

Assessment of Territorial Disparities in the Context of Socio-Economic Development of the Country: The Case Study of Armenia

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Abstract

Territorial inequality is a serious obstacle to the socio-economic development of any country. Therefore, to reduce poverty, unemployment, and improve the well-being of the population, not only the intensification of economic activity in the country is needed, but also the provision of its territorial inclusion. However, as natural and scientifically explicable these causes are, their consequences are undesirable, exacerbating tensions in all spheres of public life and giving rise to instability, crises, unemployment and poverty.

At the same time, the deepening of territorial disparities is even more worrying in developing countries and countries with economies in transition, where disproportionate territorial economic development, in the absence of funding, also leads to social stratification.

The article discusses the territorial disparities of the Republic of Armenia in the context of socio-economic development. In order to reveal the existing asymmetries between the capital Yerevan and other regions, we have developed a system of socio-economic indicators, on the basis of which sectoral indices have been calculated for the whole country, as well as for its separate regions. Then, the mentioned system of indicators was used for cluster analysis by regions, as a result of which they were classified into 4 main groups.

Keywords: Regions, regional development, territorial disparities, socio-economic indicators, regional development index, sectoral indices, cluster analysis, Armenia,

JEL classification: R1, C38, I31

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1. Introduction

Asymmetries in the territorial development of the economy are, in fact, typical for all countries. They are conditioned by various factors, from geographical, climatic, demographic factors to free competitive processes in the market economy.

In each country, as well as in its certain regions, the level and quality of life of people is determined by socio-economic development. In recent years, the concept of "quality of life" has taken a firm place in public opinion and scientific circulation. The growing interest in the problem of the quality of life indicates that human society is currently concerned not so much with survival as with sustainable socio-economic development. Scientific and practical interest in the category of "quality of life" is

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due to the ongoing process of globalization, which dictates the need for modern states to create decent living conditions that imply balanced territorial development. As we already know, imbalances in territorial development are more typical for developing countries where they also lead to social problems. At the same time, the results of monitoring show that the post-Soviet countries are especially distinguished by unipolar development (a high level of concentration in the capital).

There are significant territorial asymmetries in Armenia. Most of the indicators point to deep-rooted, sometimes extreme asymmetries, which are caused by demographic trends (low natural growth, emigration, concentration of the population in the capital, etc.), economic potential, social problems (poverty, unemployment). There are significant differences in access to public services, especially in the field of healthcare and education, which has a very negative impact on the quality of life of the population (Territorial Development Strategy of the Republic of Armenia for 2016-2025). In Armenia, territorial differences in socio-economic indicators are more pronounced and problematic between regions and the capital city of Yerevan. Thus, from the point of view of economic development and social security, Armenia can be considered monocentric.

2. Literature review

In scientific research, normative legal acts and political documents, target attitudes towards the socio-economic development of the regions and the mechanisms for achieving them have a noticeable reflection. Regional development is understood as such a change in the set of indicators of its socio-economic state and the structure of the economy and life support, which leads primarily to an increase in the level and quality of life of the population. This concept includes economic growth (GRP), growth of GRP per capita, growth of incomes of the population, development of the social sphere, development of infrastructure, growth of the level and quality of human capital (Feofilova, 2014, pp. 162-163).

The monitoring of socio-economic level is determined to seek the effects of implementation of strategic and planning documents at national, regional and local level. This information is used to promote the region, inform the public and is used as basis for the development. Particular problem of assessing the socio-economic level of regions, resulting mainly from the principle of ensuring sustainable development, is the issue of obtaining reliable data and evaluation selected indicators (Soltes, Stofkova, Kutaj, 2016, pp. 171-178).

From the point of view of assessing the level of socio-economic development, the task is to select indicators that more broadly reflect the real picture of the social life of the country (region), the standard of living of the population, the strengths and weaknesses of the economic system.

Approaches to the system of such indicators in the professional literature differ. So, I. Malganova and H. Zagladina consider the system of socio-economic indicators of territorial development from the point of view of the impact on the quality of life of the population (Malganova, Zagladina, 2015).

At the same time, they represent a “gross” index of quality of life with the following three subsystems:

1. *Social subsystem*: health, social security, education, leisure opportunities, culture and sports, information support, opportunities for individual development.
2. *Economic subsystem*: economic well-being (income), consumption of goods and services.
3. *Subsystem of the environment*: environmental conditions, weather and climatic conditions.

I.Maksimova and V.Molokanov assess the quality of life from the point of view of meeting various needs of people (Maksimova, Molokanov, Novikov, Pridachuk, 2016). In particular, the needs of consumption, education, health, employment, culture, security, access to information and in other areas describe the well-being of the population, and various indicators in each area allow us to quantify and assess the level of satisfaction of these needs.

S. Suspitsin proposes the following system of indicators of territorial socio-economic development (Nikolaev, Makhotaeva, 2014):

1. Indicators of economic development. Volumes and growth rates of production, structure of production costs, the tax burden, investment activity, etc.
2. Indicators of social development. The growth rates of the service sector, the level of employment and unemployment, indicators characterizing the income of the population and the structure of expenditures, indicators of social assistance.
3. General indicators. The level and factors of inflation, indicators of business development, indicators of economic regulation by local governments, etc.

In the EU, regional statistical analysis is carried out in the following main areas: economy, income, demography, education, health, employment, business infrastructure, innovation.

3. Methodological approach

We have developed such system of indicators as a result of studying various approaches to assessing the socio-economic development of the country and its individual territories.

The system of socio-economic indicators was initially developed for three groups of countries (18 countries in total): developed countries, CEE countries, EAEU and neighbouring countries.

To make the above-mentioned problems more descriptive and measurable, the analysis was localized for the Republic of Armenia. The system of indicators developed by us includes 20 most important indicators characterizing the socio-economic development of the country, which are divided into 5 main sectoral groups: demographic, social, economic, educational and medical. These indicators are

calculated for the period 2001-2020. The data was obtained from the official sources of the RA Statistical Committee. The system of indicators for the indicated groups is presented in Table 1.

