Reviewing Transition Economies (1989-2021): Sustainable Reform Outcomes in Post-Socialist Countries.

By Oleksandr Boguslavskyy[1], Viktoriya Gura[2], Tatyana Nikitina[3]

ABSTRACT:
The article is devoted to the assessment of the results of reforms in transition economies for 1989-2021 using cluster analysis. The article allocates 27 indicators characterizing the main parameters of the transformations of 25 post-socialist countries of CEE, SEE, Baltic, South East Asia, former CIS countries, etc. Using the methods of elbow, silhouette and gap analysis, the optimal number of clusters for transition countries is determined. The Ward method was used to cluster the transition countries into two groups and to draw a diagram with the boundaries of the clusters. The first group includes countries that are less successful in reforming, and the second group includes countries that have achieved significant results in reforming. Based on the analysis, conclusions and recommendations are drawn towards social entrepreneurship development as a driving force of social innovative dissemination.

1. Introduction

The issues of post-socialist transformation for more than three dozen countries have remained among the most pressing over the past 30 years. Of course, current global socio-political events, geopolitical instability in the center of Europe caused by Russia's large-scale military actions against Ukraine have put the study of transformation processes of economic development on the back burner.

This conflict is an obstacle to further development and growth in Europe, as both the countries engaged in active hostilities and neighboring countries are significantly increasing military spending and the size of their armies, militarizing the economy, which negatively affects the goals of sustainable economic growth.

Thus, according to the World Bank, Ukraine's GDP decreased by 28.8% in 2022 alone, and the population in Ukraine in 2022 decreased by 14.3% (World Bank (2024d)).

The current socio-economic situation in Eastern Europe is difficult to assess, as the preliminary damage from Russia's military invasion of Ukraine alone is estimated to be around $500 billion.: "These damages now exceed USD 486 billion, according to the

| [1]Kyiv Taras Shevchenko National University, Ukraine
 Institute of Public Administration and Civil Service of Kyiv Taras Shevchenko National University, Ukraine
 National University of Food Technology, Kyiv, Ukraine

World Bank" (Apulia G7 Leaders' Communiqué 2024). The economic potential of Ukraine's regions, cities, and villages is being destroyed, and the environmental situation is deteriorating significantly, including the environmental disaster caused by the explosion of the explosion of the Kakhovka hydroelectric power plant (16/06/2023). These consequences of the military confrontation contradict the achievement of all w all 17 Sustainable Development Goals (UN 2024). A more accurate assessment is possible only after the end of full-scale military operations. Further discussion may concern the use of additional indicators that would reflect in different ways the socio-economic losses as a result of military operations, increased defense spending, damage to ecosystems and regions that suffered the most from the hostilities (demining, water purification, restoration of forests and agricultural land, reconstruction of settlements and economic infrastructure), etc.

At the same time, the study of transformation processes remains very important for professional government officials and transit scholars, as the social and economic development of many countries depends on their successful completion. Another important aspect for future research is the choice of a system of parameters for assessing the socio-economic development of the population, such as the quality and accessibility of education, social protection, health care, etc., which have different dynamics in transition countries. An analysis of these reform parameters can provide more detailed information that can be used to develop further development strategies for these countries. It should be noted that the study of the results of post-socialist processes is a very complex task and requires identifying various parameters of reforms and analyzing many indicators in various fields. Well-known government reformers, such as L. Balcerowicz, Gz. Kolodko, and scholars of transition such as J. Kornai, A. Oslund, J. Stiglitz, and others have identified the main areas of reform: liberalization, privatization, institutional transformation and democratization of society, macroeconomic stabilization, etc. An appropriate assessment of the results of changes should in one way or another address these areas of research. Innovative development, demographic, and welfare indicators should be added.

Boguslavskyy O. conducted a preliminary study of the first 15 years of transition in 2006 (Boguslavskyy 2006). We will now continue and deepen this study using new statistical information and improved methodological tools.

It is advisable to compare many parameters using cluster analysis, which allows comparing differently sized variables and identifying groups of countries with similar transformation results.

This will allow us to assess the main trends of transformation and draw conclusions about the main groups of post-socialist countries: South-East Europe, Central and Eastern Europe, South-East Asia of the former CIS countries, etc. for the period 1989-2021.

Many "classic" works have been written on transition and post-socialist transformation, especially in the 1990s and 2000s.

The works of theorists and practitioners describe different aspects of transformation. Balcerowicz, L. - former Poland's deputy prime minister and finance minister in his works: "Socialism, Capitalism, Transformation", "Post-Communist Transition: Some Lessons" et al. describes the theory of "shock therapy" reforms, outlines its main directions and

analyzes the results of reform measures implemented in Poland and other transition countries (Balcerowicz 1995; Balcerowicz 2005).

Kolodko, Grzegorz W., twice Minister of Finance of Poland in different years in his works "From Shock to Therapy: The Political Economy of Postsocialist Transformation", "Post-Communist Transition: The Thorny Road", "Socialism or capitalism? Tertium Datur" etc., analyzed the successes and failures of the transition to a post-socialist country and proposes alternative balanced ways of reforms that have been successfully implemented in Poland (Kolodko 2000a; Kolodko 2000b; Kolodko 2018).

Hungarian reform theorist Kornai, J. in one of his works "From Socialism to Capitalism: Eight Essays" revealed the role of the state in post-socialist reforms (Kornai, 2008).

Aslund, A. (2012) - Swedish economist and advisor to many governments of various transition countries in his work "How Capitalism Was Built: The Transformation of Central and Eastern Europe, Russia, the Caucasus, and Central Asia" analyzed the experience of building capitalist relations in various post-socialist countries (Aslund 2012).

