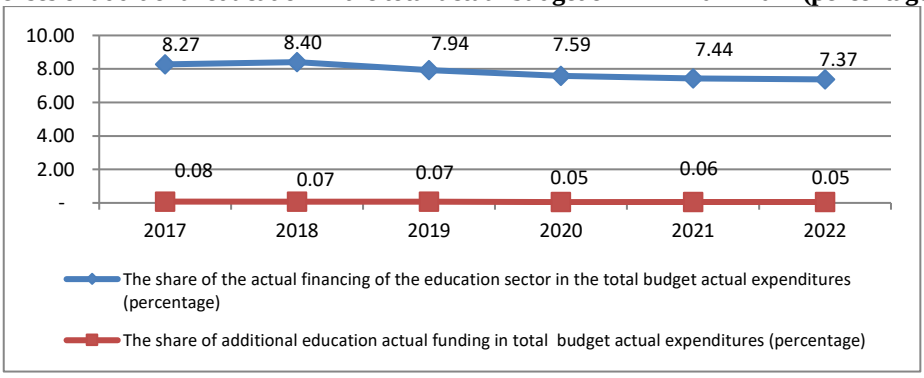
Studying the dynamics of the actual budgetary costs of the main directions of the RA education sector, according to the operational classification, we have the data presented in Figure 2. The volume of actual financing of additional education has a share of less than 1% in the total actual financing of education and exceeds only the financing of preschool education[1]. In 2022, compared to 2017, this indicator decreased by 0.2 percentage points, and compared to 2018 it decreased by 0.16 percentage points.

It is noteworthy that the share of the total actual funds of the education sector in the state budget has continuously decreased since 2018. The actual funding share of additional education decreased by 0.02 percentage points in 2022 compared to 2018 (Figure 3). This is, however, when the absolute amount of additional education funds increased by more than 95 million AMD in 2022 compared to 2018 (Figure 4).

It turns out that, compared to 2018, in 2022, the actual funding of additional education has increased in absolute terms, but its share has decreased both in the state budget and in the total expenses of the education sector. Such trends in the budgeting processes indicate, if not the reduction of the role and significance of additional education within the framework of state policy, then at least the lack of strategic priority.

Figure 3

The share of the actual budgetary expenses of the education sector and the budgetary expenses of additional education in the total actual budget of RA in 2017-2022 (percentage)



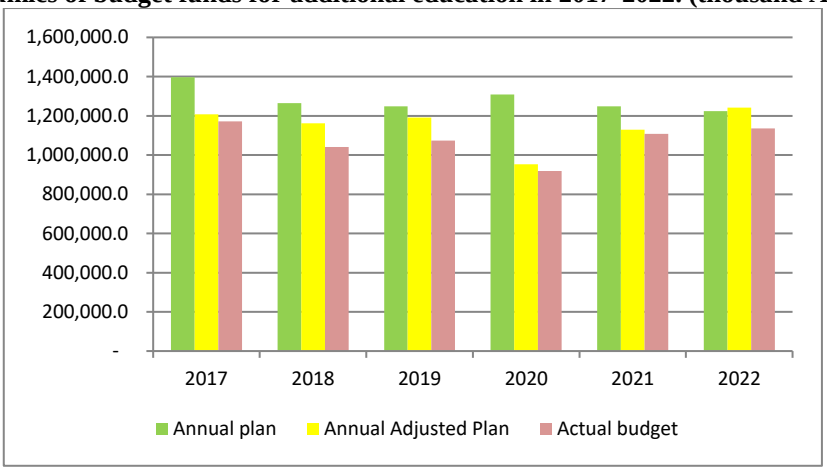
Source: The chart was made based on the author's calculations according to the Ministry of Finance's information on the annual expenditures of the state budgets (according to the operational classification) of the respective years. (https://minfin.am n.d.)

[1] In this case, it refers only to the funding allocated from the RA state budget. Preschool education funding volumes from community budgets are not included.

In 2022, compared to the previous year, a decrease in the share of additional education funds in the budget was observed by 0.01 percentage point (Figure 3), while the absolute value increased by about 29 million drams (Figure 4).

Figure 4

Dynamics of budget funds for additional education in 2017-2022. (thousand AMD)



Source: References of the Ministry of Finance on the implementation of the annual expenditures of the state budgets (according to the operational classification) of the relevant years(https://minfin.am n.d.)

In all the years included in the observed period, the actual expenditures for additional education have a deviation from the planned expenditures, which is determined by the underperformance of various additional education programs in relation to the planned and adjusted indicators. The biggest deviation is observed in 2020, which was objectively caused by the revision of expenses in the conditions of the pandemic and the war.

Examining the structure of the RA state budget for different years according to the program classification, we see that there are expenses for the training of the staff of various departments, which are not included in the operational classification in the "Additional education" section, and are not even included in the "Education (not belonging to other classes)" section. Such expense items are, for example, "Training of specialists in the field of international relations and diplomacy", "Military education and training", etc. Within the framework of the performance study of the program budget for 2022, an attempt was made to identify all possible expenditure items that correspond to "Additional education" in terms of content (Table 1). Such an approach will allow to present more systematically and in detail the cost priorities of trainings in the RA state administration system. It should also be noted that there are expenditure items that include costs for staff training, but it is not possible to separate the specific training component. Such expense items are, for example, for 2022 "Museum samples preservation, exhibition organization, specialists' training", "Library collections preservation and replenishment, reader service, library event organization, library staff training", "Development of methodological manuals, conducting research and social security specialists' training" expense items. Such expenditure items are not included in Table 1.

Table 1

The budgetary costs of training courses' financing in the RA state administration system and their performance in 2022.

	Annual plan	**Annual Adjusted Plan**	**Actual budget**	**Performance percentage against annual adjusted plan**
Expenditure item	**The amount (thousands AMD)**	**The amount (thousands AMD)**	**The amount (thousands AMD)**	**percent**
Training of public sector financial specialists	22,095.60	19600	16280.79	83,1
Professional training and special training of representatives of territorial administration and local self-government bodies	18,500.00	9116	8328.53	91,4
Training of specialists in the field of international relations and diplomacy	224,549.00	224549	224549	100
Military training and education	1,029,069.60	808069.6	792032.38	98
Training of civil servants	16,184.00	5184	4475.89	86,3
Training and special education of justice system employees	479,635.70	499510.5	498385.42	99.8
Training of civil servants of the staff of the RA National Assembly	1,260.10	1260.1	270	21,4
Training of Diaspora Youth Leaders	11,806.70	9475.9	9475.9	100
Special training courses for judges and bailiffs and training of civil servants of the judicial system	37,587.60	37587.6	3506.6	9,3
Training of special officers	197,652.00	197652	197652	100
Capacity building of the National Center for Education Development and Innovation, ICT (Information and communication technology) training of public school teachers in Tavush region of RA	243,209.50	243209.5	113128.4	46,5
Teachers' training for mandatory certification	365,424.00	393740	267828.3	68
Ensuring the development of inclusive teaching skills of teachers and teacher assistants in public schools	127,654.20	127654.2	127654.2	100
Training of diaspora teachers in Armenia in separate professional directions	16,000.00	16000	13400	83,8
Training of management staff and specialists of state and local self-government bodies	114,777.40	114777.4	114777.4	100
Training of tax and customs officials	128,843.50	148979.5	148979.5	100
Training of employees of the RA Anti-Corruption Committee	12,552.00	4252	1624.4	38,2
Qualification training courses for employees with the authority to assign examinations and obtain baseline data	15,990.90	15990.9	13381.1	83,7
Special training services for judges, prosecutors, persons on the list of candidates for judges and prosecutors, judicial officers, employees of the prosecutor's office, bailiffs	237,537.70	249453.7	249453.7	100
Provision of training scholarships for persons to be included in the list of candidates for judges and prosecutors	44,446.00	52404.8	51279.7	97,9
Implementation of specialist training programs carried out by private companies together with universities, organization of specialist training courses through the programs of private companies and their specialists.	280,000.00	212800	211584	99,4
Services of training of investigative officers and civil servants of the RA Investigative Committee Department, professional training of persons included in the list of candidates for investigative officers	12,014.70	8956.7	8509.9	95

Source: The table was compiled by the author according to Annual report on the 2022 budget (program) performance published by the RA Ministry of Finance (https://minfin.am/hy/page/petakan_byujei_hashvetvutyun_2022_t_tarekan_ n.d.)

Studying the report of the RA state budget's performance indicators in 2022, there were identified the main factors and reasons for those expenses, which have the greatest

deviations compared to the adjusted budget.

1) The deviation of the actual costs of ″the professional training of representatives of territorial administration and local self-government bodies″ from the adjusted budget (performance: 91.4%) is explained by the circumstances that due to workload, some municipal employees did not participate or were absent from the courses.

2) The deviation of ″civil servants' training″ costs (performance: 86.3%) was caused by the two-time failure of 2 of the tenders held under the procurement procedure, during which no applications for participation were submitted. As a result, 1,642 people were trained instead of 1,889 trainees planned in the adjusted plan.

3) The deviation of expenses for the ″training of civil servants of the staff of the National Assembly″ (performance: 21.4%) was explained by the small number of actual employees trained (planned: 77, actual: 36), which in turn was determined by the fluidity of employees and the availability of contract employees.

4) The saving of funds aimed at conducting ″special training courses for judges and bailiffs and training civil servants of the judicial system″ (performance: 9.3%) was explained by the lack of appropriate conditions for conducting special training courses, as well as the impossibility of allocating time to participate in the courses due to the workload of judges.

5) The low performance (46.5%) of the costs of ″ICT training of teachers of public schools of Tavush region and Capacity building of the National Center for the Development of Education and Innovation employees″, was explained by the fact that the digitization and automation software development of the teacher certification process was not carried out due to the lack of grant funds, which were insufficient due to the devaluation of the euro.

6) She underperformance of expenses for ″teacher training for mandatory certification″ (68%) was caused by the actual low number of trained pedagogical workers and the fact that part of the training was conducted remotely.

7) The low rate of training costs for diaspora teachers (performance: 83.8%) was due to the possibility of distance learning, as a result of which the number of participants increased significantly (planned: 25, actual: 129, planned number of participating states: 6, actual number: 21), and funds were saved.

8) The performance of expenses for ″the training of RA anti-corruption committee employees″ (38.2%) was explained by the low number of participants in labor tenders and, as a result, the non-filling of positions, and therefore also the low number of actually trained (planned: 96, actual 13).

9) The performance of ″professional training courses for employees with the authority to appoint experts and obtain baseline data″ was 83.7%. The reason for the difference was explained by the fact that the competent authorities did not submit the number of listeners for the given period (adjusted plan: 674, actual: 282).

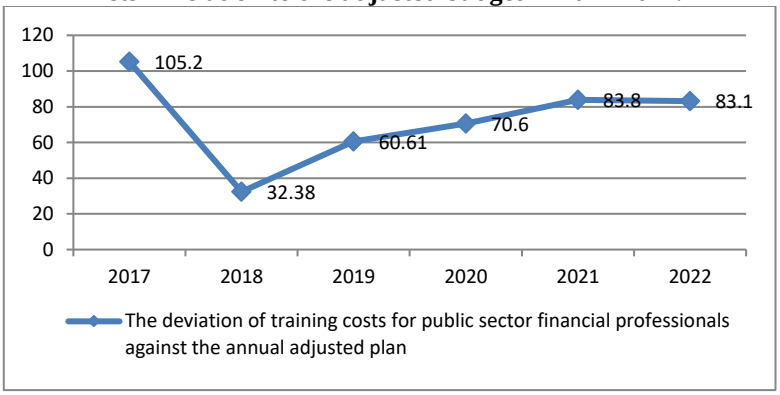
Summarizing the main picture of the performance of expenditures for the training of state system employees in 2022, we can state that the low performance of individual items is mainly due to the low demand for training among potential trainees. It is noteworthy that in such key areas as the local self-government system, the judicial system, non-participation in trainings is explained by workload. Among the main contingent, trainings are not perceived in any way as a tool for increasing work productivity, and competent authorities do not provide the necessary number of trainees. The reasoning

behind the underperformance of the costs of the special training courses for Judges and bailiffs and the training of civil servants of the judicial system is problematic, which refers to the lack of necessary conditions for the organization of the course. A question arises, how can a course be planned without considering the realism of its organization?