Table 1. System of socio-economic indicators for five main sectors.

Demographic	Social	Economic	Educational	Medical
Population	Poverty rate	Gross product	Number of pupils in general schools per 1,000 people	Doctors per 100,000 people
Population growth	Unemployment rate	Share of industry in gross product	Number of students in universities per 1000 people	Hospital beds per 1000 people
The ratio of women to men	Average annual wage	Share of services in gross product	Participation rate in universities (within 20-24 y.o. population)	Number of healthcare facilities per 100,000 people
Economic activity of the population	Consumer spending per capita	Personal income per capita		
	Household Internet Access	Employment concentration by sector (Herfindahl-Hirschman index)		

Source: The table was compiled by the author

The main goal of the study is to obtain weighting coefficients that characterize the relative importance of its components for each set of indicators, and to calculate, on their basis, sectoral indices of the country's socio-economic development. To ensure the comparability of indicators, they are included in the calculation with normalized values in the range [0; 1]. The first principal component method was used to calculate the weights of the indicators involved in calculating the coefficients.

At the same time, we consider it important to calculate individual sectoral indices instead of one general. This is due to the fact that when calculating with the method of the first principal component, indicators that have significant changes in time series acquire more significance, while relatively stable indicators are less important. For example, a health indicator that has grown significantly over the period under review may be of higher importance than another economic or social indicator that has shown relative stability. Therefore, we consider it more expedient

to conduct research in separate areas, since the indicators included in each sector are to some extent interrelated and demonstrate similar behaviour over time.

In the second part we've also conducted a cluster analysis to find out the existing "distance" between regions. The methodological basis of the analysis was the "nearest neighbour" method, the essence of which is that distances between regions are calculated according to the selected indicators, and the nearest regions are grouped into one group.

4. Conducting research and results

4.1 Assessment of territorial disparities in the RA

As a result of the analysis, weighting coefficients were calculated for each group of indicators. Table 2 shows the indicators involved in the calculation of the demographic index, with their resulting coefficients. There are also shown average coefficients for three groups of countries.

Table 2. Weighting coefficients of demographic indicators in Armenia and in the observed groups of countries.

Country	<i>Demographic indicators</i>			
	Population	Population growth	The ratio of women to men	Economic activity of the population
<i>Armenia</i>	<i>0.246</i>	<i>0.245</i>	<i>0.237</i>	<i>0.272</i>
<i>Average for developed countries</i>	<i>0.190</i>	<i>0.245</i>	<i>0.215</i>	<i>0.349</i>
<i>Average for CEE countries</i>	<i>0.282</i>	<i>0.239</i>	<i>0.235</i>	<i>0.244</i>
<i>Average for EAEU and neighboring countries</i>	<i>0.194</i>	<i>0.229</i>	<i>0.241</i>	<i>0.337</i>

Source: The calculations done by the author

The weighting coefficients of the demographic indicators in the Republic of Armenia are generally evenly distributed. Only the indicator of economic activity of the population is somewhat high. In terms of comparative analysis with groups of observed countries, the calculated coefficients are closer to the average values of the CEE countries.

In the case of social indicators, the values of the coefficients are evenly distributed for the last 3 indicators, while the coefficients calculated for unemployment and especially for the poverty rate are much lower (Table 3).

Table 3. Weighting coefficients of social indicators in Armenia and in the observed groups of countries.

Country	<i>Social indicators</i>				
	Pove rty rate	Unemploy ment rate	Aver age annu al wage	Consu mer spendi ng per capita	House old Interne t Access
<i>Armenia</i>	<i>0.039</i>	<i>0.212</i>	<i>0.250</i>	<i>0.252</i>	<i>0.247</i>
<i>Average for developed countries</i>	<i>0.184</i>	<i>0.097</i>	<i>0.243</i>	<i>0.225</i>	<i>0.251</i>
<i>Average for CEE countries</i>	<i>0.170</i>	<i>0.064</i>	<i>0.259</i>	<i>0.241</i>	<i>0.266</i>
<i>Average for EAEU and neighboring countries</i>	<i>0.118</i>	<i>0.171</i>	<i>0.247</i>	<i>0.256</i>	<i>0.207</i>

Source: The calculations done by the author

Comparing with the groups of countries under observation, it becomes clear that although they are not identical to the coefficients calculated in the Republic of Armenia, nevertheless, in all groups the last 3 indicators have gained more value, while the coefficients for poverty and unemployment rate are lower. And from individual countries, Canada and neighbouring Georgia have a similar distribution with Armenia.

From the economic indicators, the highest value of the coefficient obtained personal income per capita. The coefficients of the gross domestic product, the share of the sectors of industry and services are evenly distributed, and the Herfindahl-Hirschman index, which characterizes the concentration of employment in the sectors of economy, is lower (Table 4). A similar distribution of weighting coefficients of economic index exists in Kyrgyzstan.

Table 4. Weighting coefficients of economic indicators in Armenia and in the observed groups of countries.

Country	<i>Economic indicators</i>				
	Gross product	Share of industry in gross product	Share of services in gross product	Personal income per capita	Employment concentration by sector (Herfindahl- Hirschman index)
<i>Armenia</i>	<i>0.220</i>	<i>0.245</i>	<i>0.238</i>	<i>0.279</i>	<i>0.017</i>
<i>Average for developed countries</i>	<i>0.194</i>	<i>0.048</i>	<i>0.223</i>	<i>0.269</i>	<i>0.266</i>
<i>Average for CEE countries</i>	<i>0.216</i>	<i>0.137</i>	<i>0.142</i>	<i>0.256</i>	<i>0.249</i>
<i>Average for EAEU and neighboring countries</i>	<i>0.204</i>	<i>0.149</i>	<i>0.226</i>	<i>0.243</i>	<i>0.179</i>

Source: The calculations done by the author

The significance of the indicator of the number of pupils per 1000 people in the calculation of the educational index is higher. The number of students at universities has a relatively low ratio, and the share of the university participation rate is much lower (Table 5). Hungary has a similar distribution of educational indicators.