Nobel laureate Stiglitz, J. in his article "Wither Reform? Ten Years of Transition" illustrated the results of reforms for different countries and revealed the reasons for the successes and failures of reforms (Stiglitz 1999). A scientific analysis of the theoretical foundations and practices of state regulation was carried out by Stiglitz J. (2015) in his work "Economics of the Public Sector".

Other articles in scientific and metric databases describe various aspects of modern transformation processes. Thus, Chavance, B. in the article "Why National Trajectories of Post – Socialist Transformation Differ?" reveals the reasons for differences in the development of post-socialist countries (Chavance 2002).

In the article "Capitalist Diversity in Eastern Europe" Bohle, D., & Greskovits, B. described the reasons for differences in capitalist relations in Eastern European countries (Bohle & Greskovits 2007) .

Pehe, V. & Sommer, V. highlighted the cultural aspects of post-socialist privatization (Pehe & Sommer (2022).

Hachmeister, Hock, Jacobs & Wurzbacher considered the micro and macro perspective of post-socialist transformation (Hachmeister, Hock, Jacobs & Wurzbacher 2023)

Stark, D., & Bruszt, L. studied the sociological aspects of the transformation of Eastern European countries (Stark & Bruszt 2001).

The impact of post-socialist transformation on Organization theory was described by Soulsby, A. & Clark, E. (Soulsby & Clark 2007).

Greskovits (2002), B studied the differences and disproportions in the economic development of post-socialist countries of Eastern Europe from Western European countries.

Certain areas of post-socialist changes and their impact on relevant aspects of social and economic life are described in many works, for example "Post-Socialist Neoliberalism and the Production of Space Totalitarian" – which studies the impact of post-socialist transformation on planning and management of urban development (Drozda 2024).

2. Methodology

In this article, we analyze the results of post-socialist transformation in different groups of transition economies for the period 1989-2021 (for the years for which data are available) using the cluster analysis method.

The purpose of the study is to assess the results of post-socialist transformation for the period from 1989 to 2021/22 using cluster analysis by identifying the main clusters (groups) of transition economies with similar reform results. A very complex element of the study of post-socialist transformation is the study of cultural and ideological phenomena of transformation, changes in public consciousness that cannot be quantified, as they are essentially qualitative factors (Pehe & Sommer (2022). For example, the formation of a strong entrepreneurial culture, which occurred at different speeds and on different scales in different transition countries. In particular, in many Central European countries, such as Poland, Hungary, etc., market relations in the sphere of small and medium-sized enterprises were already developed at the beginning of intensive reforms (Balcerowicz 1995). While in all the countries of the former USSR, market relations only began to revive in 1988-1991 (Aslund 2012). This leads to the limitations of quantitative methods in assessing the results of transformational changes.

Our research began in February 2022 and lasted until November 2024.

We used indicators from World Development Indicators database, Heritage Foundation, International Monetary Fund (IMF), Transparency International, World Intellectual Property Organization (WIPO), United Nations Development Programme etc. (See the list of references).

The research was carried out at several stages:

1)   For the purposes of our analysis, we have collected information on the results of transformations in the countries of Southeast Europe, Central and Eastern Europe, the Baltic States, Southeast Asia, and others - 25 countries in total. To do this, we collected the indicators of these countries (27) on the main results of transformation (in our opinion) and formed these indicators in the form of an Excel spreadsheet.

2)   For data processing and calculations, we chose a freely available software product - the R 4.4.1 programming language (R-Studio). And we loaded the data in the form of an Excel spreadsheet into the R software environment.

3)   At this stage, we processed the table with the downloaded data as a data frame so that the R software environment could adequately recognize the information.

4)   Next, we standardized the data, since the table contains different indicators in terms of their scale and dimension.

5)   After standardizing the data, we searched for the number of clusters using different methods, namely: elbow method, silhouette method, and Gap analysis.

6)   At the sixth stage, we divided our set of countries into 2 clusters using the Ward method and analyzed the results.

7)   At this stage, we constructed diagrams and dendrograms and described the results by country group, which will be the basis for further conclusions.

Based on the results of our research, we made the following conclusions and recommendations.

3. Stages of cluster analysis of transition economies in 1989-2021:

3.1.   The first stage

For our analysis of transition countries, we have selected a set of indicators that characterize the main aspects of reforms by group:

1. Indicators characterizing GDP growth and macroeconomic stability: 1.1 GDP growth 2021, % to 1989 (GDP (current US$) (World Bank 2024a); 1.2. Average annual inflation rate, % 1990-2021 (Inflation, GDP deflator: linked series (annual %)) (World Bank 2024b); 1.3. Average unemployment, total (% of total labor force) (modeled ILO estimate) 1991-2021 (World Bank 2023a). 1.4. Average annual growth of gross capital formation (%) (Gross capital formation (annual % growth)) 1989-2001 (World Bank 2024c);

2. Some indicators of economic efficiency and productivity of the economy: 2.1. GDP per capita, PPP (constant 2021 international $) (World Bank 2021a); 2.2. GDP per unit of energy use (constant 2021 PPP $ per kg of oil equivalent) - Fragile and conflict affected situations (World Bank 2021b); 2.3. Agricultural raw materials exports (% of merchandise exports) 2021 (World Bank 2021c); 2.4. Manufactures exports (% of merchandise exports) 2021 (World Bank 2021d).

The indicators for Groups 1 and 2 collected by us are summarized in Table 1.

Table 1. Indicators characterizing GDP growth and macroeconomic stability and some indicators of economic efficiency and productivity of the economy.