"Training of public sector financial specialists" is the expenditure item whose performance was marked by relatively large deviations for the entire period under review compared to the adjusted budget (Figure 5.). In the case of other expenditure items, either the deviations are not very large, or the given expenditure was not planned for all the considered years.

Figure 5

The dynamics of the performance of training costs for public sector financial specialists in relation to the adjusted budget in 2017-2022.



Source: The chart was compiled by the author according to the RA Ministry of Finance's annual budget (program) performance reports. (https://minfin.am n.d.)

For all years of the considered period (except 2017), the deviations are explained in the same wording: "The difference is due to the savings resulting from the organization of the purchase process and the number of actual trainees." It turns out that, as a rule, the applications for participation in the training course are significantly less than the preplanned places. There is a problem of increasing the efficiency of the planning process and introducing mechanisms that will allow for a more realistic forecast of the number of potential trainees.

Recommendations

Taking into account the conclusions made, it is recommended:

- to include the expenses for trainings, qualification improvement courses in the budgeting process in one expense class (it is most appropriate - "Additional education"), to present each of the costs as separate expense items (not including them in the general items covering other costs), in order to facilitate the process of evaluation of efficiency in this area, to increase the level of transparency and accountability.
- to plan the the public sector employees participation indicators (number of participants) in training and qualification improvement courses, not based on the indicators of previous years, which are underachieved every year (due to this, funds are saved, but at the same time, the expected end result and the efficiency of the process suffer) , but based on the study of real demand for trainings. Government agencies must first carry

out needs assessment and then only planning, which means the implementation of so-called "fact-based policy". If the planning was organized in such a way that as a result less state servants were actually trained, it turns out that the need was not met, which will inevitably have its consequences on the quality of public/state services. In particular, we can assume that, for example, deficiencies in the planning of trainings of public sector financial specialists are to a certain extent the cause of public dissatisfaction with the quality of the state procurement system.

- Participation in trainings should not be an obligation for employees, which can be avoided due to workload (or participate in order to avoid work duties), but the exact opposite approach should be applied. some types of trainings should be available especially to high productivity employees, which will create healthy competition among state servants. For example, the mechanisms used within the framework of international experience can be applied: state subsidization of employees' participation in various courses (by the employee's choice, for example, organized by a university, research organization or private companies), or provision of paid educational leave. For the best employees of the departments of the previous year, the budget plan for the following year may include appropriate allocations for financing training or qualification improvement courses.
- to contribute to the gradual transformation of employees perceptions of trainings and their real impact on increasing work productivity, which should be carried out with such qualitative transformations of the process and content of trainings with state funding, which will cause real motivation to participate in them.

Conclusion and discussion

It can be concluded that there are many shortcomings and omissions in the system of state financing of trainings of state servants in RA. Additional education is not considered as a strategically important and forward-looking direction of the RA education sector (taking into account the volume and trends of funding). However, given the impact of training on improving the quality of human capital, both increased funding and effective financial management are important in this area. In the context of increasing the efficiency of financial management, competent and targeted planning is essential. The main shortcomings of the considered sector are in the domain of planning. Also important is the motivation of the participants and the belief that the trainings will really contribute to increasing their work productivity. Employees in the RA state system are generally not motivated to participate in trainings. This problem also needs deep review.

The recommendations made as a result of the analysis are aimed at solving the mentioned problems.

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ENLARGEMENT OF COMMUNITIES IN THE CONTEXT OF ADMINISTRATIVE TERRITORIAL REFORMS

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Abstract In this article we referred to the process of enlargement in RA communities in the context of administrative and territorial reforms. Administrative territorial reforms in the regions of the Republic of Armenia started in 2015-2017 and as a result of the implemented three-phase community enlargement process in 2018. As of now, the number of communities in the Republic of Armenia decreased from 915 to 502, with 52 clusters of multi-residential communities.

Referring to the changes in the management system of the enlarged communities, we noted that as a result of the enlargement, first of all, in the communities of Armenia, there was a redistribution of the posts of the staff of the communities, as a result of which the administrative and repetitive posts of the communities were significantly reduced. The main aim of this article is to find out the positive and negative changes as a result of the enlargement in communities.

We also studied the revenues and expenses of the budgets of the enlarged municipalities and showed that as a result of the enlargement process, cost planning and an increase in municipal incomes took place. The methods of document analysis, comparison, abstraction, and statistical data analysis of induction were used in the work. Within the framework of this research, we studied various public and scientific materials, as well as considered the historical development.

Thus, the enlargement of communities has generally had a positive effect and has the potential and strength to develop further. In this way, communities have become more self-financing and the level of decentralization has increased even more.

Key words: *RA government, community, NFPO, enlargement of communities, local government, position, administrative unit, budget, income, expenses*

Introduction

Referring to the start of the community enlargement process in Armenia, it should be noted that the RA government planned to implement a community enlargement program in the Republic in 2006, expecting to achieve more effective use of resources and decentralization of management as a result of community enlargement. In that context, it was planned to change the number of Armenian communities from 915 to 300 through enlargement.

Certain steps in the direction of the communities enlargement were implemented since 2008, and the same year the RA Law "On Local Self-Government in the City of

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Yerevan" was adopted (RA Law 2009). According to this law, the enlarged Yerevan community (Report 2016) was formed through 12 administrative units of Yerevan, which previously had the status of separate communities. However, despite the awareness activities carried out in the direction of the enlargement of communities, the concept of enlargement of communities and formation of inter-community associations was approved by the Government of Armenia only in 2011, when the local and legal basis of administrative territorial reforms in RA was laid by the Government of the Republic of Armenia in 2011, with the adoption of protocol decision N 44 of the session of November 10, on approving the "Concept of community enlargement and formation of inter-community associations" (RA government's 2011).

Enlargement of communities in the context of administrative territorial reforms

In the "concept of community enlargement and formation of inter-community associations" the need for administrative territorial reforms was established from the point of view of ensuring the continuity of development of communities, provision of more quality and affordable services by the community, and more effective use of the combined resources of enlarged communities.

In the concept cited above, the principles and criteria for the unification or division of communities, the same as the enlargement of communities, and the principles and criteria related to the formation of inter-community cooperation were also defined.

Basically, the results expected as a result of the enlargement of communities in the Republic of Armenia are as follows:

1. Consolidation of human resources, which implies the recruitment of qualified, good personnel and the exclusion of selection constrained by kinship ties.
2. Consolidation of infrastructures and increasing the efficiency of service delivery.
3. Strengthening of financial capabilities and expansion of the scope of implemented powers.

Administrative territorial reforms in the regions of the Republic of Armenia started in 2015, when the process of enlarging the communities was given by the amendments to the Constitution of the Republic of Armenia. The RA Ministry of Territorial Administration and Infrastructure discussed two versions of community enlargement programs: programmatic and administrative. 2015 According to the results of the local referendums held on May 17 and by the National Assembly on November 24, 2015 3 multi-residential communities - Dilijan, Tumanyan and Tatev - were formed by the law on making amendments and additions to the RA Law "On Administrative Territorial Division of the Republic of Armenia", which included 22 communities (Law 2015). Moreover, these bundles became the first and last zoom models, which were implemented as a result of the local referendum.

Next, in 2016-2017, reforms aimed at the enlargement of communities continued in the Republic of Armenia, which were implemented in several stages. In the first and second stages, around 140 communities were united, forming 18 multi-settled communities, and in the second stage, 34 multi-settled communities were created by uniting around 325 communities. It should be noted that the last process of community enlargement, by which the aforementioned 34 communities were enlarged, was carried out in 2017 according to the law adopted on June 9 and without holding a local referendum. (Law 2017)

So, in 2015-2017 as a result of the three-phase community enlargement process, in the number of communities in the Republic of Armenia decreased from 915 to 502, with 52 groups of multi-residential communities.

Referring to the changes in the management system of the enlarged communities, it should be mentioned that as a result of the enlargement, first of all, in the communities of Armenia, there was a redistribution of the positions of the staff of the communities, as a result of which the repetitive positions (staff secretary, financier, accountant, etc.) were replaced by service-providing positions. This redistribution mainly took place at the expense of reducing the staff positions of the enlarged communities, particularly at the expense of municipal employees. Instead, positions of employees providing public services to the community residents were formed in the municipal staffs. Particularly, we are talking about the technical and agricultural services that were either not provided at all before the enlargement, or were provided at an inadequate level due to the lack of specialists. The positions of individual specialists have increased, which were previously absent, especially in small rural communities. The quantitative statistics of the staff positions of the enlarged 52 municipalities of Armenia, before enlargement and after enlargement, are presented in table 1.

Table 1

Quantitative statistics of staff positions of 52 enlarged communities of Armenia before enlargement and after enlargement

№	*Community*	*Admin. post*		*Difference*	*CNPO posts*		*Difference*
1		Before enlarg.	After enlarg.		Before enlarg.	After enlarg.	
2	Berd	217	95	-122	204	307	103
3	Noyemberyan	92	60	-32	157	234	77
4	Kokhb	22	22	0	87	97	10
5	Ayrum	69	51	-18	67	67	0
6	Dilijan	104	57	-47	278	316	38
7	Aparan	186	119	-67	151	108	-43
8	Aragatsavan	50	46	-4	50	68	18
9	Tsaghkahovit	92	45	-47	48	88	40
10	Alagyaz	60	30	-30	0	0	0
11	Urtsadzor	42	40	-2	13	22	9
12	Tsjambarak	98	44	-54	80	89	9
13	Geghamasar	106	60	-46	12	10	-2
14	Vardenis	66	48	-18	200	243	43
15	Shoghakat	45	32	-13	14	21	7
16	Tumanyan	45	28	-17	24	41	17
17	Tashir	67	60	-7	66	61	-5
18	Stepanavan	70	58	-12	157	157	0
19	Odzun	52	37	-15	77	91	14
20	Alaverdi	85	67	-18	43	61	18
21	Akhtala	52	34	-18	43	61	18
22	Gyulagarak	67	36	-31	32	62	30
23	Lori berd	52	41	-11	5	5	0

24	Eghegis	77	63	-14	0	22	22
25	Gladzor	43	27	-16	35	55	20
26	Areni	93	70	-23	71	85	14
27	Zaritap	80	71	-9	11	30	19
28	Vayq	62	36	-26	131	132	1
29	Jermuk	47	37	-10	130	150	20
30	Metsavan	37	29	-8	15	15	0
31	Sarchapat	43	34	-9	6	6	0
32	Shnogh	89	84	-5	157	157	0
33	Charentsavan	138	85	-53	531	563	32
34	Byureghavan	37	30	-7	96	113	17
35	Eghvard	103	76	-27	233	269	36
36	Meghradzor	53	33	-20	41	55	14
37	Akunq	79	48	-31	0	17	17
38	Jrvezh	39	28	-11	53	64	11
39	Amasia	66	43	-23	28	31	3
40	Arqi	42	33	-9	0	0	0
41	Ashotsq	62	42	-20	28	30	2
42	Sarapat	60	49	-11	0	0	0
43	Ani	178	77	-101	39	39	0
44	Akhuryan	87	65	-22	125	189	64
45	Marmashen	104	77	-27	19	20	1
46	Tathev	66	35	-31	30	39	9
47	Gorayq	37	31	-6	3	7	4
48	Goris	129	87	-42	346	381	35
49	Meghri	116	64	-52	266	267	1
50	Tegh	61	46	-15	25	29	4
51	Kapan	266	143	-123	841	880	39
52	Sisian	273	120	-153	356	451	95
53	Qajaran	80	53	-27	84	97	13
	Total	***4386***	***2826***	***-1560***	***5763***	***6683***	***920***

Source: Ministry of Territorial Administration and Infrastructure 2024.