Table 5. Weighting coefficients of educational indicators in Armenia and in the observed groups of countries.

Country	<i>Educational indicators</i>		
	Number of pupils in general schools per 1,000 people	Number of students in universities per 1000 people	Participation rate in universities (within 20-24 y.o. population)
<i>Armenia</i>	0.401	0.310	0.289
<i>Average for developed countries</i>	0.297	0.344	0.359
<i>Average for CEE countries</i>	0.345	0.359	0.293
<i>Average for EAEU and neighboring countries</i>	0.350	0.311	0.338

Source: The calculations done by the author

In the healthcare sector, the weighting coefficient for the number of health facilities is higher, followed by the number of doctors and the number of hospital beds. A similar distribution is observed in the French health care system from the observed countries (table 6).

Table 6. Weighting coefficients of healthcare indicators in Armenia and in the observed groups of countries.

Country	<i>Healthcare indicators</i>		
	Doctors per 100,000 people	Hospital beds per 1000 people	Number of healthcare facilities per 100,000 people
<i>Armenia</i>	0.367	0.231	0.402
<i>Average for developed countries</i>	0.273	0.359	0.368
<i>Average for CEE countries</i>	0.264	0.366	0.370
<i>Average for EAEU and neighboring countries</i>	0.284	0.359	0.357

Source: The calculations done by the author

Thus, based on the weighted coefficients obtained as a result of the analysis, sectoral indicators of territorial socio-economic development are calculated. The calculation is made according to the following formula:

$$RDI = \sum_{i=1}^n a_i * x_i$$

where,

RDI - sectoral index of regional socio-economic development,

x_i - normalized value of the i -th index in the range [0; 1].

a_i - weighting coefficient of the i -th indicator.

Moreover, they were first calculated for the whole country to reveal the general trends recorded in each sector over the period (in this case, the calculation was based on indicators based on the central values (median) of the distribution series of individual regions). Then, sectoral indices were calculated for each region to discover the existing asymmetries between the regions and the capital.

Figure 1 shows the sectoral indices of the territorial development of the RA. In the period 2001-2020, socio-economic indicators registered significant growth. Thus, the social index increased from 0.06 conventional unit (c.u.) in 2001 to 0.93 c.u., having recorded a continuous growth. The economic index, despite insignificant fluctuations, also demonstrated monotonous growth, reaching 0.81 c.u.. The picture is different for other indices. In particular, the demographic index has declined. In 2008-2009, it fluctuated significantly, partly due to a change in statistical methodology, and then demonstrated relative stability.

The education index recorded some growth in 2004-2006, after which it declined until 2015. However, in recent years it has shown some stability with an upward trend.

Regarding healthcare system, we can say that there is a cyclical development. The entire period can be divided into 5 cycles, the curve of which underwent significant fluctuations, generally maintaining an upward trend.

Thus, the results of the analysis show that during 2001-2020 several socio-economic indicators in Armenia registered stable growth, while the situation is problematic in terms of access to healthcare and especially educational services. At the same time, due to the size of the population, some demographic indicators have also declined.

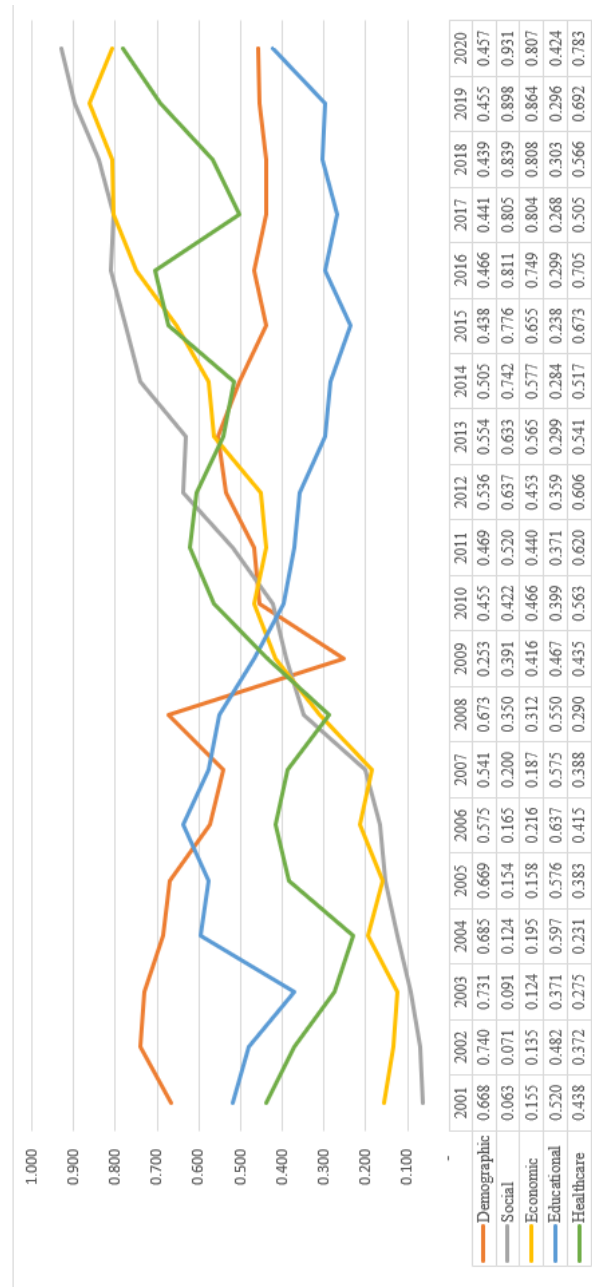


Figure 1. Sectoral indices of territorial development of the Republic of Armenia for 2001-2020*.