№	Countries	GDP growth 2021, % to 1989	Average annual inflation rate, % 1990-2021	Average unemployment, total (% of total labor force) (modeled ILO estimate) 1991-2021	Average annual growth of gross capital formation (%) 1989-2001	GDP per capita, PPP (constant 2021 international $)	GDP per unit of energy use (2015). 2021 PPP $ per kilogram of oil equivalent	Agricultural raw materials exports (% of merchandise exports) 2021	Manufactures exports (% of merchandise exports) 2021
1	Armenia	168,10	306,27	10,15	5,22	16899,07	12,90	0,00	23,00
2	Azerbaijan	280,40	192,49	6,61	24,22	20111,38	13,80	1,00	5,00
3	Belarus	161,90	287,61	8,59	3,49	29404,96	9,00	4,00	38,00
4	Bulgaria	255,10	79,15	10,92	41,49	27611,18	9,40	1,00	58,00
5	China	5000,0	6,84	4,00	10,59	20406,73	6,20	0,00	93,00
6	Czechia	628.3	7,95	5,44	3,35	48418,12	11,30	2,00	90,00

7	Croatia	174,60	112,95	11,93	4,91	37232,60	14,80	4,00	63,00
8	Estonia	594.2	62,10	8,47	8,76	44652,00	8,70	8,00	70,00
9	Georgia	128,00	1105,52	13,22	3,30	18915,65	12,30	1,00	33,00
10	Hungary	180.8	13,96	7,69	4,13	38648,00	13,00	1,00	86,00
11	Kazakhstan	323,00	231,30	7,15	2,94	33893,90	7,20	0,00	17,00
12	Kyrgyzstan	107,30	107,14	2,52	8,95	5802,39	8,50	2,00	19,00
13	Latvia	304,40	63,77	12,01	8,45	46410,07	13,50	13,00	59,00
14	Lithuania	471,80	79,72	10,76	8,17	36777,89	14,70	3,00	66,00
15	Moldova	138,00	121,48	4,24	5,02	15682,07	10,10	0,00	40,00
16	North Macedonia	362,50	97,76	29,91	4,77	22371,50	13,60	0,00	84,00
17	Poland	1014.0	14,07	11,18	5,90	40462,69	12,30	1,00	79,00
18	Romania	646.6	63,48	6,65	4,93	37969,15	17,80	1,00	79,00
19	Russian Federation	251,00	161,50	7,28	-0,63	38938,50	7,50	2,00	22,00
20	Slovakia	613.4	7,50	12,66	4,56	37790,79	11,20	1,00	89,00
21	Slovenia	301.3	22,50	6,86	3,67	46502,10	12,30	2,00	85,00
22	Tajikistan	19,10	159,27	10,25	0,61	4074,56	8,40	14,00	12,00
23	Ukraine	146,60	335,86	7,86	-0,78	18040,35	7,00	2,00	43,00
24	Uzbekistan	224,90	201,15	6,91	0,00	8162,20	4,30	3,00	35,00
25	Vietnam	5659,5	16,37	1,92	11,60	12230,26	12,60	2,00	86,00

Source: World Bank (2024a-c), World Bank (2023a), World Bank (2021a-d).

3. Indicators characterizing innovation and R&D: 3.1. Global Innovation Index 2021 (WIPO 2021); 3.2. High-technology exports (% of manufactured exports) 2021 (World Bank 2022a) ; 3.3. Research and development expenditure (% of GDP) (World Bank 2022b); 3.4. 2022 Researchers full-time equivalent per million people 2022 (World Bank 2022c).

4. Indicators characterizing the development of economic well-being and amount of population: 4.1. Human Development Index growth 2021, points to 1990 UN (2022); 4.2. Gini index 2021 (World Bank 2022d).; 4.3. Ratio of the richest 10 to the poorest 10 (2021) (World Bank 2022e).; 4.4. Population change, million people, 1990-2021 (World Bank 2024d). We summarize these indicators for groups 3 and 4 in Table 2.

Table 2. Indicators characterizing innovation and R&D and Indicators characterizing the development of economic well-being and amount of population.

№ of country	Global Innova-tion Index 2021	High-technology exports (% of manufac-tured exports) 2021	Research and development expenditure (% of GDP) 2022	Researchers full-time equivalent per million people 2022	HDI growth 2021, points to 1990	Gini index	Ratio of the richest 10 to the poor-est 10	Population change, people, 1990-2021
1	69,00	5,96	0.21	1220,00	0,10	27,90	5,90	-657212
2	80,00	2,10	0.21	1691,00	0,11	26,60	5,00	3061200
3	62,00	5,59	0.48	1382,00	0,00	24,40	4,70	-867415
4	35,00	10,91	0,77	2339,00	0,10	39,00	15,00	-1999229
5	12,00	30,41	2,43	1687,00	0,29	37,10	9,50	293710000
6	24,00	20,35	2,00	4569,00	0,14	26,20	5,70	144704
7	42,00	9,61	1,24	2331,00	0,18	28,90	7,20	-888279
8	21,00	20,63	1,75	4038,00	0,15	31,80	7,80	-237199
9	63,00	1,60	0,24	1823,00	0,11	34,20	9,70	-1094690
10	34,00	16,25	1,64	4452,00	0,13	29,20	6,90	-771828
11	79,00	27,96	0,12	682,00	0,14	29,20	5,80	2941856
12	98,00	16,30	0,08	515,00	0,05	28,80	5,90	2465900
13	38,00	16,98	0,74	2405,00	0,13	34.3	10,10	-782465
14	39,00	11,51	1,11	3935,00	0,14	36,70	11,20	-883416
15	64,00	2,24	0,38	649,00	0,08	25,70	5,10	-356508
16	59,00	4,03	0,23	768,00	0,09	33,50	12,10	-202312
17	40,00	9,44	1,44	3534,00	0,16	28,50	6,70	-214405
18	48,00	11,49	0,47	985,00	0,11	33,90	12,60	-4039399
19	45,00	9,69	0,96	2698,00	0,08	36,00	9,40	-2974238
20	37,00	9,00	0,92	3211,00	0,16	24,10	5,70	171305
21	32,00	6,21	2,13	5223,00	0,14	24,30	4,90	111728
22	103,00	0,41	0,90	191,00	0,07	34,00	8,80	4485732
23	49,00	4,51	0,33	583,00	0,04	25,60	5,10	-7924014
24	86,00	0,31	0,16	547,00	0,13	31,20	9,30	14812198
25	44,00	41,54	0,49	779,00	0,21	36,80	10,80	32001668