As we can see above, after the enlargement of the communities, the administrative positions of the communities were significantly reduced. In general, administrative positions were reduced by 1,560 after the enlargement, but at the same time, the number of CNPO employees increased by 920. This difference is 640, which, in our opinion is quite a large number. The results of the analysis show that there has been a significant reduction in repetitive positions of administrative employees, and therefore also a significant reduction in salaries. The biggest reductions were observed in Sisian, Kapan, Ani and Berd communities. A clear reduction in the number of employees has been observed in almost all communities, but questions arise as to why the number of employees in one community is larger, while in another it is relatively low. In this regard, it was necessary to develop a clear plan for reviewing the positions of the municipal staff, which would also define the clear criteria and standards, based on which both the reduction of the administrative staff of the municipalities and the increase of employees in the field of community services should be implemented.

However, these data have short-term and when we look at the report of the second quarter of 2023 on the number of positions of the united communities, we understand that this balance is decreasing. Let us consider table 2.

Table 2

Regarding the number of positions of the united communities, as of the second quarter of 2023

№	Region	Admin. post		Difference	CNPO posts		Difference	Total difference of all posts
		Before enlarg.	After enlarg.		Before enlarg.	After enlarg.		
1	Aragatsotn	1081, 6	707, 05	-374, 53	965, 25	1409, 77	444, 52	69, 99
2	Ararat	1307, 9	903	-404, 85	2178, 71	2974, 65	795, 94	391, 09
3	Armavir	956	753	-203	2051, 21	2331, 1	279, 89	76, 89
4	Gegharquniq	947	866, 5	-80, 5	1749, 14	2142, 96	393, 82	313, 32
5	Lori	1044, 4	859, 43	-184, 97	2358, 95	2605, 52	246, 57	61, 597
6	Kotayq	1020, 1	819, 5	-200, 55	3041, 93	3787, 12	745, 19	544, 64
7	Shirak	873	612	-261	845, 25	1129	283, 75	22, 75
8	Syuniq	989, 17	629, 5	-359, 67	1595, 16	2365, 75	770, 59	410, 92
9	Vayoc dzor	427	348, 3	-78, 8	550, 48	692, 63	142, 15	63, 45
10	Tavush	719	497, 5	-221, 5	1548, 76	1855, 35	306, 59	85, 09
Total		**9365**	**6996**	**-2369**	**16885**	**21294**	**4409**	**2039, 7**

Source: Ministry of Territorial Administration and Infrastructure 2024.

Our study shows that although the number of administrative employees has decreased, the number of employees of CNPO has increased significantly after enlargement. This may have a positive side in a way that various communities that needed some qualified specialists but they could not afford to pay or there was no specialist with the necessary qualifications, now they have the specialists and are properly exercising their powers. However, there should be a clear approach in this regard, otherwise there is concern that the positions will increase even more and more salaries from the formed budget will go to different positions.

As an evidence, let us note that the RA Government in its decision No. 1459 of September 8, 2021 states that it allocates 13,565.8 AMD from the reserve fund of the RA Government provided by the 2021 State Budget of the Republic of Armenia to the Ministry of Education, Science, Culture and Sports; according to Appendix № 5 (Armenian Legal Information System 2021). All the money is spent for the reopening of 6 preschool educational institutions in the communities of Ditak of Ararat region, Lusagiugh of Armavir region, Dzoragighugh and Vahagnadzor of Lori region, Geghadir and Mayakovsky of Kotayk region. Ministry of ESCS declares that the institutions with favorable building conditions in the communities were not functioning because of the lack of maintenance and operation costs. The costs of maintaining kindergartens were not covered, taking into account the small size of the municipal budgets. In future, after the expansion of the communities, the continuity of the activities of the kindergartens will be ensured at the expense of the community budgets. According to the order of the Minister of Education and Culture of RA, there is an exemplary staff list for each preschool institution, and it is natural that these newly opened kindergartens should have staff that was missing before.

Let's consider the incomes and expenses of the municipal budgets in order to analyze whether, as a result of the process of enlargement of the municipalities, there has been

an increase in incomes and a reduction in expenses, and if so, to what extent. Below the composition and structure of the incomes of the communities of Armenia during different years are presented.

Table 3

The composition and structure of the incomes of the communities' budgets of 2014-2022

№	*Index*	*2014*	*2015*	*2016*	*2017*	*2018*	*2019*	*2020*	*2021*	*2022*
1	Total income bil dram	114, 4	128, 2	128, 6	126, 6	127, 5	144, 4	156, 1	175, 4	189, 8
2	Taxes and fees	23, 3	23, 8	24, 6	26, 8	26, 3	31, 0	30, 8	38, 3	42, 4
3	Other incomes	35, 5	45	48, 8	42, 6	41, 4	46, 6	43, 8	50, 4	52, 4
4	Official grants	55, 6	59, 4	55, 3	57, 2	59, 7	66, 8	81, 5	86, 7	72, 1
5	Specific gravity %	100	100	100	100	100	100	100	100	100
6	Taxes and fees	20, 3	18, 5	19, 1	21, 1	20, 6	21, 4	19, 7	21, 8	22, 3
7	Other incomes	31	35, 1	37, 9	33, 6	32, 5	32, 2	28	28, 7	27, 6
8	Official grants	48, 6	46, 3	43	45, 2	46, 8	46, 4	52, 3	49, 5	50, 1

Source: Ministry of ESCS 2021.

From these data, we can conclude that in 2016, income increased by 14.2 billion, which in our opinion is quite a large number, and compared to 2015, it increased by about 200 million. In 2017, income decreased by around 2 billion. However, when we go deeper in the study, it is obvious that only in 2016, taxes and duties from total income amounted to 24.5 billion, and in 2017 it increased to 26.7 billion, which was mainly increased by real estate, land tax and other revenues, including property tax for vehicles. This is a very big and important indicator of the fact that enlarged communities have started to be more consistent and, if in case of a small community, they were more connected with each other by friendly ties, now this connection is secondary and a great place is given to the law. However, when the question arises as what is the reason for such a sudden decline in that case, in our study it was found that it is due to the reduction of the funds received from the state budget for financing the expenses of the implementation of the powers delegated by the state to the local self-government bodies. It was 38.6 billion in 2016, and 30.3 billion in 2017. This is a big step taken so that the communities become self-financed and about 8.3 billion have been saved from the state budget, which also shows the positive aspects of the enlargement. From that stage on the total incomes have started to increase and in 2022 it has already become around 189.8 billion. This number is greater than the data of 2014 by about 75.4 billion. To compare, in 2014, the income from taxes and duties amounted to 23.2 billion, and in 2022 it became 42.4 billion, that is, the income of the communities has increased almost 2 times. In our opinion, this is a serious indicator of the fact that after the enlargement of the municipalities, there was a sharp increase in the revenues of the municipalities' budgets. (RA Ministry of Finance 2023)

There is also a necessity to consider 2023, during which the incomes of the communities have also increased. If we compare the quarterly reports, then only according to the data of the first quarter of 2023, the revenues under the income item amounted to 43.3 billion, and in the same period of 2022 it amounted to 36.1 billion. According to the data of the 1st semester, this number was 101.9 billion, and according to the data of 2022, it was 79.9 billion. This is the indicator that the incomes of the communities have a tendency to increase and it is increasing more and more. As a result of the activities of

the State Property Management Committee in 2023 budget receipts amounted to 15.4 billion drams, 72.2% more than in 2022. This indicator is unprecedentedly higher than the indicators in the field of state property management in recent years. It was reported that 30 percent of the proceeds from the privatized state property and land is allocated to the community. It was mentioned that in 2023, 2.3 billion drams were provided to communities from the sale of state property. These revenues also strengthen the budget of the communities and make them even more autonomous.

Now let's look at the changes in the costs of the communities as a result of the enlargement process, related to the scale effect, which can be more clearly expressed in the case of administrative costs. Every municipality, regardless of size, must have a certain number of staff, so administrative costs per person in small municipalities will be higher than in large ones.

The structure and dynamics of Armenian municipal budget expenditures during the period of 2014-2022 is presented in table 4.

Table 4

2014-2022 The structure and dynamics of community budget expenditures in RA

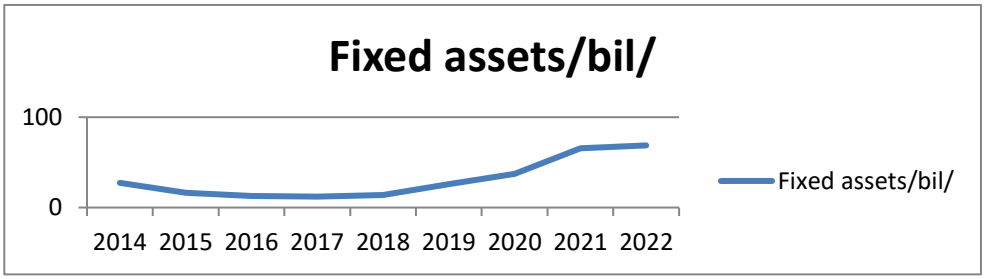
№	Index	2014	2015	2016	2017	2018	2019	2020	2021	2022
1	Total expenditures	114, 6	129, 2	128, 6	126, 6	127, 5	132, 9	138, 3	173, 1	199, 9
	Current expenditures	102, 5	120, 1	123, 3	119, 1	112, 7	118, 6	121, 2	138, 4	145, 9
3	Salary	20, 3	22, 9	23, 5	23, 4	22, 4	24, 9	27, 5	30, 3	30, 3
4	Acquirement of goods and services	38, 1	40, 6	23, 3	24, 4	24, 7	21, 5	19, 4	19	21, 2
5	Interest payment	0	0	0	0	1, 4	0, 7	0, 64	0, 15	0, 5
6	Subsidy	23, 1	25, 9	46	47, 9	49, 8	53, 8	58, 2	63, 8	70, 5
7	Grant	4, 8	5, 6	4, 7	5, 5	5, 6	6, 2	6, 4	7, 5	9, 6
8	Social allowance and pensions	3	3, 1	3, 2	4, 4	2, 1	2, 1	2, 3	2, 8	2, 0
9	Other expenditures	13, 1	22, 1	22, 5	13, 4	8	9, 9	7, 1	20, 2	12, 0

Source: State Property Management Committee 2023.

Before moving on to our research, we would like to point out that we have studied costs by economic classification, not operational. This study shows that running costs started to increase from 2014 to 2017. From here on it started to decrease and this, in our opinion, is also due to the fact that in 2017 the incomes have decreased to some extent and as a result of this decrease, the communities have reduced their current expenses. The increase of the salary fund is interesting here, which has increased by about 10 billion drams compared to the beginning. This is conditioned by both the increase in positions and the result of attracting qualified employees. The amount of subsidies has also increased here, which, in our opinion, is a positive point. However, after enlargement, we can see that the total costs have increased dramatically from 129 billion to around 200 billion. At first glance, this appears to be a very large increase, and in order to get a full picture, we want to examine other items of expenditure as well. In 2014 expenses on non-financial assets were 27.3 billion, which in 2022 amounted to 68.9 billion. We would also like to mention that a large portion of this article represents the costs of fixed assets. Let's look at the change of expenses more graphically in Figure 1.