Source: The calculations done by the author on the bases of “Regions of the Republic of Armenia in numbers, 2001-2009”, “Regions of the Republic of Armenia and capital Yerevan in numbers, 2010-2020”

* Indicators for 2020 are based on estimates.

The analysis is more valuable in terms of identifying the asymmetries of territorial development. To do this, consider the sectoral indices calculated for each region.

The value of the demographic index is the highest in the capital Yerevan - 0.8 c.u. (2020), and the lowest in Gegharkunik region - 0.31 c.u.. The range of fluctuations of the index was 0.49 c.u., while in 2001 the same indicator was 0.29 c.u.. This means that there has been a displacement of the population to the capital and an increase in concentration. The value of the demographic index is also high in Armavir - 0.61 c.u., while in other regions there is a relatively even distribution (Table 7).

In the case of the social index, no pronounced monocentric development was found. The highest value was registered in Syunik region and in the capital Yerevan - 0.51 c.u., followed by Ararat region - 0.42 c.u.. In other regions, the value of the index is lower. The most backward regions are Tavush and Shirak. Meanwhile, in 2001-2020, the asymmetry deepened even more. The fluctuation range of the index has more than doubled (Table 8).

Monocentric development becomes more evident when calculating economic indicators. The index value is higher in the capital - 0.74 c.u., followed by Syunik region - 0.57 c.u.. In terms of economic development, Shirak and Tavush regions are far behind other regions. The difference between the maximum and minimum values of the index in 2020 was 0.5 c.u., which increased by about 65% compared to 2001 (Table 9).

In the education sector, there is also a significant concentration in the capital, which is especially noticeable in the field of higher education. This is explained by the fact that the attendance in most regions is very low, and in some regions (Ararat, Aragatsotn) there are no universities at all. As a result, the existing asymmetries deepened even more (Table 10).

Currently, Armenia is facing serious problems. The sphere of education is considered one of the most important prerequisites for the country's sustainable progress, reproduction and development of human capital. Proportional territorial development is one of the most important principles of the state policy for the development of education. Ensuring equity in the education system, ensuring access to education in different regions and communities of the country, and at the same time mitigating disproportionate territorial development through education should be a cornerstone of the policy pursued (Melkumyan, 2020).

In fact, the legislation of the Republic of Armenia ensures equality and access to education for all citizens of the country. However, inequalities in territorial development and social problems can impede the realization of the right to education by various segments of the population.

**Table 7. Demographic index of the Republic of Armenia
for the capital Yerevan and regions, 2001-2020**

Regions	Demographic index																			
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Yerevan	0.700	0.730	0.720	0.693	0.694	0.685	0.685	0.744	0.675	0.736	0.747	0.747	0.795	0.783	0.796	0.782	0.793	0.789	0.815	0.801
Aragatsotn	0.553	0.572	0.544	0.527	0.485	0.467	0.451	0.529	0.456	0.511	0.526	0.507	0.535	0.461	0.406	0.418	0.416	0.426	0.434	0.445
Ararat	0.564	0.577	0.566	0.535	0.562	0.541	0.533	0.526	0.420	0.512	0.518	0.541	0.565	0.569	0.542	0.524	0.551	0.505	0.497	0.498
Armarir	0.496	0.535	0.544	0.543	0.555	0.536	0.522	0.512	0.388	0.479	0.492	0.529	0.533	0.507	0.528	0.546	0.536	0.578	0.620	0.613
Gegharkunik	0.497	0.530	0.530	0.527	0.477	0.457	0.449	0.438	0.379	0.426	0.438	0.383	0.402	0.396	0.374	0.339	0.359	0.329	0.307	0.309
Lori	0.414	0.473	0.456	0.448	0.468	0.453	0.421	0.490	0.220	0.440	0.433	0.457	0.545	0.539	0.527	0.546	0.546	0.495	0.515	0.512
Kotayk	0.452	0.503	0.487	0.451	0.424	0.398	0.388	0.412	0.249	0.387	0.427	0.406	0.471	0.484	0.510	0.463	0.463	0.499	0.507	0.496
Shirak	0.449	0.485	0.457	0.455	0.449	0.431	0.414	0.411	0.246	0.381	0.382	0.406	0.467	0.473	0.475	0.494	0.496	0.494	0.525	0.525
Syunik	0.501	0.517	0.512	0.489	0.457	0.456	0.414	0.478	0.386	0.502	0.495	0.482	0.521	0.506	0.485	0.475	0.471	0.514	0.512	0.510
Vayots Dzor	0.475	0.475	0.476	0.449	0.446	0.421	0.402	0.458	0.342	0.419	0.456	0.459	0.513	0.499	0.521	0.506	0.523	0.415	0.439	0.440
Tavush	0.484	0.505	0.471	0.448	0.449	0.448	0.421	0.513	0.435	0.503	0.514	0.503	0.545	0.511	0.502	0.491	0.480	0.430	0.474	0.480
MIN	0.414	0.473	0.456	0.448	0.424	0.398	0.388	0.411	0.220	0.381	0.382	0.383	0.402	0.396	0.374	0.339	0.359	0.329	0.307	0.309
MAX	0.700	0.730	0.720	0.693	0.694	0.685	0.685	0.744	0.675	0.736	0.747	0.747	0.795	0.783	0.796	0.782	0.793	0.789	0.815	0.801
RANGE	0.287	0.257	0.264	0.246	0.270	0.287	0.297	0.333	0.455	0.356	0.365	0.364	0.393	0.389	0.422	0.443	0.434	0.460	0.507	0.492
MEDIAN	0.496	0.517	0.512	0.489	0.468	0.453	0.421	0.490	0.386	0.479	0.492	0.482	0.533	0.506	0.510	0.494	0.496	0.495	0.507	0.498
AVERAGE	0.508	0.536	0.524	0.506	0.497	0.479	0.464	0.501	0.381	0.481	0.493	0.493	0.536	0.523	0.515	0.508	0.512	0.498	0.513	0.512