Source: WIPO (2021), World Bank (2022a-e), UN (2022), World Bank (2024d)

5. Indicators characterizing social transformations and, as a result, realized opportunities for attracting FDI: 5.1. Index of economic freedom 2024 (Heritage Foundation 2024); 5.2. Total government revenue in percent of GDP 2020 (IMF 2022); 5.3. Corruption perceptions index 2021 (Transparency International 2021); 5.4. Dynamic general equilibrium model-based (DGE) estimates of informal output (% of official GDP) 2020 World Bank (2020); 5.5. Foreign direct investment, net inflows (BoP, current US$) 1989-2021 mln. Dollars World Bank (2023b).

6. Indicators characterizing the structure of the economy by sector and final consumer spending: 6.1-3. GDP - composition, by sector of origin, (agriculture, industry, services) %, 2021 (World Bank 2021e); 6.4-5. Final consumption expenditure % of GDP, 2021 (Households and NPISHs, General government final consumption expenditure) (World Bank 2023c). And finaly Government effectiveness - Country rankings (GlobalEconomy.com 2024).

Table 3. Indicators characterizing innovation and R&D and Indicators characterizing the development of economic well-being and amount of population.

№ of country	2024 index of economic freedom	Total government revenue in percent of GDP 2020	CPI 2021	DGE estimates of informal output (% of official GDP) 2020	Foreign direct investment, net inflows (BoP, current US$) WB 1989-2021 mln. Dollars	Final consumption expenditure % of GDP, 2021		GDP - composition, by sector of origin, %			Government effectiveness Country rankings
						House-holds and NPISHs	General govern-ment final consump-tion expendi-ture	Agriculture	Industry	Services	
1	64,90	23,92	49,0	33,97	8239,98	72,2	13,60	0,4	33,3	66,3	110
2	61,60	41,42	30,0	39,05	69073,88	52,4	13,90	6,1	53,5	40,4	90
3	48,40	38,26	41,0	36,77	28952,52	50,9	16,80	8,1	40,8	51,1	152
4	68,50	34,9	42,0	27,76	74896,37	58,1	19,00	4,3	28,0	67,4	104
5	48,50	28,05	45,0	8,02	4174145,37	38,1	15,80	7,9	40,5	51,6	56
6	70,20	41,37	54,0	16,66	196673,08	45,4	21,40	2,3	36,9	60,8	35
7	67,20	47,46	47,0	28,42	48750,11	57,1	23,00	3,7	26,2	70,1	51
8	77,80	39,99	74,0	26,43	43128,76	49,8	20,00	2,8	29,2	58,1	22
9	68,40	27,1	55,0	58,19	23397,80	81,4	14,10	8,2	23,7	67,9	47
10	61,20	43,63	43,0	22,46	530043,01	48,3	20,90	3,9	31,3	64,8	55
11	62,00	17,51	37,0	35,47	172891,09	51,6	11,30	4,7	34,1	61,2	74
12	55,20	31,02	27,0	33,18	6059,48	85,5	16,60	14,6	31,2	54,2	156
13	71,50	37,24	59,0	25,61	23855,01	57,1	21,00	3,9	22,4	73,7	45
14	72,90	34,07	61,0	27,23	32839,35	57,6	17,60	3,5	29,4	67,2	38

15	57,10	29,92	36,0	42,78	6185,69	83,6	16,80	17,7	20,3	62,0	112
16	61,40	29,58	39,0	32,69	8449,34	67,8	15,80	10,9	26,6	62,5	93
17	66,00	41,53	56,0	22,87	359012,00	56,2	18,70	2,4	40,2	57,4	69
18	64,40	28,91	45,0	25,76	125987,61	61,5	17,90	4,2	33,2	62,6	85
19	52,00	35,28	29,0	39,09	669989,16	51,5	17,10	4,7	32,4	62,3	141
20	68,10	29,33	52,0	15,89	62586,34	56,8	21,10	3,8	35,0	61,2	65
21	65,90	43,75	57,0	24,08	22527,47	51,7	20,70	1,8	32,2	65,9	36
22	51,30	27,38	25,0	43,00	4471,17	80,4	10,90	28,6	25,5	45,9	146
23	54,10	39,97	32,0	46,01	101330,00	69.1	17,70	12,2	28,6	60,0	125
24	55,90	25,65	28,0	27,30	20329,09	59,8	16,60	17,9	33,7	48,5	115
25	62,80	18,54	39,0	10,62	192151,43	55,5	9,60	15,3	33,3	51,3	72

Source: Heritage Foundation (2024), IMF (2022), Transparency International (2021), World Bank (2020), World Bank (2023b), World Bank (2021e), World Bank (2023c), GlobalEconomy.com (2024).

We collected all 27 of the above indicators for these 25 countries in one Excel spreadsheet called CountclustT.xlsx for further processing in the next stages of the study.

3.2. The second stage.

At the second stage, we chose a freely available software product for data processing and calculations - the R 4.4.1 programming language (R-Studio). We installed the necessary packages for clustering: install.packages("psych") and similarly "factoextra", "cluster", "NbClust", "clValid", "ggplot2", "MASS", "gplots", "factoextra". And also the corresponding libraries to them: library(psych), etc.
We also used the read_excel command to load the data in the form of an Excel spreadsheet named CountclustT.xlsx into the R program environment: CountclustT <- read_excel("C:/Users/user/Desktop/Var5/CountclustT.xlsx").

3.3 The third stage.

At this stage, we processed the table with the uploaded data as a data frame so that the R software environment could adequately recognize the information;
CounclustT_numeric <- as.data.frame(lapply(CountclustT[-1], function(x) as.numeric(as.character(x)))).