Figure 1

Fixed assets/bil/. Source: RA Ministry of Finance 2023



It is clear from this figure that the cost of fixed assets has increased dramatically in recent years, which includes the following items:

1. Buildings and constructions
2. Machinery and equipment
3. Other fixed assets.

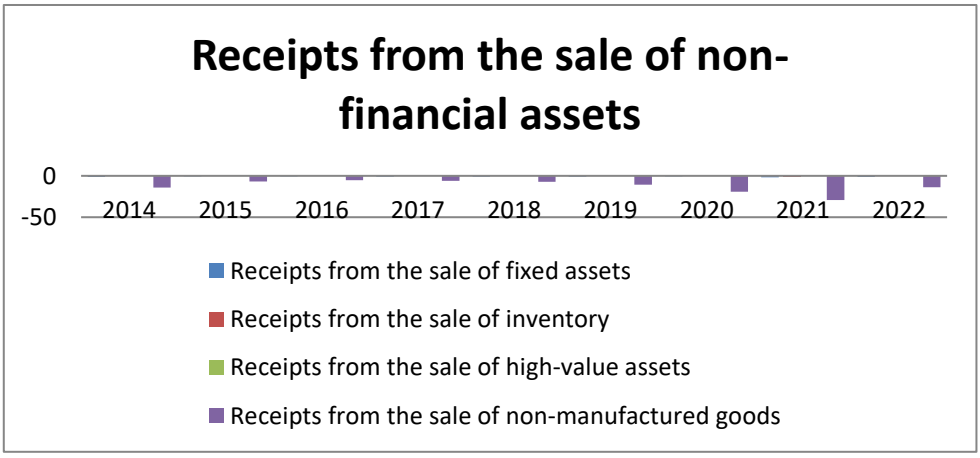
To our point of view, it is conditioned by the fact that after passing the complex stage of system establishment, more attention was paid to the state of buildings and the communities equipped with new machinery and equipment, which small communities could not afford to buy, but it was a necessity to improve community life.

It is necessary to examine the other item of expenses, which is called receipts from the sale of non-financial assets. It includes:

1. Receipts from the sale of fixed assets
2. Receipts from the sale of inventory
3. Receipts from the sale of high-value assets
4. Receipts from the sale of non-manufactured goods

Here, a particularly large portion is receipts from the sale of non-manufactured goods, which implies income from the sale of land, income from the sale of minerals, and others. Let us consider Figure 2.

Figure 2



Source: RA Ministry of Finance 2023.

It can be seen from this figure that the income from the sale of the main non-financial assets is the income from the sale of the same non-produced goods, which implies the sale of land, etc. It is obvious from this figure that the members of the society have started to acquire more land legally than before the enlargement by simply fencing it and without legally buying it from the community. In these studies, we foresee that the expenses of 2023 will be higher, because only according to the data of the first half of 2022, the total expenses amounted to 67.1 billion, and the total expenses for the same period of 2023 were 86.3 billion (RA Ministry of Finance 2023).

Conclusion

Thus, we can say that as a result of the enlargement of the communities, the financial capacities have strengthened, and the scope of the implemented powers has expanded. The infrastructures of the communities have been consolidated, and the efficiency of service delivery has increased. The autonomy of communities has increased and the enlargement of communities in general, has had a positive effect. It has the opportunity and strength to develop even more. In this way, communities have become more self-financing and the level of decentralization has increased even more.

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IMPROVEMENT OF FINANCIAL RESULTS BUDGETING IN THE CSR CONTENTS

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Abstract: Budgeting for financial results has traditionally been considered the preparation of cost and revenue estimates with responsibility centers in an organization. However, currently it covers a wider range, taking into account not only the internal but also the external value chain of the business. Currently, the value of organizations is not only evaluated by financial indicators, but also takes into account the responsibility of business from the point of view of ensuring public interests. The article makes recommendations for budgeting improvement of financial results, based on the requirements of companies' corporate social obligations.

Key words: *revenues and expenses, estimates, budgeting, sustainable development, business value chain, responsibility centers, corporate social responsibility*

Introduction

Budgeting of income and expenses is not at all addressed only to the formation of profit of the organization's activities, but also includes more scopes. As a rule, budgeting is interpreted as the localization of concretely defined objectives in different business activities in order to understand the contribution of each of them to the expected final results (Hakobyan A., Tshughuryan A., & Martirosyan G., 2023, pp. 169-176). With such an approach, it is possible to establish control over the activities of each link of the business, and thereby to form centers of responsibility in line with the results formed by them. In addition, deviations of the actual achievements from the planned results of each responsibility center are compared through budgeting, and the reasons for their occurrence are highlighted. This process is especially important in the context of the implementation of corporate social responsibility, when organizations are accountable to the public, in terms of the financial, social, and environmental consequences of their organized business (Fateeva S.V., 2019, pp. 46-52.). Therefore, it is currently a problem to take into account the perceptions of corporate responsibility undertaken by organizations in the budgeting process of financial results, in order to effectively implement financial control (Fisher M.V. 2018, pp. 204-211).

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Results and Findings

Traditionally, RA organizations present the financial results of their activities from the point of view of private interest's, when the profits arising from business are disclosed to investors, shareholders, and executive management. With this information, statistical services present reports on the effectiveness of financial and economic activities (see table 1). Moreover, statistical services present reports about the cost structure of production (see table 2).However, such information may partially satisfy external users, especially if they pursue public interests (Tshughuryan A., Hakobyan A., Grigoryan L., & Bayadyan A., 2022, pp. 152-158). Thus, organizations pursuing private interests often bypass public interests during their business activities, damage the environment, form environmental damages, and ignore the social needs of communities. In such situations, the business of organizations is not evaluated as effective, even if they present good financial indicators, while not having environmental, social and effective management obligations assumed before the public (Source:Kharkova D., (2019, pp. 76-80). Therefore, when budgeting for financial results, organizations should take into account separately the income and expenses related to the performance of corporate responsibility to the public.

Table 1

Indicators of profitability, solvency and financial stability of products and assets of manufacturing industry organizations in RA (%)

Indicators	2019	2020	2021	2022
Product profitability	28,7	48,4	61,0	39,8
Assets profitability	3,1	-8,7	28,2	18,2
Current liquidity ratio	35,2	56,8	133,5	179,9
Equity ratio	59,7	59,1	46,9	41,4
Coefficient of autonomy	-7,1	-13,0	20,0	45,1

Source: Armenian Statistical Yearbook, 2023, page 478

Table 2

Indicators of the structure of production and sales costs of manufacturing industry organizationsin RA (%)

Indicators	2019	2020	2021	2022
Costs of production and sales	100	100	100	100
material costs of which	29,0	41,3	41,7	43,4
raw materials	24,7	35,6	36,4	37,7
fuel	1,7	2,0	2,4	2,9
energy	2,5	3,7	3,0	2,8
labor costs	18,0	26,0	27,1	27,4
depreciation	8,1	11,9	10,8	10,89
other expenses	44,9	20,9	10,3	18,4

Source: Armenian Statistical Yearbook, 2023, page 471

However, on the other hand, the published information still does not fully reflect the financial and economic side of CSR of the organizations operating in RA. CSR account-

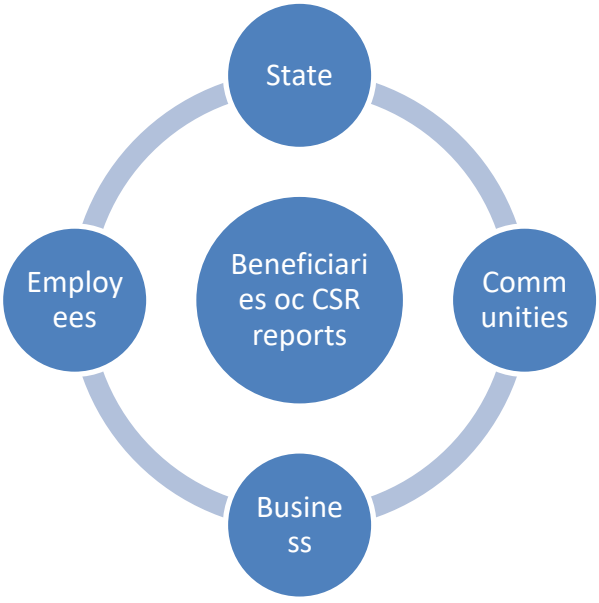
ability in business is mainly declarative in nature, making a cursory reference to implemented social programs (Tshughuryan A, Khachatryan N., 2023, pp: 71-94). In addition, from the financial and economic point of view, these reports are not complete, and the beneficiaries are not informed about the economic results of the implementation of environmental or social programs, how much the costs of the implementation of the programs were, and to what extent the benefits were obtained (Chupalaev M.R., 2014, pp.1108-1111).

Thus, the Grant Tobacco company is currently implementing support programs for rural communities, in the field of construction and repair of schools and kindergartens in different regions of the Republic of Armenia. In addition, the company implements projects for the sustainable supply of drinking water for the inhabitants, projects for the implementation of complex irrigation systems. The programs that support the development of scientific, cultural and sports life receive attention from the company committee.

In 2023, Coca-Cola Hellenic Bowling Company Armenia CJSC implemented the "World Without Waste" program, during which 150 waste sorting bins were installed in 30 schools in Yerevan and trainings were conducted for 1539 students. As a result, more than 3000 kg of waste was collected. 788 thousand formed in the company, 775 thousand kg of non-harmful waste was processed, and 8 thousand kg of hazardous waste was disposed of by the licensed organization. The share of more environmentally friendly models of refrigerators in the total cooling equipment is 48%, which has a tendency to improve by two points annually. And in parallel, such accountability of corporate social responsibility performance does not have financial and economic components at all, the demand of which can be felt by the range of beneficiaries of CSR reports (see Figure 1).

Figure 1

The scope of CSR reporting beneficiaries



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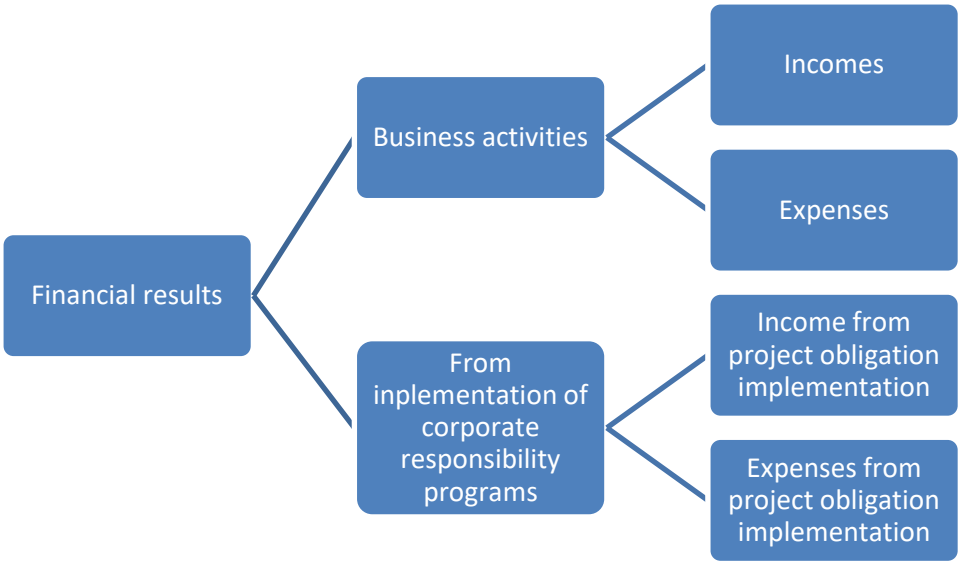
By using a sustainable development toolkit and implementing green entrepreneurship, organizations spend additional resources, expecting additional benefits from it, which need to be included in the framework of corporate social responsibility accountability (Tochilkina O.E., (2019, pp. 47-56). Currently, the reports published by RA organizations mainly reflect the financial results of traditional activities, which do not at all reflect the financial and economic results of the implementation of corporate responsibility. Therefore, presently there is a problem of revising the reporting structure of financial results of organizations, also recording the financial and economic consequences arising from the implementation of corporate social programs. In other words, there is a problem of separation of financial results according to traditional economic activity and according to corporate social responsibility (see Figure 2).