Source: The calculations done by the author on the bases of “Regions of the Republic of Armenia in numbers, 2001-2009”, “Regions of the Republic of Armenia and capital Yerevan in numbers, 2010-2020”

Table 8. Social index of the Republic of Armenia for the capital Yerevan and regions, 2001-2020

Regions	Social Index																			
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Yerevan	-0.035	-0.028	0.029	0.071	0.101	0.140	0.177	0.078	0.045	0.073	0.177	0.279	0.309	0.408	0.430	0.455	0.471	0.471	0.502	0.507
Aragatsoin	-0.027	-0.030	-0.002	0.038	0.052	0.096	0.118	0.088	0.122	0.118	0.188	0.276	0.275	0.301	0.336	0.354	0.311	0.312	0.282	0.279
Ararat	-0.024	-0.017	0.009	0.043	0.071	0.094	0.131	0.096	0.125	0.132	0.188	0.297	0.301	0.361	0.387	0.426	0.423	0.401	0.404	0.422
Armavir	-0.045	-0.035	-0.012	0.033	0.067	0.085	0.125	0.137	0.112	0.122	0.181	0.249	0.290	0.296	0.307	0.320	0.312	0.330	0.338	0.350
Gegharkunik	-0.061	-0.046	-0.031	0.025	0.043	0.064	0.058	0.101	0.075	0.091	0.149	0.174	0.224	0.268	0.313	0.353	0.355	0.291	0.300	0.319
Lori	-0.105	-0.110	-0.077	-0.053	-0.036	-0.021	0.027	0.018	0.003	0.024	0.079	0.141	0.162	0.231	0.272	0.307	0.312	0.306	0.279	0.298
Kotayk	-0.053	-0.043	-0.006	0.036	0.070	0.071	0.081	-0.019	0.021	0.041	0.076	0.135	0.177	0.234	0.262	0.295	0.264	0.255	0.276	0.282
Shirak	-0.173	-0.191	-0.166	-0.104	-0.048	-0.023	0.008	-0.037	-0.007	0.004	0.083	0.128	0.128	0.180	0.201	0.208	0.177	0.205	0.206	0.216
Syunik	-0.137	-0.140	-0.115	-0.065	-0.022	0.039	0.061	0.152	0.142	0.177	0.217	0.284	0.324	0.323	0.370	0.418	0.450	0.479	0.492	0.510
Vayots Dzag	-0.041	-0.045	-0.018	0.033	0.073	0.118	0.141	0.060	0.033	0.080	0.171	0.277	0.262	0.299	0.354	0.342	0.358	0.257	0.251	0.255
Tavush	-0.042	-0.029	0.000	0.026	0.050	0.045	0.085	0.091	0.096	0.118	0.153	0.206	0.197	0.221	0.238	0.268	0.299	0.145	0.176	0.183
MIN	-0.173	-0.191	-0.166	-0.104	-0.048	-0.023	0.008	-0.037	-0.007	0.004	0.076	0.128	0.128	0.180	0.201	0.208	0.177	0.145	0.176	0.183
MAX	-0.024	-0.017	0.029	0.071	0.101	0.140	0.177	0.152	0.142	0.177	0.217	0.297	0.324	0.408	0.450	0.455	0.471	0.479	0.502	0.510
RANGE	0.149	0.174	0.195	0.175	0.149	0.163	0.169	0.188	0.149	0.173	0.141	0.169	0.196	0.228	0.229	0.247	0.294	0.333	0.326	0.328
MEDIAN	-0.045	-0.043	-0.012	0.033	0.052	0.071	0.085	0.088	0.075	0.091	0.171	0.249	0.262	0.296	0.313	0.342	0.312	0.306	0.282	0.298
AVERAGE	-0.068	-0.065	-0.035	0.008	0.038	0.064	0.092	0.069	0.070	0.089	0.151	0.222	0.241	0.284	0.316	0.340	0.337	0.314	0.319	0.329

Source: The calculations done by the author on the bases of “Regions of the Republic of Armenia in numbers, 2001-2009”, “Regions of the Republic of Armenia and capital Yerevan in numbers, 2010-2020”

Table 9. Economic index of the Republic of Armenia for the capital Yerevan and regions, 2001-2020