3.4. The fourth stage.

At the fourth stage, we standardized the data, since the table contains different indicators in terms of scale and dimension: scale_CountclustT_numeric <- scale(CountclustT_numeric[-1], center=T, scale=T)
We do not publish the standardized table in the article, as it does not fit into the article format in terms of length.

3.5. The fifth stage.

After standardizing the data, we searched for the number of clusters using different methods, namely the elbow method, the silhouette method, and the gap method. The elbow method was used to find the number of clusters as: follows:fviz_nbclust(scale_CountclustT_numeric, kmeans, method = "wss"). In this case, the variance of the clusters is not obvious, it can be from 2 to 4 clusters.
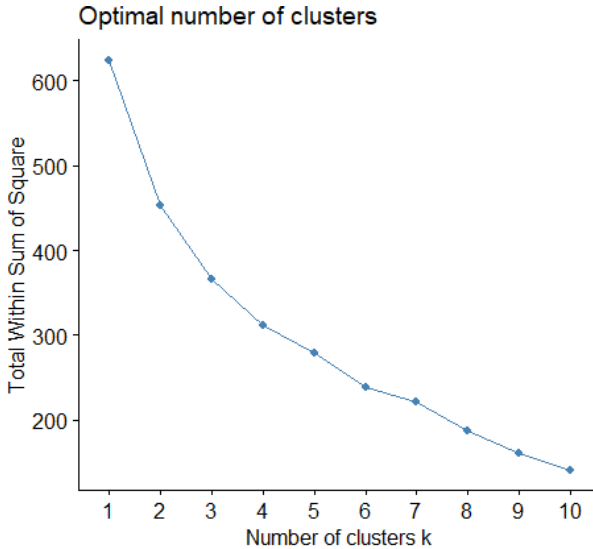

Figure 1. Finding the number of clusters using the elbow method
Source: authors' calculations.

The number of clusters was calculated using the silhouette method as follows: fviz_nbclust(scale_CountclustT_numeric, kmeans, method = "silhouette")
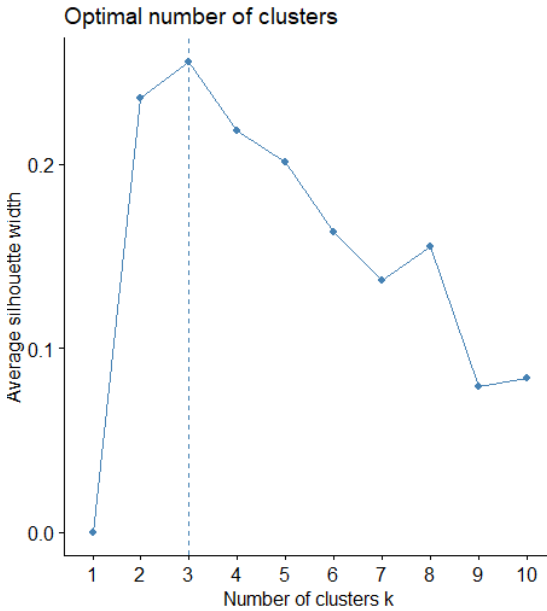
Figure 2. Finding the number of clusters by the silhouette method
Source: authors' calculations.

The silhouette method shows that the optimal number of clusters is three.
The gap method was performed using the command:
fviz_nbclust(scale_CountclustT_numeric, kmeans, method = "gap_stat")
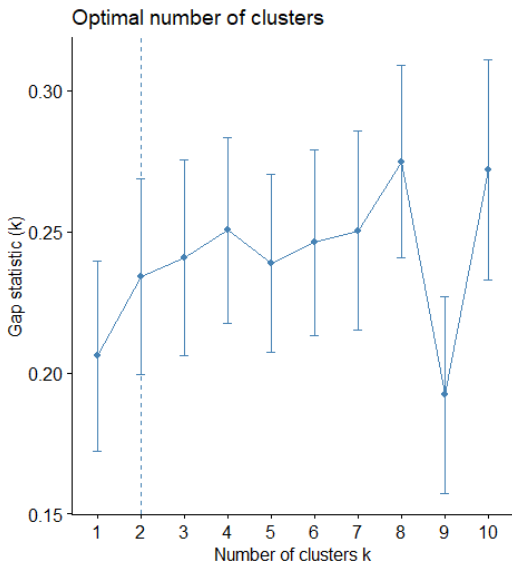
Figure 3. Finding the number of clusters by gap analysis.
Source: authors' calculations.

In turn, the gap_stat method shows the optimal number of two clusters, as shown in Figure 3.

So, applying different methods to find the number of clusters shows us a number from two to 4 clusters, and most methods (2 out of 3) show that the optimal number is either 2 or 3 clusters.

3.6. The sixth stage.

At the sixth stage, we clustered our set of countries using the Ward method, which allows us to identify clusters with high granularity:
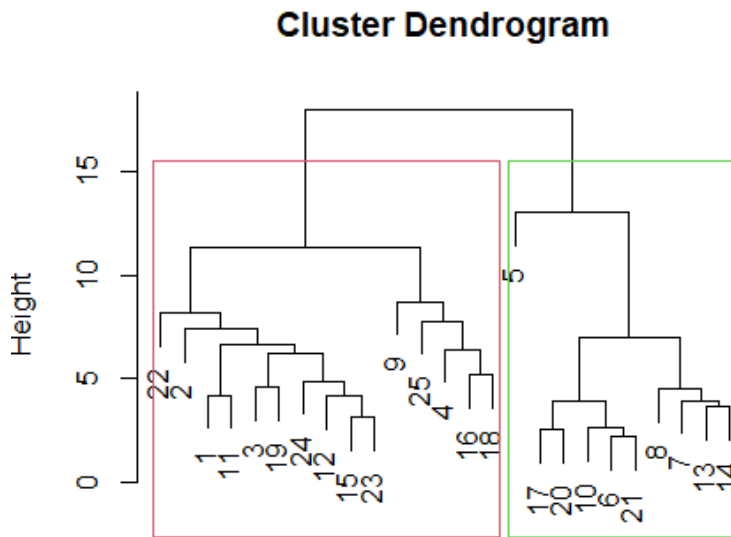
clust <- hclust(dist(scale_CountclustT_numeric, method = "euclidian"), method = "ward.D2").