Figure 2

A proposed information flows for budgeting financial results



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Thus, in the reporting year, the organization undertook social responsibility in a number of directions and budgeted the expenditure of resources for their implementation. At the end of the reporting period, the performance of the planned resource costs and the results derived from them was evaluated, which was presented in the framework of CSR management accountability (see table 3). If such a report is formed within the framework of CSR, then based on it, an opportunity is created not only to evaluate, but also to subject to factor analysis the financial and economic effectiveness of CSR implementation.

Table 3

Financial and non-financial budgeting information in evaluating CRS performance

CRS indicators	Financing of CRS implementation processing			Outcome's from CRS implementation		
	proposed	actual	perfor-mative (F)	proposed	actual	perfor-mative (R)
Support for community school building	95 mln	92 mln	0,97	825m^2	711m^2	0,86
Use of returnable production waste	134 mln	141 mln	1,05	46 tons	48 tons	1,04
Economical use of water resources	29 mln	25 mln	0,86	25000m^3	19000ú^3	0,76
Use of alternative energy	478 mln	475 mln	0,99	356m/wt	352m/wt	0,67

Composed by author, with a conventional example.

For this purpose, we suggest to use in the calculation of the financial and economic performance CSR index, which provides an opportunity to evaluate the financial and economic efficiency of CSR. Moreover, the proposed index uses relative indicators (coefficients) of the fulfillment of obligations, which provides an opportunity to provide a unified and comparable measurability in terms of financial and non-financial results of CSR implementation. The lower the recommended index becomes less than 1.0, the more negatively the organization's CSR performance is evaluated.

I CSR = $\frac{1}{n} \times \sum_{n}^{i=1} In$ =(R1/ F1 + R2/ F2 + R3/ F3+ R4/ F4) / 4 =

= (0.886+0.99+0.883+0.676) / 4 = 0.885

The application of the proposed CSR financial-economic performance index (ICPR) also creates an opportunity to apply factor evaluation of actions, aimed at sustainable development in individual directions. In the presented evaluations, in the reporting period, the organization achieved the most success in the direction of the use of returnable waste, and the result of CSR performance in the field of alternative energy use is the worst.

I1 = R1 / F1 = 0.86/0.97 = 0.886

I2 = R2 / F2 = 1.04/1.05 = 0.990

I3 = R3 / F3 = 0.76/0.86 = 0.883

I4 = R4 / F4 = 0.67/0.99 = 0.676

Thus, the recommended management reporting of CSR performance allows not only to integrate financial and non-financial information in one reporting format, but also to carry out factor analysis in the sustainable development activities of the organization and to enable CSR beneficiaries to make decisions according to different ESG directions.

Conclusions

Thus, in RA organizations, we emphasize the budgeting of financial results in the context of CSR in a number of directions.

First, during the budgeting of financial results, the component of non-financial results should also be taken into account, thereby creating informational opportunities for making managerial decisions in the domain of the value chain of the business model.

Second, organize integrated reporting of financial results so that the user of the reports can understand how manageable the revenues and expenses generated by organizations in the business ecosystem become.

Third, organizations should present integrated information on financial results in a standardized format, based on the sectorial features of ESG criteria, which will create an

opportunity to conduct comparative analyzes in the competitive field.

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ENTROPIC ANALYSIS: UNDERSTANDING ECONOMIC SECTOR RELATIONSHIPS WITH LEONTIEF'S INPUT-OUTPUT TABLES

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Abstract. The article delves into the evolution of the "entropy" concept and its corresponding theoretical interpretations. Employing Shannon's entropy formula and leveraging the methodology of entropy calculation through Leontief's input-output tables, the study conducts entropy calculations for the economic systems of Australia, the Republic of South Africa, the United States, Luxembourg, Russia, South Korea, Japan, India, and China. These calculations are based on the tables published by the Organization for Economic Cooperation and Development. The primary finding of the study can be summarized as follows: Economic entropy, determined through the coefficients of total costs in Leontief's input-output tables, serves as a gauge of the interconnectedness among various branches within the economic system. Furthermore, financial and economic crises, as well as natural disasters, contribute to an escalation in the interconnectedness of economic branches, signifying a rise in entropy.

Key words - entropy, input-output tables, uncertainty, economic complexity, economic volatility, information theory, multi-theorization of the economy

Introduction

The concept of entropy in the natural sciences quantifies the level of disorder within a system composed of numerous elements. Specifically, in statistical physics, entropy signifies the likelihood of a macroscopic state's occurrence; in information theory, it denotes the degree of uncertainty surrounding an experiment with multiple potential outcomes; and in computer science, it measures the incompleteness and uncertainty inherent in information.

In economic theory, entropy serves as a metric for gauging the level of uncertainty within an economic framework. Its application in economics has expanded significantly, giving rise to novel scientific disciplines such as econophysics, complexity economics, and quantum economics. These fields introduce innovative methodologies; for instance,

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econophysics challenges the efficient market hypothesis, while complexity economics suggests that markets and economies operate optimally at the brink of chaos. Jakimowicz (Jakimowicz A., 2020, pp. 1-25) finds that incorporating entropy into econometrics has enriched the analytical toolkit, with non-extensive cross-entropy econometrics emerging as a valuable addition. This approach complements traditional econometrics by enabling the estimation of models for non-ergodic inverse problems, accounting for anomalies and misbehavior within economic systems.

The primary objective of this study is to investigate the impact of the global economic crisis of 2008-2009 on the entropy levels of the economic systems in various countries.

Our hypothesis posits that the computed entropy value mirrors the extent of interconnectedness among different sectors of the economy, rather than indicating the level of economic complexity.

Theoretical foundations of entropy

The concept of entropy was initially introduced by the German physicist Rudolf Clausius in 1865. Clausius (Clausius R., 1934, pp. 130-159) revolutionized the understanding of thermodynamics by substituting the word "transformation" with the ancient Greek term "entropy," thereby offering a fresh formulation of the Second Law of Thermodynamics: "Entropy remains constant in a closed reversible process." Expanding upon this principle to encompass natural changes, Clausius proposed that "the entropy of the universe tends towards maximum," consequently hypothesizing the eventual "heat death of the universe." Ludwig Boltzmann furthered the application of entropy in thermodynamics by linking it to probability theory. According to Boltzmann, the entropy of a system in certain states is proportionate to the logarithm of the probability of that state. In 1900, Max Planck formalized Boltzmann's concept of entropy, providing it with a definitive mathematical expression.

$$S = kln(\Omega) \quad (1)$$

where S is the entropy, k is a constant, and Ω is the thermodynamic probability.

In 1929, Leo Szilard's article titled "On the Reduction of Entropy by the Intervention of a Thinking Being in a Thermodynamic System" was published. In this seminal work, Szilard proposed that a system comprising a small number of molecules could experience an increase in its level of organization through the intervention of a thinking being, who provides information. This concept highlighted a fundamental distinction between information entropy and thermodynamic entropy (Davtyan G., 1981, pp. 138-145).

The concept of entropy undergoes further development in cybernetics and information theory, where it becomes intricately linked to the notion of information. In this context, any information is acquired through the minimization of entropy. Information entropy serves as a metric for quantifying the level of uncertainty regarding the state of a system. Consequently, there arises a need to measure entropy. Claude Shannon addresses this need by proposing the following formula for measuring the entropy, denoted as H(a), of a physical system:

$$H(a) = -\sum_{i=1}^{k} p(A_i)\, log\, p(A_i) \quad (2)$$

where A_1, A_2,... A_k are the possible states of the physical system or the possible outcomes of any experiment, and , $p(A_1)$, $p(A_2)$..., $p(A_k)$ are the probabilities of being in those states or the outcomes occurring.

In the realm of contemporary information technologies, it is fitting to use a base-2 logarithm, as binary digits (0 or 1) can be stored in the memory cell of a calculator operating on a binary principle with equal probability (Nalchajyan T. & Nalchajyan V., 2017, p. 10). According to Shannon's formula, the entropy of the system would be calculated as (Shannon C., 1966, p. 245):

$$H(a) = -\left(\frac{1}{2}log_a\frac{1}{2} + \frac{1}{2}log_a\frac{1}{2}\right) = log_a 2 \quad (3)$$

When using a base-2 logarithm, the uncertainty level corresponds to 1. In this context, uncertainty is quantified in bits. Specifically, 1 bit represents the uncertainty of a system that can exist in either of two distinct states with equal probability.

Nicholas Georgescu-Roegen's (Georgescu-Roegen N., 1971) work "The Entropy Law and the Economic Process" provided a rationale for the utilization of entropy in economics. The author posited that all natural resources utilized in economic endeavors undergo irreversible degradation, resulting in a decline in the Earth's capacity to satisfy human needs. This phenomenon, according to Georgescu-Roegen, will inevitably culminate in humanity's extinction. Due to the physical degree of entropy (decreasing system order and increasing uncertainty), such an approach was called "entropy pessimism". Previously, Kenneth Boulding (Boulding K., 1966, pp. 3-14) proposed examining the relationship between the economy and the environment through the lens of thermodynamic laws. According to the second law of thermodynamics, also known as the law of entropy, achieving 100 percent secondary recycling of waste is unattainable. A portion of waste inevitably accumulates because it cannot be transformed into new resources. Consequently, Boulding emphasized the importance of directing all efforts towards minimizing waste generation and maximizing its secondary processing. In alignment with this line of reasoning, Herman Daly (Daly H., 1991, pp. 180-194) advocates for the concept of a steady or static economy, which stands in contrast to the notion of perpetual growth. Daly argues that in a steady-state economy, the output of energy and resources is harmonized with the environment's capacity to absorb waste and replenish resources. Conversely, an economy predicated on ceaseless expansion will inevitably deplete resources and degrade the environment, driven by the escalation of entropy stemming from production processes.

Sieniutycz and Salamon's (Sieniutycz S. & Salamon P., 1990) work, "Finite Time Thermodynamics and Thermoeconomics," delves into thermoeconomics as an alternative economic doctrine that integrates the principles of statistical mechanics into economics. Additionally, in 2021, Barclay Rosser (Rosser B., 2021, pp. 1-15) examined the correlation between econophysics and the law of entropy as the fundamental underpinning of economic phenomena. The paper elucidates how the interplay between entropy and anti-entropy can influence various aspects, such as the dynamics of business cycles, financial markets, and income distribution.

Skolka (Skolka V., 1964) and Theil (Theil H. & Pedro U., 1967, pp. 451-462) explored the application of entropy measures in Leontief's input-output tables in their works. Specifically, Theil examines entropy as a metric for capturing the uncertainty or

information content inherent in economic data. Additionally, Batten's (Batten D., 1981) research demonstrates the utilization of the maximization of entropy paradigm, in its conventional form, within the realm of spatial and extraspatial analysis of costs and outcomes. When discussing input-output spatial analysis, special attention is paid to orthogonal and dynamic extensions of Leontief's original model, proposing a simple aggregation scheme based on the minimum information loss criterion. Given the limitations of static formulations in depicting aggregate interregional flows between sectors, Leontief's dynamic model proves instrumental in addressing this challenge.