Regions	Economic index																			
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Yerevan	0.336	0.303	0.311	0.305	0.335	0.350	0.393	0.425	0.454	0.484	0.522	0.559	0.582	0.626	0.625	0.671	0.704	0.742	0.772	0.742
Aragatsozn	0.065	0.063	0.093	0.091	0.096	0.094	0.116	0.137	0.143	0.146	0.172	0.173	0.204	0.228	0.287	0.270	0.276	0.310	0.319	0.305
Ararat	0.106	0.138	0.161	0.154	0.164	0.177	0.176	0.182	0.190	0.200	0.210	0.248	0.266	0.285	0.335	0.362	0.367	0.368	0.383	0.373
Armavir	0.102	0.103	0.105	0.114	0.111	0.119	0.121	0.128	0.137	0.155	0.153	0.167	0.181	0.197	0.222	0.218	0.240	0.257	0.276	0.278
Gegharkunik	0.053	0.059	0.079	0.099	0.088	0.078	0.080	0.091	0.102	0.104	0.112	0.132	0.145	0.161	0.205	0.243	0.262	0.275	0.280	0.279
Lori	0.100	0.095	0.100	0.130	0.145	0.152	0.165	0.217	0.212	0.224	0.223	0.252	0.224	0.212	0.296	0.315	0.340	0.290	0.303	0.313
Kotayk	0.206	0.197	0.192	0.198	0.201	0.201	0.219	0.258	0.247	0.262	0.278	0.309	0.342	0.369	0.382	0.431	0.406	0.436	0.443	0.421
Shirak	0.083	0.071	0.076	0.099	0.102	0.102	0.113	0.131	0.120	0.136	0.153	0.164	0.176	0.203	0.238	0.227	0.238	0.256	0.260	0.245
Syunik	0.152	0.159	0.187	0.236	0.261	0.264	0.279	0.301	0.313	0.342	0.360	0.394	0.412	0.441	0.440	0.444	0.520	0.570	0.574	0.567
Vayots Dzeq	0.035	0.048	0.052	0.054	0.064	0.073	0.077	0.124	0.152	0.161	0.150	0.176	0.207	0.207	0.265	0.254	0.230	0.277	0.294	0.269
Tavush	0.050	0.041	0.053	0.054	0.061	0.063	0.070	0.097	0.101	0.096	0.089	0.092	0.121	0.129	0.194	0.203	0.243	0.244	0.256	0.247
MIN	0.035	0.041	0.052	0.054	0.061	0.063	0.070	0.091	0.101	0.096	0.089	0.092	0.121	0.129	0.194	0.203	0.230	0.244	0.256	0.245
MAX	0.336	0.303	0.311	0.305	0.335	0.350	0.393	0.425	0.454	0.484	0.522	0.559	0.582	0.626	0.625	0.671	0.704	0.742	0.772	0.742
RANGE	0.302	0.262	0.259	0.251	0.275	0.287	0.323	0.334	0.353	0.388	0.433	0.467	0.461	0.497	0.431	0.469	0.474	0.498	0.516	0.497
MEDIAN	0.100	0.095	0.100	0.114	0.111	0.119	0.121	0.137	0.152	0.161	0.172	0.176	0.207	0.212	0.287	0.270	0.276	0.290	0.303	0.305
AVERAGE	0.117	0.116	0.128	0.140	0.148	0.152	0.164	0.190	0.197	0.210	0.220	0.242	0.260	0.278	0.317	0.331	0.348	0.366	0.378	0.367

Source: The calculations done by the author on the bases of “Regions of the Republic of Armenia in numbers, 2001-2009”, “Regions of the Republic of Armenia and capital Yerevan in numbers, 2010-2020”

Table 10. Educational index of the Republic of Armenia for the capital Yerevan and regions, 2001-2020

Regions	Educational index																			
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Yerevan	0.375	0.381	0.285	0.400	0.428	0.475	0.486	0.517	0.529	0.517	0.479	0.449	0.440	0.415	0.425	0.490	0.508	0.520	0.525	0.489
Aragatsotn	0.371	0.355	0.358	0.319	0.257	0.274	0.247	0.192	0.173	0.142	0.116	0.144	0.121	0.106	0.100	0.102	0.100	0.105	0.128	0.140
Ararat	0.316	0.278	0.259	0.238	0.211	0.199	0.164	0.120	0.124	0.107	0.079	0.099	0.073	0.063	0.064	0.072	0.078	0.086	0.111	0.131
Armavir	0.328	0.303	0.278	0.266	0.213	0.219	0.201	0.168	0.168	0.133	0.107	0.124	0.104	0.084	0.078	0.081	0.085	0.091	0.107	0.121
Gegharkunik	0.396	0.361	0.353	0.340	0.321	0.313	0.290	0.225	0.219	0.186	0.156	0.173	0.144	0.127	0.114	0.117	0.109	0.107	0.114	0.114
Lori	0.387	0.301	0.252	0.245	0.269	0.267	0.257	0.227	0.246	0.238	0.210	0.284	0.201	0.187	0.189	0.204	0.211	0.237	0.244	0.249
Kotayk	0.343	0.257	0.252	0.180	0.186	0.170	0.153	0.100	0.142	0.119	0.101	0.127	0.110	0.104	0.102	0.119	0.126	0.133	0.156	0.172
Shirak	0.412	0.396	0.359	0.358	0.358	0.352	0.354	0.308	0.309	0.260	0.238	0.241	0.207	0.182	0.135	0.206	0.193	0.200	0.216	0.219
Syunik	0.269	0.238	0.235	0.211	0.191	0.179	0.179	0.150	0.158	0.144	0.128	0.150	0.135	0.118	0.122	0.135	0.138	0.140	0.153	0.162
Yavayis Dzoz	0.401	0.373	0.336	0.313	0.277	0.263	0.252	0.223	0.215	0.180	0.148	0.156	0.123	0.096	0.094	0.102	0.107	0.114	0.132	0.144
Tavush	0.296	0.272	0.233	0.243	0.186	0.177	0.212	0.193	0.186	0.178	0.176	0.187	0.180	0.150	0.152	0.178	0.177	0.190	0.212	0.211
MIN	0.269	0.238	0.233	0.180	0.186	0.170	0.153	0.100	0.124	0.107	0.079	0.099	0.073	0.063	0.064	0.072	0.078	0.086	0.107	0.114
MAX	0.412	0.396	0.359	0.400	0.428	0.475	0.486	0.517	0.529	0.517	0.479	0.449	0.440	0.415	0.425	0.490	0.508	0.520	0.525	0.489
RANGE	0.143	0.159	0.126	0.220	0.242	0.305	0.332	0.418	0.405	0.409	0.400	0.351	0.367	0.352	0.361	0.418	0.430	0.434	0.418	0.375
MEDIAN	0.371	0.303	0.278	0.266	0.237	0.263	0.247	0.193	0.186	0.178	0.148	0.156	0.135	0.118	0.114	0.119	0.126	0.133	0.153	0.162
AVERAGE	0.354	0.319	0.289	0.283	0.261	0.263	0.254	0.220	0.224	0.200	0.176	0.194	0.167	0.148	0.143	0.164	0.166	0.175	0.191	0.196

Source: The calculations done by the author on the bases of “Regions of the Republic

There are number of factors that are most important when assessing access to education in a country and in its specific areas. They are:

1. Capacity of educational institutions,

2. Involvement of the population in education,
3. Territorial accessibility,
4. Financial accessibility (in secondary vocational and higher educational institutions).