3.7. The seventh stage.

At this stage, we built a dendrogram and described the results by country group, which will be the basis for further conclusions.

We visualize the results with the help of command line (Figure 4.):

plot(clust) та rect.hclust(clust, k = 2, border = 2:4)

Cluster Dendrogram

dist(scale_CountclustT_numeric, method = "euclidian")
hclust (*, "ward.D2")

Figure 4. Dendrogram of clusters using the Ward method.
Source: authors' calculations.

Using the Ward clustering method, we obtained two large clusters of countries - the first in the red box and the second in the green box in Figure 4. Cluster 1 contains countries

with lower reform results for 1989-2021. Cluster 2 contains countries with better reform results.

Based on the results of our study, we have drawn conclusions and recommendations.

The first group includes 15 countries with the corresponding serial number in Table 1: 1-Armenia; 2-Azerbaijan; 3-Belarus; 4-Bulgaria; 9-Georgia; 11-Kazakhstan; 12-Kyrgyzstan; 15-Moldova; 16-North Macedonia; 18-Romania; 19-Russian Federation; 22-Tajikistan; 23-Ukraine; 24-Uzbekistan; 25-Vietnam (Figure 4.).

The second group includes 10 countries with better reform results: 5-China; 6-Czechia; 7-Croatia; 8-Estonia; 10-Hungary; 13-Latvia; 14-Lithuania; 17-Poland; 20-Slovakia; 21-Slovenia (Figure 4.).

It is also possible to deepen the distribution further and divide these two large clusters into a number of smaller subgroups - as seen in the dendrogram.

In Fig. 4, cluster 1 clearly shows subgroup 1.1 - countries with contradictory reform results: - These are almost all former CIS countries (namely, from left to right in Fig. 4): 22-Tajikistan; 2-Azerbaijan; 1-Armenia; 11-Kazakhstan; 3-Belarus; 19-Russian Federation; 24-Uzbekistan; 12-Kyrgyzstan; 15-Moldova; 23-Ukraine (10 countries)). At the same time, similarities in the development of Ukraine and Moldova, Belarus and the Russian Federation, etc. can be clearly seen in Figure 4.

The second part of cluster 1, subgroup 1.2, contains mainly the countries of South-Eastern Europe (from right to left: in Fig. 4: 18-Romania; 16-North Macedonia; 4-Bulgaria) plus 9-Georgia; 25-Vietnam, which have achieved medium success in socio-economic transformation, but have comparatively lower results than the group of 2. leading countries in economic development.

The second group of leading countries includes the following subgroups 2.1. 5-China as one of the leaders of reforms, which has its own special way and at the same time the best results in the dynamics of transformational changes and at the same time significant specificity of the Chinese way of development. Cluster 2. is further clearly divided into 2 more groups of transition countries, namely 2.2. (17-Poland; 20-Slovakia; 10-Hungary; 6-Czechia; plus 21-Slovenia. And 2.3 - the Baltic States: 8-Estonia; 13-Latvia; 14-Lithuania; plus 7-Croatia, which have implemented some of the fastest and deepest reforms with high results in the shortest time and thus differ from the rest of the countries (Figure 4.).

Thus, the countries in Cluster 1, especially Subgroup 1.1, need to study in detail and implement the experience and reform measures of Cluster 2 countries with better transition results.

At the same time, the subjective and objective factors of reforms should be analyzed for each country individually and for groups of transition economies as a whole.

In particular, the subjective factors of reforms include the initial macroeconomic situation of various transition countries, which was generally difficult but varied significantly from country to country (Balcerowicz 2005). For example, Eastern European countries experienced a serious transformation recession, which in some countries reached up to 40% of GDP and more, according to various estimates (Stiglitz 1999). At the same time, China has not experienced a transformational decline since 1987 (and Vietnam, respectively, since 1981). European integration goals were an important element of the transformation strategies of the Eastern European countries. While many other transition countries did not have such goals.

Also, the strategies for transformational change differed significantly. While reforms in Poland, the Baltic States, Ukraine, and Russia were carried out on the basis of "shock therapy" ("Washington Consensus") in different time periods (Balcerowicz 1995), transformations in Hungary, the Czech Republic, Slovakia, and Slovenia were based on the strategy of "gradualism" (Kornai, 2008).

In turn, the countries of Southeast Asia followed their own special path, which is sometimes called the "Beijing Consensus" as opposed to the "Washington Consensus." The quality of the governments of the transition countries also varied significantly over the years. Future research should deepen the consideration of these individual features of reforms to further improve the results of socio-economic policy.

4. Discussion

The list of the main directions and indicators of post-socialist transformation is debatable and can be further refined. In addition, other methods of primary data processing and clustering can be used in cluster analysis. In general, the issue of methods, directions and indicators of post-socialist transformation remains open for further research.

It is debatable whether countries with lesser reform results can apply the entire experience of successful countries, as they have different socio-economic preconditions for this. On the other hand, these countries in Cluster 1 can fully utilize the experience of more successful countries (Cluster 2) in creating a favorable business climate, deregulating the economy, fighting corruption, etc. Such measures do not lead to significant expenditures from the state budget, but rather allow saving and better use of available resources in any country. These aspects can be the basis for further more effective strategies to achieve future economic growth in the countries of Cluster 1.