Zwick and Heiat (Zwick M. & Heiat A., 1982, pp. 266-268) proposed applying Shannon's entropy index to various components of technical coefficient matrices, interdependence coefficients, the final demand vector, and other facets of cost-output tables. These entropy indices function as metrics for assessing different forms of economic diversity. The significance of these indicators for economic planning and analyzing the structural complexity of the economy and its evolution is emphasized.

Zachariah and Cockshott (Zachariah D. & Cockshott P., 2017, pp. 1-9) introduced a methodology for quantifying the complexity of multi-sector economies of countries, drawing on Shannon's entropy concept. Adopting V. Leontev's perspective, which defines the production process as a circular flow, they examined the national economies of seven countries and formulated the process using a Markov chain approach. The complexity of the economy, as derived from their research, is characterized by the average number of bits required to encode the flow of goods and services within the production process. The article faces several fundamental limitations: 1) Calculations for individual countries are conducted based on data from different years, leading to potential inconsistencies. 2) The branch structure of the national economies across countries does not align, which may impede meaningful comparisons. 3) Quantitative comparability is compromised as the branches within the national economies of the countries are not standardized.

We contend that comparing the complexity of different economic systems solely through an assessment of economic system complexity is inherently flawed without aligning the sectoral structures of the countries involved. Meaningful insights into the similarities or differences between these economies cannot be gleaned otherwise. Every qualitative change in systems manifests quantitatively, but for this quantitative measure to accurately reflect the qualitative changes in systems and facilitate comparative analysis, it's imperative that certain states of systems are measured using consistent methodologies. Accurate comparison of two phenomena necessitates an appropriate common basis of comparison, which is lacking in this case. The discrepancies in methodology highlighted by the authors underscore the inherent limitations of the paper.

In contemporary times, economic complexity serves as a gauge of a country's development and diversification of production capacity, typically assessed through the composition of its export basket. We argue that calculating entropy using Leontief's input-output tables is inadequate for characterizing economic complexity. This is because Leontief's tables represent circular processes, and entropy calculated using Shannon's formula does not inherently reflect the level of development, scientific advancement, or diversification within the system. Even without formal calculation, it's evident that economic complexity entails more than just the variety of branches. It's worth noting that the definition of economic complexity, as described, has been circulating in scientific

discourse since 2009. However, contemporary assessments of economic complexity often employ different methodologies, such as the Economic Complexity Index.

When entropy is calculated using a logarithm base of 2, increasing entropy by 1 unit is equivalent to doubling it. Consequently, even a small deviation in entropy can lead to a significant disparity between economies of different countries. However, the authors, while analyzing data for the 1990s of various countries, fail to ensure the quantitative relevance of clear temporal and sectoral structures. Despite this, they note that the entropy levels in the 1990s are comparable among developed industrial countries.

Based on the considerations outlined above, our calculations ensure the comparability and consistency of data. We utilized data from the same time period and included identical economic sectors in the analysis for all countries. The data was sourced from the Organization for Economic Co-operation and Development (OECD), which offers uniform information across represented countries. In essence, the calculations for all countries were conducted using the same methodology, ensuring a standardized approach to the analysis.

Research methodology

To comprehensively depict the relationships among the branches constituting the economic system, the final production within each branch is preceded by the flows of goods and services exchanged between that branch and others. In 1936, the American economist Wassily Leontief pioneered the compilation of input-output tables, also known as inter-branch balance tables. To illustrate the composition and structure of these tables, let's employ the following designations:

- x_i, gross output of i-th industry
- y_i, the volume of output released in the i-th branch, which is intended for final consumption in the non-production sector
- x_{ij}, the volume of output of the i-th branch that is consumed during production in the j-th branch

Table 1

Input-output table for an economy consisting of n industries branch (Leontief W., 1986, p. 168)

	INTERSECTORAL FLOWS						Final consumption	Total Products
	branch 1	branch 2	...	branch j	…	branch n		
branch *1*	x_{11}	x_{12}	…	x_{1j}	…	x_{1n}	y_1	x_1
branch *2*	x_{21}	x_{22}	…	x_{2j}	…	x_{2n}	y_2	x_2
...	…	…	…	…	…	…	…	...
branch *i*	x_{i1}	x_{i2}	…	x_{ij}	…	x_{in}	y_i	x_i
...	…	…	…	…	…	…	…	...
branch *n*	x_{n1}	x_{n2}	…	x_{nj}	…	x_{nn}	y_n	x_n

Initial investment	z_1	z_2	…	z_j	…	z_n	
Total. investment	x_1	x_2	…	x_j	…	x_n	

The rows of the table display the gross output of each industry and how that output is utilized by all industries. Conversely, the columns represent the investments made by all branches into the output of the specified branch. The balanced nature of the table is characterized by the following condition being applicable to any branch:

$$x_i=x_{i1}+x_{i2}+...+x_{in}+y_i \quad (4)$$

Currently, such tables are compiled for 71 branches of the economy in the US every year (Input-Output Accounts Data, 2024).

There are 2 main methods of calculating entropy in the input-output table.

1. Calculation of entropy using direct cost coefficients,
2. Calculation of entropy using full cost coefficients (Zwick M. & Heiat A., 1982, pp. 266-268).

Denote $a_{ij}=\frac{x_{ij}}{x_j}$. This ratio denotes the cost incurred by the i-th branch to produce one unit of currency or one unit of output in the j-th branch, or the quantity of output from the i-th branch in the j-th branch. These ratios are referred to as direct cost ratios.

We can express the Leontief model in matrix form as follows:

$$X = AX + Y \quad (5)$$
$$(I - A)X = Y \quad (6)$$
$$X = (I - A)^{-1}Y \quad (7)$$

X represents the vector of gross output, Y signifies the vector of final consumption, A stands for the matrix of direct cost coefficients, and I denotes the unit matrix of order n. Let's denote: $D=(I - A)^{-1}$: Let's denote the elements of matrix D as d_{ij}, which indicate how much the volume of gross product in the i-th branch should increase if the final consumption of the j-th product is increased by one unit[1]. These d_{ij}'s are referred to as full cost ratios. After normalizing all rows of matrix D such that the sum of elements in each row equals 1, we obtain a new matrix, B_H. Using this matrix, we can calculate the entropy of each sector using the following formula:

$$H_j = -\sum_{i=1}^{n} b_{ij}\, log_2\, b_{ij}, \quad (8)$$

where

$$b_{ij} = \frac{d_{ij}}{\sum d_{ij}}$$

[1] As a result of the derivation of the equation $x_i=d_{i1}y_1+\ldots+d_{ij}y_j+...+d_{in}y_n$ by y_j, we get d_{ij}.

One can also compute a higher-order entropy for the entire economy:

$$H = -\sum_{j=1}^{n} H_j \, log_2 \, H_j \, , \quad (9)$$

where H_j is to be normalized. The magnitude of H_j increases when there are fewer non-zero elements in each row of matrix B and these elements are similar in size. Here's what it means: If there are no zero elements in the B_H matrix, it indicates complete interconnectedness among all branches of the economy, due to the significance of b_{ij} elements. If $b_{ij} \neq 0$, an augmentation in the final consumption of the j-th branch is contingent upon an increase in the gross output of the i-th branch. If these elements are closely matched in magnitude, the interdependencies among branches are equally evident, resulting in a higher entropy for the entire economy as a measure of their interconnectedness.

Entropy calculation for analyzing the diversity of product and service flows can be done using direct cost ratios. Both input and output entropy can be defined for each branch:

$$H_j^{input} = -\sum_{k=1}^{n} a_{kj} \, log_2 \, a_{kj} \quad (10)$$

$$H_j^{output} = -\sum_{k=1}^{n} a_{jk} \, log_2 \, a_{jk} \quad (11)$$

A sector with high output entropy contributes more diversely to the economy compared to a sector with low entropy.

Results

In our research, we analyzed the entropy of the economies of nine randomly selected countries from 2005 to 2015. This period was chosen to examine the impact of the global economic crisis of 2008-2009 on the entropy of these countries' economies.

Leontief's input-output table, which provides insights into the economies of the countries, consisted of 36 branches for all countries during the considered period (Input-Output Tables (IOTs), 2021 ed.), serving as the foundation for comparisons. Our objective was to determine whether entropy accurately reflects the economic reality and to evaluate how the interdependence among economic branches changes due to asymmetric processes within each country's economy.

We utilized the matrix of total cost ratios as the foundation for calculating entropy. This choice was driven by the fact that changes in the relationships between branches, stemming from ongoing developments in information and communication technologies within both the real and financial sectors of the economy, are captured in the matrix of total cost ratios. The findings of our study are detailed in Table 2.

Table 2

Economic entropy of countries in 2005-2015 (*Source:* Developed by the authors)

Year	India	China	Australia	South Africa	USA
2005	5.096672905	5.117259564	5.114269934	5.111861524	5.107095605
2006	5.09876344	5.117632133	5.1116781	5.110095537	5.105424932
2007	5.098191907	5.113310265	5.108362625	5.108194685	5.101727284
2008	5.099447733	5.113945703	5.112247239	5.108377411	5.099238008
2009	5.103907792	5.112651814	5.113214141	5.116832058	5.088330952
2010	5.097108133	5.10745469	5.112136847	5.112780889	5.114982399
2011	5.099021941	5.10928829	5.112667518	5.109908654	5.114957025
2012	5.098264819	5.108389538	5.117064203	5.108094638	5.09184516
2013	5.096259683	5.106886532	5.113739748	5.108214749	5.092043901
2014	5.094948008	5.105986893	5.113610687	5.108162581	5.093672294
2015	5.104494145	5.109304762	5.118046809	5.108450847	5.09132977

Table 2

Economic entropy of countries in 2005-2015 (cont.)

Year	Luxembourg	Russian Federation	South Korea	Japan
2005	5.067647919	5.106793367	5.11441856	5.10909184
2006	5.067012283	5.110269971	5.116082744	5.110150847
2007	5.072221737	5.109246567	5.116123294	5.110762337
2008	5.076759953	5.110247014	5.116774785	5.112366142
2009	5.077335451	5.1108088	5.119501355	5.110306551
2010	5.084195319	5.111368893	5.118263671	5.111316816
2011	5.083890635	5.113657117	5.118607523	5.111986745
2012	5.088572472	5.111947614	5.118768269	5.110842386
2013	5.092401349	5.112528076	5.119729876	5.11142607
2014	5.093769933	5.113573232	5.116183386	5.112336164
2015	5.096358542	5.121909724	5.114065112	5.111402637

Figure 1

Economic entropy of countries in 2005-2015 (*Source:* Developed by the authors)