Preschool education is the most vulnerable in terms of accessibility in Armenia. In our country, only 32.6% of the 0–5-year-old population attend PSIs (preschool institutions), of which 38% in cities and 22.6% in rural areas (Regions of the Republic of Armenia and capital Yerevan in numbers, 2020).

There is no significant problem of involving the population in general education. The overall enrolment rate is relatively higher in primary and general schools - 91.1% and 89.4%, respectively. It is slightly lower in secondary schools - 59.9%, but they are complemented by institutions of pre-vocational (vocational) and secondary vocational education (Regions of the Republic of Armenia and capital Yerevan in numbers, 2020).

In contrast to lower levels of education, higher education has a very high level of territorial concentration. Thus, 45 out of 56 universities operating in the country and 59,036 out of 69,622 students are in Yerevan. In other words, about 81% of universities are located in the capital, so 85% of students study in only one community. This means that geographic access to higher education in Armenia is at an undesirable level (Regions of the Republic of Armenia and capital Yerevan in numbers, 2020).

The gross enrolment rate of higher professional education in the capital is very high - 135.6%, which is associated with a large flow of students from the regions. And the overall enrolment rate in the country was 52.2%. Thus, one of the obstacles to access to higher education in the regions is, first of all, the lack of institutions that provide high-quality higher professional education, and in some regions - their absence.

Moreover, in contrast to other levels of education, the level of public funding for higher education is also quite low: out of 61,495 students enrolled in state universities, 10,024 or 16.3% of students studied in the education system with free tuition. At the same time, the number of students who received a partial refund in the amount of 25-75% of the tuition fees amounted to about 10,000 people. Therefore, higher education remained inaccessible to the poor and extremely poor population (Regions of the Republic of Armenia and capital Yerevan in numbers, 2020).

Thus, the problem of access to education in the Republic of Armenia manifests itself to a greater extent at the level of preschool and higher education. The enrolment rate in preschool educational institutions was only 32.6%, while in some regions this indicator is very low. This is primarily due to the insufficient capacity of such institutions, their absence in many settlements.

More than 80% of university students of the republic are concentrated in the capital. This leads to a lack of resources in the capital, on the one hand, and an underutilization of resources in the regions, on the other. Ensuring equal opportunities for higher education for residents of the regions presupposes the presence of regional universities, which at the same time contributes to solve the problem of balanced territorial development.

Table 11. Healthcare index of the Republic of Armenia for the capital Yerevan and regions, 2001-2020

Regions	Healthcare index																			
	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Yerevan	0.479	0.441	0.471	0.470	0.522	0.521	0.537	0.574	0.627	0.666	0.672	0.671	0.666	0.692	0.699	0.708	0.702	0.706	0.699	0.717
Aragatsotn	0.357	0.363	0.365	0.370	0.366	0.367	0.307	0.263	0.270	0.294	0.296	0.297	0.293	0.294	0.304	0.309	0.281	0.285	0.318	0.327
Ararat	0.412	0.399	0.413	0.426	0.434	0.423	0.412	0.397	0.413	0.417	0.422	0.423	0.419	0.417	0.418	0.421	0.411	0.431	0.428	0.452
Armavir	0.362	0.382	0.380	0.388	0.378	0.383	0.339	0.333	0.359	0.381	0.383	0.392	0.381	0.384	0.384	0.386	0.386	0.388	0.385	0.390
Gegharkunik	0.218	0.204	0.216	0.216	0.273	0.273	0.263	0.272	0.264	0.321	0.339	0.320	0.319	0.312	0.315	0.315	0.318	0.322	0.331	0.338
Lori	0.382	0.329	0.305	0.283	0.293	0.301	0.250	0.250	0.308	0.341	0.355	0.354	0.354	0.364	0.378	0.352	0.351	0.363	0.371	0.381
Kotayk	0.242	0.239	0.230	0.318	0.318	0.315	0.300	0.280	0.311	0.317	0.323	0.322	0.327	0.329	0.352	0.359	0.354	0.338	0.347	0.332
Shirak	0.317	0.244	0.250	0.246	0.252	0.256	0.240	0.214	0.249	0.254	0.248	0.256	0.260	0.273	0.274	0.272	0.276	0.292	0.295	0.308
Syunik	0.576	0.488	0.426	0.412	0.351	0.370	0.358	0.354	0.386	0.368	0.373	0.360	0.358	0.235	0.237	0.226	0.221	0.222	0.206	0.210
Vayots Dzor	0.348	0.265	0.268	0.263	0.327	0.320	0.319	0.266	0.289	0.294	0.301	0.301	0.254	0.253	0.262	0.259	0.265	0.273	0.286	0.296
Tavush	0.328	0.315	0.316	0.315	0.322	0.320	0.303	0.296	0.383	0.383	0.362	0.386	0.365	0.368	0.377	0.393	0.400	0.402	0.411	0.420
MIN	0.218	0.204	0.216	0.246	0.252	0.256	0.240	0.214	0.249	0.254	0.248	0.256	0.254	0.255	0.237	0.226	0.221	0.222	0.206	0.210
MAX	0.576	0.488	0.471	0.470	0.522	0.521	0.537	0.574	0.627	0.666	0.672	0.671	0.666	0.692	0.699	0.708	0.702	0.706	0.699	0.717
RANGE	0.358	0.284	0.255	0.223	0.270	0.265	0.297	0.360	0.379	0.413	0.424	0.415	0.412	0.457	0.462	0.482	0.481	0.484	0.492	0.507
MEDIAN	0.357	0.329	0.316	0.318	0.327	0.320	0.307	0.280	0.311	0.341	0.355	0.354	0.354	0.329	0.352	0.352	0.351	0.338	0.347	0.352
AVERAGE	0.366	0.334	0.331	0.343	0.349	0.330	0.330	0.318	0.351	0.367	0.370	0.371	0.363	0.356	0.364	0.364	0.361	0.366	0.371	0.379