Further discussion could explore how these practices could be implemented practically in lower-performing countries. What are the barriers to adopting reforms, and how could these be overcome? Such questions could guide more actionable strategies in the context of socio-economic transformation. In addition, this analyze demonstrates that social entrepreneurship development can become a driving force of economic, social and ecological development. Public administration should take into account the importance of social challenges as it was mentioned above cultural and ideological perception play an important role in state transformation.

5. Conclusions

Having analyzed the results, we can come to the following conclusions:

1.   The issue of post-socialist transformation and modern socio-economic changes remains in the focus of attention of many researchers-economists.

2.   In our opinion, it is advisable to use the methodology of cluster analysis to assess the results of post-socialist transformation, since in these studies it is necessary to compare a large number of different indicators in different areas of socio-economic transformation.

3.	Based on the 27 indicators collected by us for the main directions and indicators of reforms, we conducted a cluster analysis of transition countries using the Ward method and searched for the optimal number of clusters using the elbow and profile methods.

4.	The leaders of socio-economic reforms in 1989-2021 are the group of countries belonging to cluster 2: (5-China; 6-Czechia; 7-Croatia; 8-Estonia; 10-Hungary; 13-Latvia; 14-Lithuania; 17-Poland; 20-Slovakia; 21-Slovenia (Figure 4.).

5.	In turn, cluster 2 can be divided into subgroups of countries - 2.1. China with some of the best results of economic reforms and significant social changes while preserving the specifics of the Chinese way of socio-economic development. 2.2 Central European countries (17-Poland; 20-Slovakia; 10-Hungary; 6-Czechia) and Slovenia. At the same time, they have high results of reforms, high level of population welfare and significant social transformations. 2.3. The Baltic States and Croatia, which have simultaneously carried out the most rapid and large-scale social and economic transformations and at the same time achieved a high population welfare.

6.	The first group includes the SEE countries and former CIS countries with average and contradictory results of reforms: serial number in Table 1: 1-Armenia; 2-Azerbaijan; 3-Belarus; 4-Bulgaria; 9-Georgia; 11-Kazakhstan; 12-Kyrgyzstan; 15-Moldova; 16-North Macedonia; 18-Romania; 19-Russian Federation; 22-Tajikistan; 23-Ukraine; 24-Uzbekistan; 25-Vietnam (Figure 4.). In particular, subgroup 1.2. includes the countries of Southeast Europe plus Vietnam and Georgia, which have made significant progress in economic development, democratic transformation and building an open economy. Subgroup 1.1. includes most of the former CIS countries with controversial reform results, which need to learn from the best practices of more successful countries in post-socialist transformation.

7.	We consider social entrepreneurship as a powerful instrument in socio-economic growth of countries as in innovative ways can solve a huge amount of social problems and add social value to the society. Thus, state regulation should stimulate this entrepreneurial activity for further development of the state

References

Aslund, A. (2012). How Capitalism Was Built: The Transformation of Central and Eastern Europe, Russia, the Caucasus, and Central Asia (2nd ed.). Cambridge: Cambridge University Press. doi: https://doi.org/10.1017/CBO9781139207850

Apulia G7 Leaders' Communiqué (2024) https://www.g7italy.it/wp-content/uploads/Apulia-G7-Leaders-Communique.pdf Accessed 20/10/2024

Balcerowicz, L. (1995). *Socialism, Capitalism, Transformation*. Central European University Press. https://doi.org/10.7829/j.ctv280b73c

Balcerowicz, L. (2005). Post-Communist Transition: Some Lessons. In: *SSRN Electronic Journal*. 10.2139/ssrn.676661.

Boguslavskyy O. (2006) Otsinka rezultativ perekhidnykh peretvoren postsotsialistychnykh krain za dopomohoiu klasternoho analizu. In: *Formuvannia rynkovykh vidnosyn v Ukraini: Zbirnyk naukovykh prats.* - Vypusk 7 (62). – K., 2006. - PP. 32–38. In Ukrainian

Bohle, D., & Greskovits, B. (2007). Capitalist Diversity in Eastern Europe. In: *Economic Sociology - the European Electronic Newsletter*, 8(2), (3-9)

https://www.econstor.eu/bitstream/10419/155882/1/vol08-no02-a2.pdf

Chavance, B. (2002) Why National Trajectories of Post – Socialist Transformation Differ? In: *Journal of Economics and Business.* Vol. V – 2002, No 1 (47 – 65) https://www.u-picardie.fr/eastwest/fichiers/art13.pdf

Drozda, L. (2024) Post-Socialist Neoliberalism and the Production of Space Totalitarian. In: *The Dubious Post-Socialist Legacy of Contemporary Eastern European Cities.* Vol 9 (2024). https://doi.org/10.17645/up.i320

GlobalEconomy.com (2024) Government effectiveness. Country rankings 2022: https://www.theglobaleconomy.com/rankings/wb_government_effectiveness/ Accessed 20/08/2024

Greskovits, B. (2002). The Postsocialist Transformation in Central and Eastern Europe. In: *Brazilian Journal of Political Economy.* 22. 10.1590/0101-31572002-1270.

Hachmeister, M., Hock, B., Jacobs T., & Wurzbacher O. (2023) Multiple transformations: an introduction. In: *Journal of Contemporary Central and Eastern Europe*, 31:1, 15-26, DOI: 10.1080/25739638.2023.2182502

Heritage Foundation (2024) 2024 Index of Economic Freedom; https://www.heritage.org/index/pages/report Accessed 16/08/2024

IMF (2022) Total government revenue in percent of GDP 2020. https://data.imf.org/?sk=77413f1d-1525-450a-a23a-47aeed40fe78 Accessed 18/08/2024

Kolodko, Grzegorz W. (2000a). From Shock to Therapy: The Political Economy of Postsocialist Transformation. New York: Oxford University Press. doi: https://doi.org/10.1093/acprof:oso/9780198297437.001.0001

Kolodko, Grzegorz W. (2000b). Post-Communist Transition: The Thorny Road. University of Rochester Press, Rochester, NY, USA, and Woodbridge, Suffolk, UK.