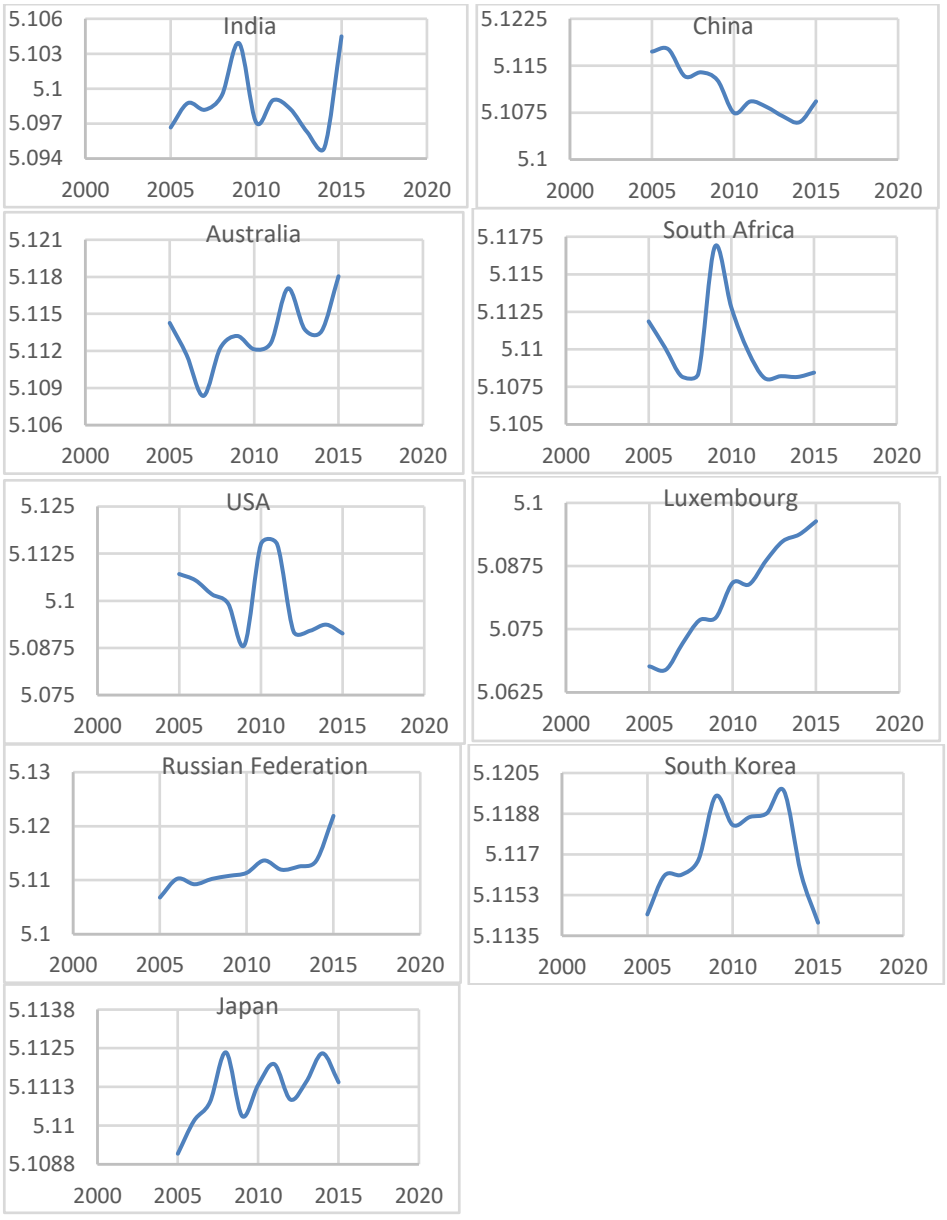
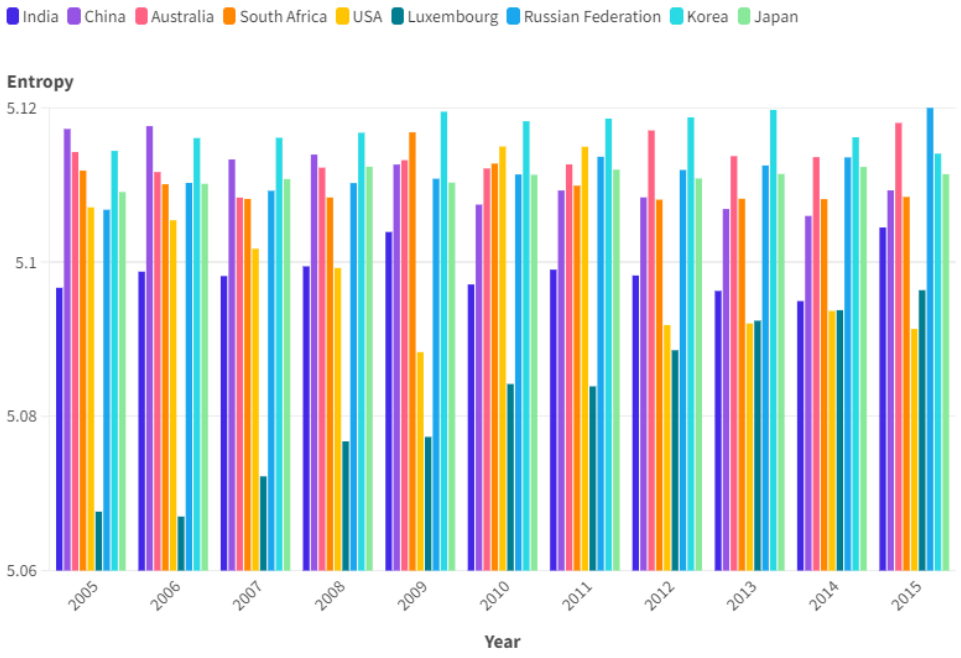


Figure 2

Economic entropy of countries (*Source:* Developed by the authors)



The period under consideration encompasses the global financial and economic crisis of 2008, which left its mark on the entropy of countries. In specific instances, entropy exhibited significant fluctuations, influenced by economic, political, social, and other factors within each country.

A high entropy value indicates a complex and diversified economic structure, necessitating a broad array of inputs from various sectors to meet final demand. Conversely, a lower entropy value signifies a more centralized economic structure, with fewer sectors contributing to final demand satisfaction. This indicates a heightened level of interdependence among economic sectors.

As depicted in the graphs, entropy experienced a notable increase across all countries in either 2008 or 2009, attributed to a sharp global demand downturn, disruptions in trade finance, and a general economic downturn impacting both exports and imports. Consequently, the level of interdependence among industries within the economy inevitably rose, as local production replaced imports.

The United States, being the epicenter of the crisis, witnessed significant shifts in its trade balance due to diminished exports and imports, stemming from sharp declines in consumer spending and industrial production. However, the level of interdependence among economic sectors peaked in 2011.

In Australia, entropy surged to a peak value in 2012, exhibiting an upward trajectory until that point. As the EU is one of Australia's largest trading partners, the European

debt crisis contributed to this trend by inducing heightened uncertainty, increased volatility, and alterations in trade patterns. These factors collectively bolstered the interdependence among domestic sectors. Additionally, natural disasters such as floods and forest fires in 2012 further exacerbated the increase in entropy.

Meanwhile, entropy in Russia peaked in 2015. During this period, Russia encountered substantial economic challenges, including a sharp decline in oil prices, resulting in deteriorating terms of trade. Given Russia's heavy reliance on the export of natural resources, this downturn had a significant impact. Moreover, geopolitical tensions starting in 2014 prompted economic sanctions, particularly those imposed by the European Union, which restricted investments in various sectors such as infrastructure, transportation, telecommunications, energy, as well as oil, gas, and mineral extraction.

When analyzing the evolution of Luxembourg's economic structure, a notable trend emerges. In the early 2000s, the economy exhibited a higher level of concentration, with a few dominant sectors such as industry and financial services. However, from 2004 onward, the government initiated efforts to diversify the economy across five main areas: information and communication technology, logistics, space industry, biotechnology, and eco-technology.

Significant investments in technology ensued, leading to the establishment of a robust technological infrastructure. Consequently, Luxembourg emerged as a frontrunner in the realm of digital technology. This transformative shift is vividly depicted in the entropy graph of the country, illustrating a steady increase in the interconnectedness of its economic sectors year after year.

In Japan, entropy peaked in 2011 and 2014. In 2011, a devastating 9.0 magnitude earthquake and subsequent tsunami struck off the east coast, resulting in the destruction of a nuclear power plant in Fukushima Prefecture. These catastrophic events necessitated a coordinated response from various economic sectors to facilitate the country's recovery.

As a consequence, the level of interdependence among economic branches surged, as concerted efforts were required across sectors to address the aftermath of the disaster and restore economic stability.

Conclusions

- Entropy, as an economic metric derived from the coefficients of total costs in Leontief's input-output tables, signifies the degree of interconnectedness among different branches of the economy. It's important to note that entropy does not encapsulate the complexity of the economy, which involves the computation of multi-dimensional characteristics of economic systems. Our hypothesis is confirmed.
- Natural disasters and financial crises in countries typically result in heightened interconnections between economic branches rather than weakening them. This phenomenon often translates into elevated entropy values, indicating increased interconnectedness within the economic system.
- Countries with economies concentrated in specific branches or specialized in particular areas tend to exhibit lower entropy values. Conversely, countries boasting diversified and complex economies typically display higher entropy values, reflecting the heightened interconnectedness among various sectors.

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ASSESSMENT OF THE SHADOW ECONOMY AND TAX EVASION IN RA

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Abstract: This article aimed to assess the shadow economy and tax evasion in Armenia applying the indirect method of Currency Demand Approach (CDA). As the macroeconomic indicators in our analysis are not stationary at the same degree, we have used the autoregressive distributed lag (ARDL) models and the co-integration test showed that there exists a co-integration between the model variables, therefore it is possible to use the CDA.
In the model have been used monthly data during the 2013-2023 period. We can conclude that the CDA method can be considered to be an appropriate method for measuring the shadow economy and tax evasion in the RA's economy. The results of the research show that during the observed years the level of the shadow economy and tax evasion are decreasing, which means that government is increasingly recognizes the importance to constrain the shadow economy given its connection to issues such as loss of tax revenues.

Key words: *shadow economy, tax evasion, currency demand approach, distributed autogression model, long-term effects*

Introduction

Currently, proper analysis and evaluation of the shadow economy, tax evasion, or tax burdens (tax/gdp) are essential for a number of countries. Obviously, the shadow economy cannot be completely eliminated, but it can be reduced by improving legislation and developing more effective methods. Researches by the different authors suggest that the tax burden is the factor that can be used to represent and explain informal actions in the economies because it can be measured in quantitative terms.

We can mention that there are two groups of methods concerning the assessment of the shadow economy: direct and indirect. Generally direct methods are private and public inquiries that target non-formal busy people to discover their shadowy incomes. At the analytical level, indirect methods based on macroeconomic modeling are of the greatest interest. More common indirect methods are Multiple indicators, multiple causes (MIMIC) (Frey B., Weck-Hanneman H., 1983, 23-44) and Currency Demand Approach (CDA) (Tanzi V., 1980, 427-453). This method has been used by Cagan for the first time, who assesed the shadow economy of the USA between 1919-1955. He calculated

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the correlation for the currency demand and the ratio of tax on gdp. He concluded that if the ratio of tax/gdp gets higher then the currency demand relation to broad money also increases (Cagan, P., 1958, 302-328).

In the basis of the Currency Demand Approach is the demand for money in circulation, where it is assumed that the demand for money in circulation can be an indicator of the underground economy. When there are rates for the taxes, people tend to go into the underground economic activities and as a result of which the volume of tax evasion increases. According to this approach the taxpayers who are involved in the underground economy use cash in their transactions to evade taxes on their underground economic activities (Amoh J., Babonyire A.,2019., 626-645).

As for the evaluation of the shadow economy in Armenia, then IMF represents the following: the size of shadow economy using the PMM (Predictive Mean Matching) method has been equal to 19.5% and 42.6% by MIMIC method over the 1991-2015 (Medina L, Schneider F., 2021, 11-70). By another assessment the shadow economy's size relative to official GDP in Armenia (Eilat Y., Zinnes C., 2000, 28-30) using the modified total electricity (MTE) approach was 31-65 % in 1990 -1997 (Eilat Y., Zinnes C., 2002, 1233-1254). As specified by to the estimates of the World Bank's Structural equation model's MIMIC Method during 1999-2007 period the shadow economy's size has been equal to 44% in average (Schneider F., Buebn A., & Montenegro C., 2010, 17-22). According to the Luys foundation the shadow economy from the perspective of the tax system over the period 2001-2009 was characterized by a tangible shadow economy of 55 -65 percent of GDP, after which the average size rapidly decreased to 28 percent in 2018 ("LUYS" foundation., 2020, 32-34).

The econometric model

The aim of our study is to try to estimate tax evasion from the size of the shadow economy on the basis of the currency demand model, which has been developed by Tanzi (1980, 1983). In reality this method has been used in 1976 to estimate underground economy in the US (Tanzi V.,1979, 283-305).