Source: The calculations done by the author on the bases of “Regions of the Republic of Armenia in numbers, 2001-2009”, “Regions of the Republic of Armenia and capital Yerevan in numbers, 2010-2020”

With regard to access to healthcare services, there are a number of problems in most regions. The numbers of doctors and hospital beds are especially low. The healthcare index is very high in the capital – 0.72 c.u. (2020) and low in Syunik region - 0.21 c.u.. During the period under review, the range of fluctuations of the index increased by about 30% (Table 11).

4.2 Cluster analysis

Based on 20 indicators presented in 5 sectoral groups, we also conducted a cluster analysis to find out the existing “distance” between the capital Yerevan and other regions, group the adjacent regions. The analysis was carried out during the observed period for three years of the sample: 2001, 2010, 2019.

Table 12 presents the results of the cluster analysis matrix based on 20 indicators observed in 2001. In the course of the analysis, the regions of the Republic of Armenia and the capital Yerevan were divided into 4 groups according to the main indicators of socio-economic development. The first group includes the capital, where the observed indicators are significantly higher than other regions, they are in a different plane. Thus, the problem of monocentric development of the economy is also noticed here. The second group includes Ararat, Gegharkunik, Lori, Shirak and Syunik regions, which are closer in development to the Armavir and Kotayk regions, which are in the third group. Vayots Dzor, Tavush and Aragatsotn districts are located at a greater distance from both the capital and other regions.

Table 12. Result matrix of cluster analysis of the RA regions and the capital of Yerevan, 2001

Regions	Yerevan	Ararat, Gegharkunik, Lori, Shirak, Syunik	Armavir, Kotayk	Vayots Dzor, Tavush, Aragatsotn
Yerevan	-	311,375	277,807	356,133
Ararat, Gegharkunik, Lori, Shirak, Syunik	311,375	-	28,795	32,541
Armavir, Kotayk	277,807	28,795	-	67,062
Vayots Dzor, Tavush, Aragatsotn	356,133	32,541	67,062	-

Source: The calculations done by the author

Table 13 shows the calculation results for 2010. As you can see, the distance between Yerevan and other regions has not only been preserved, but also increased. Armavir, Kotayk and Aragatsotn regions entered the second group, where the Syunik region was ahead of other regions in terms of development, forming a separate group. Vayots Dzor and Tavush regions retained their positions.

Table 13. Result matrix of cluster analysis of the RA regions and the capital of Yerevan, 2010

Regions	Yerevan	Armavir, Kotayk, Ararat, Aragatsotn, Gegharkunik, Lori, Shirak	Syunik	Vayots Dzor, Tavush
Yerevan	-	1,240,941	1,179,507	1,410,544
Armavir, Kotayk, Ararat, Aragatsotn, Gegharkunik, Lori, Shirak	1,240,941	-	89,424	81,946
Syunik	1,179,507	89,424	-	256,409
Vayots Dzor, Tavush,	1,410,544	81,946	256,409	-

Source: The calculations done by the author

According to the results of the 2019 analysis, Ararat, Kotayk and Armavir regions are ahead of the rest of the group's regions, forming a new group. Vayots Dzor and Tavush regions came close to Gegharkunik, Shirak, Lori and Aragatsotn (Table 14).

Table 14. Result matrix of cluster analysis of the RA regions and the capital of Yerevan, 2019

Regions	Yerevan	Armavir, Kotayk, Ararat,	Vayots Dzor, Tavush, Aragatsotn, Gegharkunik, Lori, Shirak	Syunik
Yerevan	-	2,290,584	2,608,118	2,347,592
Armavir, Kotayk, Ararat,	2,290,584	-	167,152	183,576
Vayots Dzor, Tavush, Aragatsotn, Gegharkunik, Lori, Shirak	2,608,118	167,152	-	428,781
Syunik	2,347,592	183,576	428,781	-

Source: The calculations done by the author

5. Conclusions

The results of the assessment of the level of territorial socio-economic development in the Republic of Armenia show that although high growth tendencies were registered in a number of spheres, particularly in social, economic, and partly healthcare indicators, nevertheless, this growth often led to the country's socio-economic potential to concentrate in the capital rather than mitigating territorial disparities.

Thus, the results of the calculation and analysis of the sectoral indices of the regions show that the level of asymmetry is especially high in terms of demographic,

economic and medical indicators. Nevertheless, the polarized development is also noticeable in the regional distribution of social and educational indicators. At the same time, more worrisome is the fact that the range of fluctuations in the index increased in all observed areas, in other words, in the period 2001-2020, the disparities in territorial development in the capital Yerevan and in the regions increased even more. This indicates the absence of an effective policy of levelling the economy and regional development.

As a result of cluster analysis, we received 4 main groups characterizing the level of territorial socio-economic development of the Republic of Armenia. The capital Yerevan and Syunik region are included in separate groups, followed by Ararat, Armavir and Kotayk regions. Moreover, the indicators observed in Yerevan are much higher, and the Syunik region is closer to the regions of the second group than to the capital. The rest of the regions are included in the last group, they are located at a greater distance from Yerevan.

Here are some suggestions for flattening territorial disparities in RA:

- Improving the tax system: developing new ways of redistributing local taxes
- Improving financial equalization mechanisms
- Introduction of an effective community enlargement system
- Introduction of the concept of territorial growth poles, which will act as a locomotive for the progress of the most backward regions.

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