Kolodko Grzegorz W. (2018) Socialism or capitalism? Tertium Datur In: *Economy and forecasting*, 4. https://doi.org/10.15407/eip2018.01.007

Kornai, J. (2008). From Socialism to Capitalism: Eight Essays (NED-New edition, 1). Central European University Press. http://www.jstor.org/stable/10.7829/j.ctt2jbmwf

Pehe, V. & Sommer , V. (2022) Historicizing postsocialist privatization at the juncture of the cultural and the economic. In: *Journal of Contemporary Central and Eastern Europe*, 30:1, 1-9, DOI: 10.1080/25739638.2022.2044618

Stiglitz, Joseph E. (2015) Economics of the public sector / Joseph E. Stiglitz, Jay K. Rosengard.—Fourth edition. W. W. Norton & Company, INC. New York London. https://www.academia.edu/37552359/Economics_of_the_Public_Sector_Joseph_E_Stiglitz Accessed 11/11/2024

Stiglitz, J.E. (1999) Wither Reform? Ten Years of Transition. Keynote Address at Annual Bank Conference on Development Economics, World Bank, Washington DC, 28-30 April 1999.

Stark, D., & Bruszt, L. (2001). One Way or Multiple Paths: For a Comparative Sociology of East European Capitalism. In: *American Journal of Sociology*, 106(4), 1129–1137. https://doi.org/10.1086/320301

Soulsby, A. & Clark, E. (2007). Organization theory and the post-socialist transformation: Contributions to organizational knowledge. Human Relations - HUM RELAT. 60. 1419-1442. 10.1177/0018726707083470.

Transparency International (2021) Corruption perceptions index 2021 https://www.transparency.org/en/cpi/2021 Accessed 18/08/2024

UN (2022) Human Development Report 2021-22. United Nations Development Programme https://hdr.undp.org/system/files/documents/global-report-document/hdr2021-22reportenglish_0.pdf Accessed 14/08/2024

UN (2024) THE 17 GOALS. Department of Economic and Social Affairs https://sdgs.un.org/goals Accessed 08/11/2024

WIPO (2021) Global Innovation Index 2021 Tracking Innovation through the COVID-19 Crisis. World Intellectual Property Organization https://doi.org/10.34667/tind.44315

World Bank (2020). Dynamic general equilibrium model-based (DGE) estimates of informal output (% of official GDP) 2020. Prosperity Data360. https://prosperitydata360.worldbank.org/en/indicator/WB+INFECDB+DGE_p Accessed 18/08/2024

World Bank (2021a). GDP per capita, PPP (constant 2021 international $) World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/NY.GDP.PCAP.PP.KD Accessed 09/08/2024

World Bank (2021b). GDP per unit of energy use (constant 2021 PPP $ per kg of oil equivalent) - Fragile and conflict affected situations. World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/EG.GDP.PUSE.KO.PP.KD?locations=F1 Accessed 13/08/2024

World Bank (2021c). Agricultural raw materials exports (% of merchandise exports) 2021. World Development Indicators database. https://data.worldbank.org/indicator/TX.VAL.AGRI.ZS.UN Accessed 14/08/2024

World Bank (2021d). Manufactures exports (% of merchandise exports) 2021. World Development Indicators database. https://wdi.worldbank.org/table/4.8# Accessed 14/08/2024

World Bank (2021e). GDP - composition, by sector of origin, (agriculture, industry, services) %, 2021. World Development Indicators database. Accessed 16/08/2024

https://www.cia.gov/the-world-factbook/field/gdp-composition-by-sector-of-origin/ Accessed 18/08/2024

World Bank (2022a) High-technology exports (% of manufactured exports) 2021. World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/TX.VAL.TECH.MF.ZS Accessed 13/08/2024

World Bank (2022b) Research and development expenditure (% of GDP). World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/GB.XPD.RSDV.GD.ZS Accessed 14/08/2024

World Bank (2022c) Researchers full-time equivalent per million people 2022. World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://databank.worldbank.org/source/world-development-indicators/Series/SP.POP.SCIE.RD.P6 Accessed 14/08/2024

World Bank (2022d) Gini index 2021. World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/SI.POV.GINI Accessed 14/08/2024

World Bank (2022e) Ratio of the richest 10 to the poorest 10 (2021) World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://wdi.worldbank.org/table/1.3 Accessed 14/08/2024

World Bank (2023a) Unemployment, total (% of total labor force) (modeled ILO estimate). World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/SL.UEM.TOTL.ZS?end=2021&most_recent_year_desc=false&start=1991 Accessed 12/08/2024

World Bank (2023b) Foreign direct investment, net inflows (BoP, current US$) World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/BX.KLT.DINV.CD.WD?end=2021&locations=US&start=1970 Accessed 19/08/2024

World Bank (2023c). World Development Indicators: Structure of demand 2021. World Development Indicators database. https://wdi.worldbank.org/table/4.8# Accessed 14/08/2024

World Bank (2024a) GDP (current US$). World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/NY.GDP.MKTP.CD?locations=PL Accessed 08/08/2024

World Bank (2024b) Inflation, GDP deflator: linked series (annual %). World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/NY.GDP.DEFL.KD.ZG Accessed 12/08/2024

World Bank (2024c) Gross capital formation (annual % growth. World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://data.worldbank.org/indicator/NE.GDI.TOTL.KD.ZG Accessed 12/08/2024

World Bank (2024d).; 4.4. Population change, million people, 1990-2021. World Development Indicators database. World Bank. Eurostat-OECD PPP Programme. https://wdi.worldbank.org/table/2.1 Accessed 15/08/2024