In his study Tanzi assumed that the income tax rate, proportion of wages and salaries in national income, the interest paid on saving deposits and the per capita income can influence on the ratio of the currency in circulation to money supply. The equation is:

$$ln(C/M_2)_t = \beta_0 + \beta_1 \ln(1+TW)_t + \beta_2 \ln(WS/Y)_t + \beta_3 \ln(R)_t + \beta_4 \ln(Y/N)_t + \mu_t$$

where, C/M_2 is the ratio of currency in circulation to broad money supply, TW is the weighted average income tax rate, WS/Y is the proportion of wages and salaries in national income, R is the interest paid on saving deposits, Y/N is the per capita income and ln denotes the natural logarithms.

Based on the currency demand approach (Tanzi (1980, 1983)) we can represent the procedure of the calculation of the shadow economy and tax evasion by the following steps:

- It is used the (2) equation for deriving the predicted values for currency demand with tax/gdp ratio as a variable in the model, $ln(C/M_2)_t$
- Then it is necessary to calculate the ratio of currency in circulation to broad money supply without tax/gdp ratio, by setting $\ln(tax/gdp)_t$=0, taking the other variables constant, $ln(C/M_2)'_t$
- To estimate the volume of the illegal money in the economy we should have this

difference: $(ln(C/M_2)_t - ln(C/M_2)'_t)$

- In this step we compute the illegal money in the economy by multiplying the difference by the expanded money supply: $IM_t = (ln(C/M_2)_t - ln(C/M_2)'_t)$ x M_2. This is done as in the currency demand approach it is thought that additional money in cash will be demanded for the illegal activities since tax duties have been increased.
- Now it is calculated the demand for legal money: $LM_t = M_t - IM_t$.
- Here we need to compute the velocity of money in circulation, which is done by dividing nominal GDP by the value of legal money: $V_t = GDP_t/LM_t$
- As it is considered that the velocity of money in the shadow economy is equal to the velocity of money in legal economy, the size of the shadow economy is obtained by multiplying the velocity with illegal money: $SHE_t = V_t\, x\, IM_t$.
- Finally, it was assumed that we have the same ratio of tax/gdp in the shadow economy as in the legal economy. Therefore, we have multiplied tax/gdp by the estimated size of the shadow economy for finding an assessment for the tax evasion (TE) during the study period.

To obtain an evaluation with the methodology described, we first need to evaluate the ARDL (distributed autogression model), because the observed series becomes standardized after using an I(1) and an I(0) operator. ARDL models are models of time series in which both dependent and independent variables are interconnected not only during the appropriate period but also in historical values (Nkoro E., Aham U.,2016, 63-91).

Results and findings

We have used monthly data for 2013-2023 period to study shadow economy and tax evasion in Armenia as the dates has been available for the mentioned period. The data have been taken from the Central Bank of Armenia, Statistical Committee of Armenia and State Revenue Committee of the RA. After a number of modifications, we've adapted this approach and specified the following econometric model:

$$ln(C/M_2)_t = \beta_0 + \beta_1 \ln(el)_t + \beta_2 \ln(fs)_t + \beta_3 \ln(tax/gdp)_t + \beta_4 \ln(rex)_t + \ln(trade)_t + \beta_6 \mathrm{d\_Cd} + \mu_t \quad (1)$$

where C/M_2 is the ratio of currency in circulation to broad money supply, el is the volume of the electricity consumption cost for the population, fs is the ratio of normative total capital to risk-weighted assets, tax/gdp is the ratio of taxes on gdp, rex is the effective real exchange rate, $trade$ is the volume of the trade in gdp, d_Cd is the first difference of the currency in circulation, and ln is the natural logarithms of the indexes.

We have test the stationarity of variables through the Augmented Dickey–Fuller (ADF) test, which resalts are presented in Table 1, it was found that some of them were stationary at level I(0), and some were stationary on the first difference I(1), so we should assess the ARDL.

Table 1

The results of the ADF Unit Root Test

Variable	Calculated value	Critical value	Degree of stationarity	Level of significance
Ln (C/M)	-10.4	-3.5	I (1) **	1%
Ln (el)	-3.8	-3.5	I (1) **	1%
Ln (fs)	-9.5	-3.5	I (1) **	1%
Ln(tax/gdp)	-6.5	-2.9	I (1) *	5%
Ln (rex)	-10	-2.9	I (1) *	5%
Ln (trade)	-2	-1.6	I (1) *	10%
D_cd	-12	-3.5	I (0) *	1%

*without intercept and trend; **with intercept.

Source: Developed by the author.

Table 2

ARDL Bounds - test for cointegration

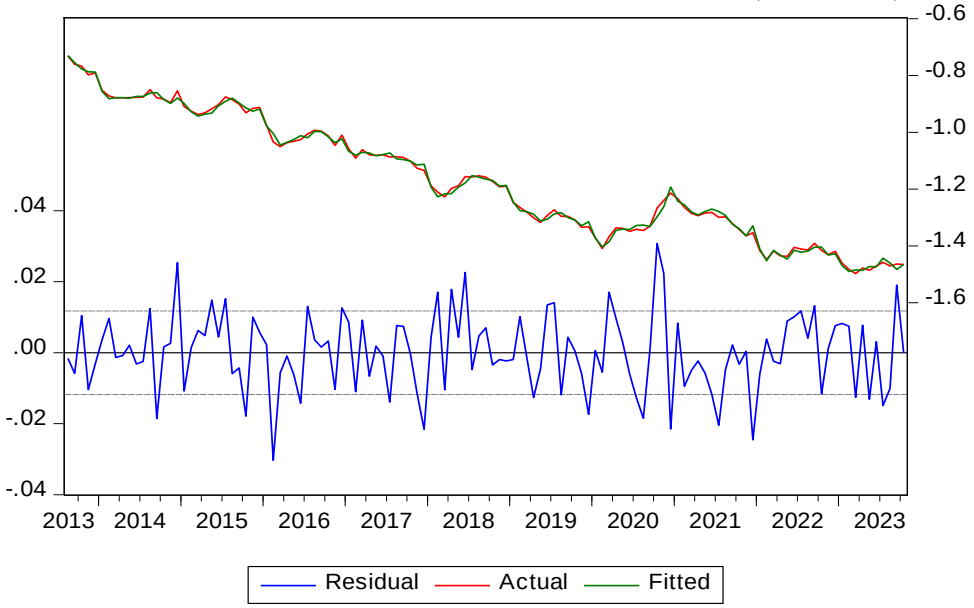
F-Bounds Test				
Test Statistic	Value	Significance	I (0)	I (1)
F-statistic	31.396	10%	1.99	2.94
-	-	5%	2.27	3.28

Source: Developed by the author.

The ARDL models evaluate the short-term interactions between variables. We have assesed ARDL(1,0,1,0,3,7,0) for the described CDA and the residuals, actual and fitted values are presented in the Figure 1.

Figure 1

The residuals, actual and fitted values of estimated ARDL(1,0,1,0,3,7,0)



Source: Developed by the author.

After verifying the appropriate hypotheses of the evaluated model's errors, to evaluate the size of the shadow economy and tax evasion, it is also necessary to evaluate the long-term effects through the following cointegration equation:

$$\ln(C/M_2) = -0.249 * \ln(el) - 2.039 * \ln(fs) + 0.347 * \ln(tax/gdp) + 1.352 * \ln(rex) - 1.728 * l(trade) - 21.794 \quad (2)$$

The evaluations of independent variables used in (2) are given in the Table 3, where beside the electricity all the variables are significant because the probablities are smaller than 0.05, so variables are essential to the dependent variable in the long-term.

The tax/gdp coefficient is positive, which shows that when the tax burden increases it leads to an higher demand for currency for the purpose of carrying out commercial transactions in cash and to avoid registered banking transactions for the purpose of tax evasion. The coefficient of the financial stability (fs) is negative, which means that improving financial stability can reduce the demand for cash and expand the commercial operations through banks. The effective real exchange rate has a positive effect on the demand for money as an increase in the exchange rate showes a need for a greater amount of money for different transactions. As about trade then the relation is negative, which may be of the fact that in the last years, the large-scale trade in RA is done by the non-cash methods. Like the trade in recent years population pay for the electricity consumption mostly by the non-cash methods. Finally, the effect of the variables that we have not included in the assessment is negative.

Table 3

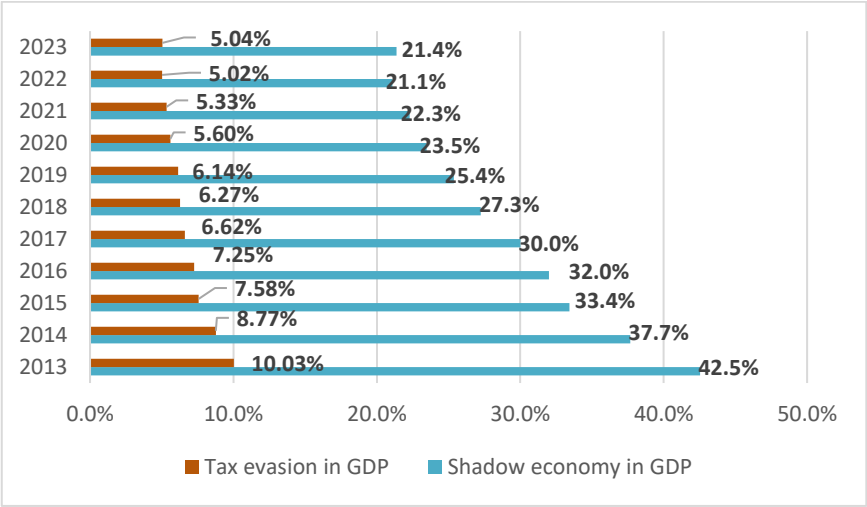
Estimated long-run elasticities using ARDL

Levels Equation Seleced model ARDL (1,0,1,0,3,7,0) Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
Ln(el)	-0.249113	0.368923	-1.67524	0.08
Ln(fs)	-2.039386	0.741172	-2.75156	0.00
Ln(tax/gdp)	0.346994	0.297204	2.167526	0.04
Ln(rex)	1.352714	0.558529	2.421921	0.02
Ln(trade)	-1.728280	0.432175	-3.99902	0.00
D_cd	0.00000	1.25E-05	2.665799	0.01
C	21.79348	6.542598	3.331013	0.00

After assessing (2), we take the appropriate steps to calculate the size of the shadow economy and tax avoidance. As we see from the chart, we have a decrease in the volume of the grades during 2013-2023, the volume of the shadow economy was 42.5 percent of GDP in 2013, by 2023, 21.4 percent, it is remarkable that in 2022 it was 21.1 percent and tax evasion volume was 10.03 percent and 5.33 percent respectively. Noticeably. Just in case, we can say that this is the result of good tax administration and the appropriate institutions have been able to effectively manage tax compliance in the economy.

Figure 2

Shadow economy in GDP and Tax evasion in GDP in 2013-2023



Source: Developed by the author.

Conclusion

As we have already seen in our study the CDA method can be considered to be one of the most effective approaches for measuring the shadow economy and tax evasion in the RA's economy. Also, it takes into the account the nature of its assumptions which gives an opportunity to make the model framework more useful and to represent real economic relations.

Based on the results of the research we found out that during the 2013-2023 years the size of the shadow economy and tax evasion in our economy has been decreased, which is the evidence of the improvement of the tax administration and many activities of government. Moreover, we can observe that the persistent problem of loss of the tax revenues and the shadow economy is in the process of the research and analyzing for the government. Therefor, the appropriate institutions are able to find different ways to achieve optimal and effective results concerning this problem, which face many developing countries.

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